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Doctoral Dissertations, 2011-2026 Public and International Affairs

2013

Perfecting War: The Organizational Sources of Doctrinal Change

Hunzeker, Michael Allen

Princeton, NJ : Princeton University

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PERFECTING WAR

THE ORGANIZATIONAL

SOURCES OF DOCTRINAL OPTIMIZATION

Michael Allen Hunzeker

A DISSERTATION

PRESENTED TO THE FACULTY

OF PRINCETON UNIVERSITY

IN CANDIDACY FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

RECOMMENDED FOR ACCEPTANCE

BY THE DEPARTMENT OF

THE WOODROW WILSON SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

ADVISER: AARON L. FRIEDBERG

NOVEMBER 2013

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Abstract

Warfare changes over time, which means no two wars are exactly alike. Armies strive to anticipate the next war, yet it is impossible to predict with perfection. Unexpected adversaries, undetected capabilities, and unforeseen goals mean gaps will exist between the war an army expects and the war it must fight.

Armies must therefore evolve in war. At least in part, victory depends on how well they realign pre-war assumptions to address wartime realities. In some cases the gaps will be small and the corresponding adjustments minor. In other cases the gaps will be large and the responses major, innovative, and unprecedented. In all cases, adjustment implies *optimization*. In other words, to increase its ability to win on the battlefield an army must assess, learn, change, and reassess in an iterative attempt to fight more effectively.

Herein lay an important puzzle: if optimization is a necessary part of warfare, then why are some armies better at it than others? The Qin in ancient China; Gustav Aldolphus' Swedes in early modern Europe; the French Army during the Napoleonic Wars; the Prussian (and later German) armies from Moltke the Elder to Ludendorff; the U.S. Marine Corps in the interwar Small Wars; and the U.S. Army in Iraq – these armies were remarkable for their ability to respond to that which was unforeseen, undetected, and unexpected. They were, to put it bluntly, better at perfecting war.

I argue that there is a systematic reason some armies are better at innovating, emulating, and adapting to war than others. The explanation has to do with how they are organized.

Specifically, I predict that armies with moderately decentralized command cultures, a doctrinal assessment mechanism, and a centralized training system will consistently generate new ideas; distinguish good ideas from bad ideas; and implement the best ideas across the organization more efficiently and more effectively than armies organized in any other way.

I present my argument in three steps. First, I build a theory capturing how and why an army's command culture, assessment mechanisms, and training structures affect optimization. Second, I test this theory's internal validity by comparing its expectations against a detailed study of the Western Front during World War I (1914 – 1918). Finally, I test this theory's external validity by comparing its expectations to the U.S. Army's experiences in Vietnam (1965 – 1972) and Iraq (2003 – 2011).

Acknowledgements

This dissertation caps a decade-long quest to understand why some armies are better at adapting to war than others. I first asked this question as a young Marine, patrolling Iraq's deserts. I continued to look for an answer as a much older graduate student wandering Princeton's streets. What follows is my best attempt to solve this puzzle.

I owe a tremendous debt to those who helped me throughout this journey. First, I want to thank my primary adviser, Professor Aaron Friedberg. His course on International Security inspired me to pursue a Ph.D. Without his support – and occasional prodding – my project would not have made it onto paper. I also want to thank my committee. Professor Ezra Suleiman helped me build an organizational theory worthy of explaining military change. Professor Stephen Rosen's theory of military innovation (which I read for the first time in Professor Friedberg's International Security course) framed my approach. His incisive feedback was invaluable in sharpening my argument. I owe a great deal to my reader, Professor Edward Erickson. Aside from his Herculean effort to review a 900+ page draft, my chapters on combined arms in the First World War benefited enormously from his expertise. I consider all four professors true mentors.

I also want to express my gratitude to the many scholars and professionals who provided invaluable assistance. Professor Tom Christensen's phenomenal course on international strategy led me to think about doctrinal change through the lens of the First World War. His positive feedback led me to turn a simple research paper into a dissertation project. Professor Stephen Biddle provided vital feedback at several important points in the writing

process. Professors Christina Davis, Joanne Gowa, and Keren Yarhi-Milo helped me develop the tools I needed to tackle my question. I am truly in debt to Professor Kristen Harkness. She encouraged me through the toughest phases of the project, helped me think through methodological issues, and taught me how to write a historical case study. I also want to thank Cindy Ernst and Ann Lengyel. Both guided me as I tried to navigate the Byzantine procedures dictating life in graduate school; both provided levity when I needed it most; and I consider both friends.

I gratefully acknowledge the organizations and institutions whose generous support made this project possible. A series of grants from the Bradley Foundation provided for my overseas archival work. Financial support from the Fellowship of Woodrow Wilson Scholars freed me to focus exclusively on this project in my final year of graduate school. I also want to thank the Woodrow Wilson School of Public and International Affairs. Aside from the not-insignificant fact that they kindly accepted me into their graduate program, I cannot imagine undertaking this journey without their seemingly inexhaustible support (and patience.) I especially want to thank Ann Corwin, Amy Craven, Melissa McGinnis, Karen McGuinness, and John Templeton.

Graduate school might have been unbearable were it not for the classmates with whom I shared the experience. I especially want to thank Alex Lanoszka, who toiled alongside me since the first hour of the first day of the program. From midnight coffee runs while frantically studying for general exams to midnight coffee runs while feverishly racing to finish our dissertations, his advice, friendship, and freakish knowledge of the political

science literature were immensely helpful. I also want to thank Barret Bradstreet, Mark Christopher, Liam Collins, Zack Cooper, Mark Crow, Rex Douglass, Walter Fick, Adam Liff, Christopher McPherson, Rohan Mukherjee and Tom Scherer. Whether giving me feedback on one of my 'breezy' 70-page drafts, or helping me organize the umpteenth student trip to Gettysburg, I could not have asked for a better group of intellectual companions.

Whether they know it or not (most do not), countless Marines played a role in this project. I would not have known what questions to ask, or how to go about answering them, had I not served alongside these incredible leaders and warriors. I owe a special thanks to two former battalion commanders – Colonel Robert Abbott and Colonel Brian Buckles. Both taught me about the link between intellectual curiosity and military effectiveness. I also want to thank Lieutenant Colonel John Binder as well as Majors Jason Filos, John Gwazdauskas, Seth Lynn, Jacob Robinson, Victor Ruble, Christopher Thomas, and Brian Strack. These officers gave me the courage to go to graduate school and were an important source of ideas and criticism throughout. Although I cannot thank every last Marine whose imprint is on this dissertation, here is my best attempt: Hector Arellano, Christophe Bach, Ryan Barton, Gregory Bishop, George Camia, Fideleon Damian, Jeremy Hart, Jeffrey Jarosz, Sandor Marton, Coy McHorse, Arch Ratliff III, Matthew Rauth, Daniel Reeves, Wes Souza III, Angel Torres, James Tunney, Steven Underwood, Adam Vandegrift, Thomas Vanderhorst, Raul Villegas, Craig Wiggers, Shawn Woodard, Darrin Wynn, and Guadalupe Zapata. Thank you, Marines. Lieutenant Alex Wetherbee, Master Gunnery Sergeant John Singleton, Sergeant Dustin Curtiss, Corporal Jesus Medellin, Lance Corporal Ronald White, and Private

First Class Brian Cutter – this project is a humble attempt to honor your service and memory.

At the end of the day, none of this would have been possible were it not for my family. Dad, thank you for pushing me to think harder and for teaching me how to take risks. I have spent a lifetime trying to emulate your courage. Mom, thank you for encouraging me to pursue my dreams. As a new parent I can now imagine what you must have been thinking the day I announced I wanted to go to Berkeley… and join the Marines. As absurd as that must have sounded, you supported me with all your heart. Adam, your loyalty and support kept me going (and yes, I still have the t-shirt emblazoned with 'not that kind of doctor'). Mom and Dad Yeh, thank you for your generosity and support over the past seven(ish) years. It was brave of you to let me marry your daughter a month before starting graduate school. And thank you for taking care of Lauren Faith those last few months so I could concentrate on finishing this project. Yu-Ching – you are the reason I dared to take this journey in the first place. I can never hope to repay you for those long months we spent apart as I deployed around the globe. Because it represents our shared sacrifice, I can only hope this project makes you proud. Lauren Faith – you are (thankfully) far too young to remember any of this. Just know that while everyone else helped me start and navigate this journey, you are the one who inspired me to end it.

To my father, for teaching me how to think

To my Marines, for inspiring a question worth thinking about

To my wife and daughter, for getting me to stop thinking and start writing

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Abbreviations and Acronyms

A2AD	Anti-Access Area Denial
ARCOV	Evaluation of Army Combat Operations in Vietnam
ARVN	Army of the People's Republic of Vietnam (South Vietnam)
BEF	British Expeditionary Force
C2	Command and Control
CALL	Center for Army Lessons Learned
CAT	Command, Assessment and Training theory
CDC	Combat Developments Command
C-in-C	Commander-in-Chief
CGSC	U.S. Army Command and General Staff College
CJTF-7	Combined Joint Task Force 7
COIN	Counterinsurgency
CONARC	Continental Army Command
CORDS	Civil Operations and Revolutionary Development Support
CSI	Combat Studies Institute
DOD	Department of Defense
ExRfdI	Exerzier-Reglement fur die Infanterie
FM	Field Manual
FSR	Field Service Regulations / Felddienst Ordnung
GHQ	General Headquarters
GQG	Grand Quartier General
HES	Hamlet Evaluation System

H&I	Harassment and Interdiction fire
IGMTE	Inspector General of Military Training and Education
IO	Information Operations
MAAG	Military Assistance Advisory Group
MACV	Military Assistance Command, Vietnam
MARCOV	Evaluation of Army Mechanized and Armor Combat Operations in Vietnam
NLF	National Liberation Front (Viet Cong)
ODUSA(OR)	Office of the Deputy Under Secretary of the Army for Operations Research
OHL	Oberste Heeresleitung,
OIF	Operation Iraqi Freedom
OIL	Observations, insights, and lessons
ORLL	Operations Report – Lessons Learned
ORSA	Operations Research and Systems Analysis
PAVN	People's Army of Vietnam (North Vietnamese Army)
PF	Popular Forces
RF	Regional Forces
SAMS	School of Advanced Military Studies
SS	Stationary Service
TECOM	Training and Education Command
TRADOC	Training and Doctrine Command
USARV	U.S. Army, Vietnam

Part I

The Optimization Puzzle

Chapter 1

Organizing for Change

"But let us not for a moment forget that, while study and preparation are necessary, war itself is the real school where the art of war is learned."[1]

I. The puzzle

Warfare changes over time, and so no two wars are exactly alike.[2] Armies strive to anticipate and prepare for the next war, but it is impossible to predict with perfection.[3] Unexpected adversaries, undetected capabilities, and unforeseen goals mean that gaps will invariably exist between the war an army expects to fight and the war it must fight.

Therefore, once the fighting starts armies must evolve by adjusting pre-war assumptions to meet wartime realities. To evolve means engaging in an iterative process of assessment, learning, change, and reassessment. Innovation, adaptation, and emulation are all mechanisms through which adjustment occurs. In other words, to maximize their chances at victory, armies need to *optimize*.

---

[1] General John J. Pershing, in an address to the American 1st Division in April 1918, as quoted in Dennis J. Vetock, *Lessons Learned: A History of US Army Lesson Learning* (Carlisle, PA: US Army Military History Institute, 1988), 37.

[2] War would still be a rock-throwing contest if it did not. These changes are both endogenous and exogenous to warfare. Endogenous change occurs because each side possesses an independent will and seeks to gain an advantage over its adversary). Exogenous change occurs because new technologies (often developed for non-military purposes, such as the railroad, the airplane, or the microchip) and new political entities (i.e. the rise of the nation-state in the 17th century; and the rise of non-state and supra-state actors in the 20th and 21st centuries) change both the nature of the actors engaged, and the purposes for which they fight. These factors mean warfare is in a constant state of flux. The rate at which these changes occur is a major source of debate. For a discussion, see Bernard Brodie and Fawn Brodie, *From Crossbow to H-Bomb* (Bloomington, IN: Indiana University Press, 1973); Carl von Clausewitz, *On War* (Princeton, NJ: Princeton University Press, 1976); Andrew Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest* (1994): 30; Martin Van Creveld, *Technology and War: From 2000 B.C. to the Present* (New York, NY: Free Press, 1991); Michael Vickers, "The Structure of Military Revolutions" (Ph.D. Dissertation, Johns Hopkins University, 2010).

[3] Harold R. Winton, *To Change an Army: General Sir John Burnett-Stuart and British Armored Doctrine, 1927-1938*, Modern War Studies (Lawrence, KS: University Press of Kansas, 1988), 7; Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York, NY: Cambridge University Press, 2011), 4.

Herein lies an important puzzle: if optimization is such an important part of warfare, why are some armies better at it than others? The Qin in ancient China; Gustav Aldolphus' Swedes in early modern Europe; the French Army during the Napoleonic Wars; the Prussian (and later German) armies from Moltke the Elder to Ludendorff; the U.S. Marine Corps in the so-called Small Wars; and the U.S. Army in Iraq. These armies were notable for their ability to respond to the unforeseen, undetected, and unexpected.[4] They were, simply put, better at perfecting war.

Is there a systematic way to explain why some armies are better at optimizing in war than others? Do armies only change when they are on the brink of defeat? Does change usually come from outside the organization? Or can it originate from within?

In this dissertation, I argue that we can systematically explain doctrinal optimization in war, and that such an explanation revolves around three organizational variables: the degree to which an army delegates command on the battlefield; the degree to which it controls training in the classroom; and whether or not it possesses an independent doctrinal assessment mechanism. These organizational characteristics affect an army's ability to generate new ideas, distinguish good ideas from bad ones, and implement the best of them across the entire organization – even in the middle of a war.

[4] Even if they proved no better at anticipating it in the first place.

I present my argument in three steps. First, I build a theory that captures how and why an army's command culture, assessment mechanisms, and training structures affect optimization. Second, I test this theory's internal validity by comparing its expectations to a detailed study of the Western Front during the First World War. Third, I test this theory's external validity by comparing its expectations to the U.S. Army's experiences in Vietnam and Iraq.

The motivation: Why is wartime optimization an important puzzle?

It is important to know whether an army can rapidly realign its prewar doctrines to address wartime realities. Historically, wars are an important determinant of state security. States whose armies are better at optimizing will achieve greater security at a lower cost, all things equal. Moreover, states with a proven track record of responding quickly to shifts in warfare can make more credible threats.[5] Some scholars even suggest that 'first movers' and 'early adapters' lock in long-term competitive advantages.[6]

21st century security threats, many of which transcend traditional boundaries of peace and war, suggest optimization will continue to matter. Energy security, global warming, terrorism, pandemics, humanitarian crises, and state failure may present a greater threat to international stability than conventional war. Governments often call on their armed forces

[5] The logic here is as follows: if a state threatens to use military force if a certain action is (or is not) undertaken the target of that threat has to determine whether that threat is credible. All things equal, if the state making the threat has a military with a long history of failing to adapt in war during periods of change; and if the target state assumes there is some probability that the nature of warfare is currently changing, then it (the target) will take that into account and may be more willing to risk ignoring the threat. If, however, the state issuing the threat has a military with an excellent track record of adapting to wars even during periods of change, then there is a lower probability that the target state will ignore the threat – even if it does suspect that the nature of warfare is currently changing.

[6] See chapter 2's discussion of the revolution in military affairs literature. Again, this dissertation concludes that first movers often pay a high price for their initiative.

to respond to these challenges because – right or wrong – other agencies lack the required capacity.

Finally, wartime optimization has a powerful moral imperative. It matters whether a military can adapt to the wars it is asked to fight. War represents a willingness to sacrifice lives and resources in exchange for political objectives that would otherwise be impossible to achieve. Leaders, citizens, and soldiers alike recognize that risk is part of war, and that warfare involves the unknown and the unknowable. While citizens understand that war is unpredictable, they are less forgiving of a failure to adapt to the present. After all, their sons and daughters are the ones who pay the price when an army fails to change.

For all of these reasons we need to understand why some armies are better at optimizing in war than others.

II. The research question and key definitions

The research question

I seek to explain the relative speed and efficiency with which armies optimize doctrinally.

Terms like 'doctrine,' 'inadequate,' 'relative speed,' 'adapt,' 'emulate,' and 'innovate' should rightfully spark skepticism. After all, does better mean faster, more efficient, more effective,

or all three?[7] What counts as doctrine in the first place? And perhaps most importantly, what distinguishes an optimal doctrine from a suboptimal one?[8] Is it not possible for two intelligent, well-informed people to reach different conclusions despite looking at the same facts? These are important questions. I discuss my definitions for doctrine and optimization below and address the remaining issues in chapter 3.

The dependent variable

Doctrine

I define doctrine as a formal expression of how an army intends to fight.[9] Doctrines serve as the "conceptual core around which decisions must be made concerning how the force should be organized, trained, and equipped."[10] They provide "guidance for the force to use in its war preparation without being so specific that it binds too tightly the hands of the future commanders who will have to use it."[11]

Doctrines fill four main roles, many of which are associated with the rise of mass-industrial armies in the 19th century. First, they fill a predictive function. Writing and vetting a doctrine helps armies think systematically about the future, a challenge that became much harder with the mass-industrial army's advent. Before the 19th century, weapons and

[7] For an in-depth discussion of why it is so hard to define ostensibly simple concepts like efficacy and efficiency in a policy context, and why gains in one often represent sacrifices in another, see Deborah A Stone, *Policy Paradox: The Art of Political Decision Making* (New York: Norton, 2002), 35–130.
[8] I address this issue at length at the beginning of chapter 3.
[9] Modern armies often have multiple doctrines at once. For example, an army may have one doctrine for conventional war and another for unconventional threats. Most armies also have separate doctrinal manuals for the strategic, operational, and tactical levels of war.
[10] Harold R. Winton, "On Military Change," in *The Challenge of Change: Military Institutions and New Realities, 1918-1941*, ed. David R. Mets and Harold R. Winton, Studies in War, Society, and the Military (Lincoln, NE: University of Nebraska Press, 2000), xii.
[11] Ibid.

tactics changed at a relatively slow pace – Napoleonic warfare had more in common with combat in 1700 than it did with combat in 1900. As the rate of change grew faster, so too did the challenge of identifying what future conflicts might look like.

Second, doctrines fill an educational role.[12] Before the mass industrialized army, only top-level officers needed to know how to make decisions. Soldiers fought standing shoulder-to-shoulder and only needed to know how to react to orders. With the rise of the massive conscript-fed armies, a single general could no longer control the entire battlefield. Compounding this effect, industrialization produced weapons that could generate massive amounts of firepower, forcing already bloated armies to spread out across the battlefield to survive. Ultimately, armies had little choice but to delegate at least some control. Doctrines helped identify and communicate the skills needed to fight in the absence of direction from above. Similarly, doctrines serve as institutional memory. Most military organizations face constant personnel turnover. Doctrines capture experience and knowledge that might otherwise be lost.

Third, doctrines fill a coordinating function. They are, in essence, a type of standard playbook. In war, disparate units and arms (i.e. infantry, artillery, armor, air and support) must synchronize action to win. Doctrines help units coordinate operations even when they cannot see or communicate with one another, since each can anticipate what the other is most likely to do. In peace, geographic and budget constraints may keep units from

[12] R. A Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," *Leavenworth Papers* (1979): 1.

training together. Doctrines allow them to rehearse according to a common playbook despite being on their own.

Finally, doctrines help leaders deal with the fog and friction of war. As the saying goes, no plan survives first contact. Thus, detailed orders and standard operating procedures are often insufficient (and, in the face of an independent adversary, even counterproductive). Individual units must therefore improvise and adjust to deal with unanticipated contingencies. Doctrines help commanders think through these kinds of challenges.

This fact also explains why doctrines are often written in vague language. As the historian M.A. Ramsay frames the issue: "It cannot be emphasized too much that military planners and writers can deal only in probability and estimates, that the outcomes of combat remain uncertain and consequences unknown."[13] Instead of determining specific strategies, tactics, or objectives, they help leaders at every level decide which among the nearly infinite possible courses of action are most important or attainable.[14] In this way, doctrines guide decision-making without limiting a commander's ability to respond to unforeseen contingencies and local conditions.

[13] M. A. Ramsay, *Command and Cohesion: The Citizen Soldier and Minor Tactics in the British Army*, *1870-1918* (Praeger Publishers, 2002), 10.
[14] Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," 1.

Optimization

I define optimization as the "act, process, or methodology of making [doctrine] as fully perfect, functional, or effective as possible."[15] In other words, optimization is the iterative process by which a military determines the best way to fight given its goals, adversaries, resources and limitations.[16]

Thinking about military change in this way represents a unique approach vis-à-vis existing scholarship. Typically, the literature distinguishes between three types of military change: adaptation, defined as incremental modifications to an army's existing routines, practices and procedures; innovation, defined as a major – and often novel – shifts in the same; and emulation, defined as the copying another organization's routines, practices, and procedures. Following from these definitions and distinctions, scholars develop a unique theory to explain each.

One of the most prolific writers on military change, Williamson Murray, thinks of adaptation as a truncated type of innovation. He suggests that innovation only happens when militaries have the time to methodically explore, refine, and implement new ideas. Adaptation, on the other hand, is ad hoc. It occurs when militaries are forced to change

[15] I borrow this definition directly from the Merriam-Webster dictionary. See http://www.merriam-webster.com/dictionary/optimization. Accessed as of January 14, 2013.

[16] It is also important to point out that this dissertation does not define optimization narrowly as a mathematical process or pure problem solving. To be sure, wartime optimization often includes rigorous operations research and systems analysis (ORSA). However, this is not an ORSA dissertation and the real topic of interest is the end product – a doctrine appropriate to the task at hand and soldiers that fight according with its provisions.

under incredible time and resource constraints. These definitions lead him to argue that armies innovate in peace, but adapt in war.[17]

Two other leading scholars of military change, Theo Farrell and Terry Terriff similarly draw a line between adaptation and innovation.[18] They define adaptation as the process of "adjusting existing military means and methods," and innovation as the act of adopting entirely new ones.[19] In an article on the British in Afghanistan from 2006 to 2009, Theo Farrell goes even further.[20] He contends that innovations involve major changes that unfold over long periods of time. By their nature, innovations tend to be top-down, and often require intervention from top ranking leaders. In contrast, adaptation involves bottom-up, minor adjustments that front line units undertake in response to war's ever-changing nature.

Scholars similarly treat emulation as a distinct phenomenon. Although adaptation and innovation involve finding a unique solution, emulation involves copying, importing, or otherwise 'borrowing' practices developed elsewhere. For this reason, scholars usually

[17] See Williamson Murray and Allan R. Millett, *Military Innovation in the Interwar Period* (Cambridge University Press, 1998) for a series of case studies on peacetime innovation. And see Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York, NY: Cambridge University Press, 2011) for his more recent edited volume on organizational change in wartime. This view is not entirely dissimilar to Stephen Rosen's. Although Rosen does not rule out the possibility that innovation can occur during wartime by definition, he does conclude that innovation's requirements make it exceedingly difficult to achieve during a war. See Rosen, *Winning the Next War*, 107-108.

[18] Theo Farrell and Terry Terriff, "The Sources of Military Change," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, 2002), 6.

[19] The precise conceptual boundaries are left blurry.

[20] Theo Farrell, "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006–2009," *Journal of Strategic Studies* 33, no. 4 (2010): 567–594.

study emulation to understand diffusion, or how innovations and adaptations spread through the international system.[21]

I take a different approach, arguing that innovation, adaptation, and emulation overlap to such a degree that it is practically impossible, and analytically arbitrary, to distinguish among them.[22] While all three possess distinct traits, in practice they have even more in common. As the case studies in Parts II and III of this dissertation empirically demonstrate, there is no such thing as a 'pure' form of change. If one looks closely enough, every innovation contains countless smaller adaptations and emulations. The opposite is also true. Emulations involve elements of innovation and adaptation. No practice, doctrine, or technology can be imported wholesale if the goal is to use it effectively. Differences in culture, organizational structure, maintenance capability (in the case of technological emulation), geography, and a myriad of other factors mean emulators must modify imported doctrines to make them 'fit'.[23] These modifications are adaptations – and even innovations in their own right.

An example illustrates this point. Developed in the late 1970s, the American Army's AirLand Battle doctrine is often touted as an example of an innovative doctrine based on revolutions in precision technologies. But in advocating maneuver and deep strikes against enemy centers of gravity, the doctrine echoes (in other words, copies) maneuver doctrines

[21] See Ibid.; Horowitz, *The Diffusion of Military Power*; and João Resende-Santos, *Neorealism, States, and the Modern Mass Army* (New York, NY: Cambridge University Press, 2007).
[22] This echoes a similar shift in the business and management literature on organizational change. See Fariborz Damanpour, "An Integration of Research Findings of Effects of Firm Size and Market Competition on Product and Process Innovations," *British Journal of Management* 21, no. 4 (December 1, 2010): 996–1010.
[23] Barret Bradstreet, "Army and the Body Politic: Donors, Recipients, Rejection and Matching in Indian Military Practice" (Ph.D., Princeton University, Forthcoming).

stretching back to *at least* the First World War. As revolutionary as the technologies upon which this doctrine was based were, they were heavily built around technologies already developed in the private sector. Even the core idea to use computers and microprocessors to facilitate deep strike was taken directly from the Soviets.[24] Finally, the doctrine did not inspire the creation of new combat arms. Rather, the practices (of maneuver) and technologies (of rapid communications and precision guidance) were largely grafted onto existing combat formations. It is absurd to argue that AirLand Battle was not innovative. But it is just as absurd to argue that it was not adaptive, or emulative. In the final analysis, AirLand Battle was all three.

Ultimately, how one labels organizational change is largely a function of where one chooses to look. The truth is that most important changes involve elements of all three. To ignore or privilege innovation, adaptation or emulation over the other two is to omit a critical part of the causal story.

Taken together, the foregoing discussion means this dissertation is agnostic about whether a change is innovative, adaptive, or emulative. It argues that the same organizational characteristics impede and empower all three. The important question is whether or not an army has adjusted its prewar doctrines to match wartime realities. In some cases, adaptation suffices. In others, major innovations are needed. In all cases, it is ridiculous to think that emulation is a 'lesser' form of change.

[24] For an in-depth look at the story behind the ideas under-girding AirLand Battle doctrine, see Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel* (Stanford, CA: Stanford University Press, 2010).

In fact, one of the major findings in the case studies on the First World War is that emulators tend to fare better than first movers. They recoup the costs of being 'late to the game' by avoiding the inevitable costs of trial and error.[25] Moreover, if we can draw any generalizations from the case studies, it is that the more innovative a change is, the more likely the innovator is to overreach. Determining a novel way to fight on the battlefield seems to blind political and military leaders to whatever it was they were fighting for in the first place.

In the process of exploring wartime doctrinal optimization, I try to shed light on three related questions. First, does the historical record suggest that first movers and quick adapters (in wartime) enjoy a long-term advantage over their competitors? If so, does such flexibility come at the price of drawbacks and trade-offs? Second, as a policy matter, what can states do to make their armies better at optimizing? And third, is it possible for armies to do a better job of predicting in the first place, thereby reducing the need to optimize doctrine once the fighting has started?

III. A brief overview of the theory

I put forward a theory, called Command, Assessment and Training (CAT) theory, to explain why some armies are better than others at wartime optimization. As mentioned, this theory uses three organizational categories: command cultures, assessment mechanisms, and training structures.

[25] The most costly of which seems to be employing the 'wrong' strategy to take advantage of the 'right' doctrine.

CAT theory predicts that armies that give their soldiers *moderate* discretion on the battlefield; retain tight control over what they are taught in the classroom; and possess an independent doctrinal assessment mechanism to help leaders wade through the mountains of incoming information; will optimize faster and more efficiently than armies organized in any other way. CAT theory pushes back on the idea that armies must be highly centralized to operate effectively (at least vis-à-vis doctrinal optimization). It also questions the degree to which theories of change borrowed from the private sector, which emphasize decentralization, help us understand military organizations engaged in war. Finally, CAT theory challenges the assumption that organizations are either centralized or decentralized. Indeed, it suggests that armies can simultaneously be both. The real question is what an army chooses to centralize, and what it chooses to decentralize.

CAT theory starts by observing that modern armies are extraordinarily large and complex organizations. They lack equivalents in the private and public sectors in size and in activity scope. [26] Complexity means that armies defy traditional categorizations. Terms like hierarchical or flat, and centralized or decentralized, are too crude. Modern armies encompass such a bewildering array of activities that they can simultaneously retain tight control over some activities while delegating significant latitude in others. This observation is especially true of an army's two most important activities: training and fighting.

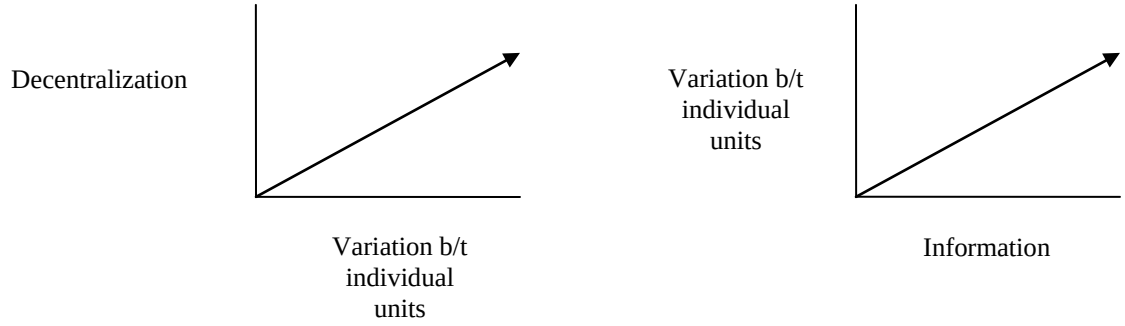
[26] Walmart stands as a rare exception to this statement. With approximately 2 million employees (full and part time) it is roughly two times larger than the U.S. Army, which has approximately 1.2 million uniformed servicemen and women (active and reserve). Nevertheless, the U.S. Army's scope of activities far outpaces those of Walmart's. Still, during the Vietnam War, the U.S. Army had roughly 5 million soldiers under arms. During the Second World War, it had nearly 9 million soldiers fighting from Okinawa to Europe.

Command culture[27]

CAT theory predicts that a strong relationship exists between how an army fights and how it generates new ideas.[28] The more an army delegates (i.e. decentralizes) decision-making authority, the more likely it is that subordinates will experiment. And the more subordinates experiment, the more new ideas the army generates.

The degree to which an army centralizes or decentralizes decision-making has both short and long run effects. In the short term, it increases the number of units willing to experiment with new approaches. As decentralization increases, so too does the variation in how units fight. This variation in turn generates new information and new alternative ways of fighting.

Relationship between command culture and information generation
Figure 1.1



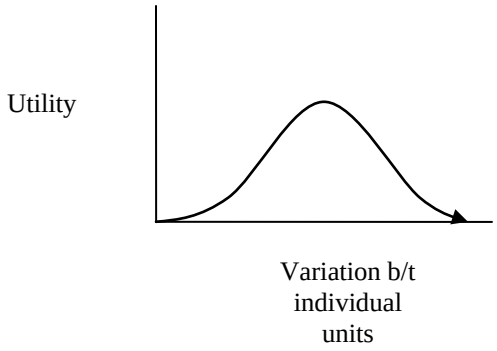
Decentralization's benefits only go so far. In theory, an army that unleashes its commanders to fight however they want and without limits will generate the most information. Yet this information will be of little use, both because there will be too much of

[27] I borrow this term from Jorg Muth, although I use it in a slightly different way. See Jorg Muth, *Command Culture: Officer Education in the U.S. Army and the German Armed Forces, 1901-1940, and the Consequences for World War II*, 1st ed (Denton, TX: University of North Texas Press, 2011), 7–8.
[28] I am indebted to Stephen Biddle for the following discussion on decentralization.

it (armies are typically made up of hundreds and even thousands of individual units), and because most experiments will fail. At best, too much information overwhelms a system's capacity to process it in meaningful ways. At worst, the army will be defeated in battle long before it optimizes.

Thus, there is a theoretical inflection point at which the costs of decentralization (in terms of battlefield efficacy) start to outweigh its benefits (in terms of generating information). Moderate levels of decentralization maximize this utility/variation trade-off.

Trade-off between decentralization and utility
Figure 1.2



In the long run moderate decentralization fosters a culture where leaders are willing to take risks and listen to ideas from below. This is because today's senior commanders were given the same leeway as junior officers. The opposite is true in armies that are either extremely centralized or decentralized. In armies with a longstanding tradition of giving subordinates no latitude, junior leaders are less likely to experiment and senior leaders are less tolerant of risk and new ideas from below. In armies that give subordinates extremely high levels of authority, leaders at each rung are unlikely to listen to one another.

Training Structures

Even the best new doctrinal practice is only as good as its implementation. We cannot gloss over the challenges and obstacles to implementation for at least two reasons. First, change elicits opposition. Armies are dynamic social organisms made up of sub-groups, cliques, and parochial interests.[29] Doctrinal shifts change the balance of power within the army, creating new winners and losers. As a result, advocates for change always face resistance, if only because someone stands to lose something in the process. The more an army centralizes control over its entry level and unit training, the more power senior officers have to undermine and overcome resistance.

Second, because armies are large and complex, even the seemingly straightforward act of transmitting new practices across the entire organization becomes a challenge. Wartime conditions make the task even harder. Centralization abets standardization, ensuring that as many people as possible are taught the new idea the right way. This capability is especially important for those just joining the organization. Unlike most other organizations, armies bring in large numbers of new personnel every year. Control over entry-level training ensures that within a few years the youngest members – who make up the largest percentage of the organization – will know nothing other than the new approach.

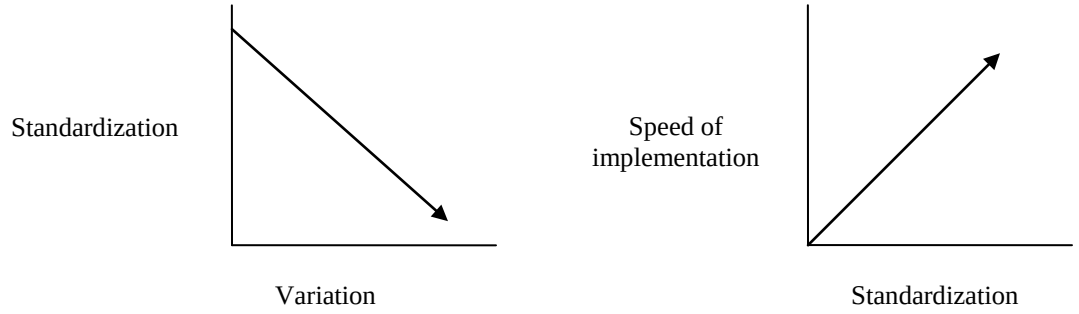
Standardization also helps overcome resistance from those already in the organization. While many front line troops have no vested interest in which doctrine they use, they may

[29] Stephen P Rosen, *Winning the Next War* (Ithaca, NY: Cornell University Press, 1994), 20.

be rightfully suspicious of new ideas should they fail on the battlefield. When existing troops have been unevenly trained in new practices, they may fail not because the new practices were unsound, but because they were improperly trained in their application. In this way, standardization and resistance are themselves inversely related.

The preceding discussion suggests that more centralization is almost always better for training. Unlike command culture, where decentralization is beneficial in moderation, training only improves with centralization. Technology, cost, combat demands and geography obviously place practical limits on the degree to which an army can centralize training. In theory, if an army were ever able to achieve perfect centralization (e.g. pull every soldier off of the line and train them all in one classroom), then perhaps we might see a point where the returns to centralization start to diminish. Nevertheless, for practical purposes, CAT theory treats the relationship as linear.

Relationship between training structure and implementation
Figure 1.3



Doctrinal assessment mechanism

Even if we understand the organizational attributes that abet experimentation and implementation, two important questions remain: what determines whether senior leaders

see a need for change in the first place; and how do leaders decide on which idea to implement in the second?

As mentioned in the discussion on command culture, CAT theory predicts that armies with moderately decentralized command cultures foster leaders who are more receptive to ideas and input from below. Since there are strong reasons to believe that junior leaders in the front line will be the first to identify performance gaps (i.e. the gap between pre-war doctrines and wartime requirements),[30] we can expect leaders in armies with moderately decentralized command cultures to be more likely to support the call for change.

Still, in any large organization, someone is always calling for change. Armies are no different. In an army with thousands of junior front line leaders, what determines which will be heard and which will be ignored? CAT theory argues that it comes down to whether an army has a doctrinal assessment mechanism. Wars generate mountains of information, much of it chaotic and contradictory.[31] Armies with a formal, independent unit that analyzes front line reports, tests new ideas, and disseminates best practices up and down the command structure are more likely to have leaders that detect the need for change, and select an appropriate doctrine to meet the army's wartime needs. These assessment processes work best when they are separated from an army's intelligence activities. This is because traditional intelligence focuses on operations whereas doctrinal change encompasses a far wider range of activities and considerations including evaluation,

[30] J.A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam: Learning to Eat Soup with a Knife* (Praeger Publishers, 2002).
[31] Clausewitz, *On War*, bk. 1; S. S Gartner, *Strategic Assessment in War* (New Haven, CT: Yale University Press, 1999), 26.

acquisition, and training. Having an assessment mechanism increases the chance that the right information (about performance gaps and alternative ways to fight) will get into the right hands (the senior leadership's) so that an overarching decision about doctrine can be made and implemented. In short, a true assessment mechanism continuously asks whether the army is meeting its mission, and whether the army is even asking the right questions about what its mission means in the first place.

Putting it all together

In sum, CAT theory thinks of an army as a gigantic, dynamic, and evolving search engine. During periods of peace, armies develop doctrines to prepare for the next war. Once the fighting starts, armies must detect where their pre-war doctrines fail to meet wartime needs. They then develop a range of alternatives, select one, implement it, and re-evaluate. This cycle repeats *ad infinitum* (since an army can never be sure it possesses the optimal doctrine) or the war ends.

This statement is probabilistic. Just as a football team can lose on 'any given Sunday,' it is possible that an army exhibiting all of these characteristics will still fail to adopt an optimal doctrine. Moderate levels of decentralized authority might fail to generate the 'right' idea, and a highly centralized training structure might nevertheless implement it. And even the most rigorous filtration process might still "ignore relevant facts, focus on transmitting the

wrong information, and fall prey to confirmation bias" by ignoring information that fails to conform to pre-existing expectations.[32]

CAT theory's core predictions
Table 1.1

Variables	Predicted effect				
	Centralized	Moderate	Decentralized	Assessment mechanism	No mechanism
Command culture	Control comes at the price of too little experimentation/information generated	**Balance between experimentation/information generation and need for control**	Lack of control generates too much experimentation/information for analysis; high risk of battlefield defeat	N/A	N/A
Training structure	**Control ensures uniformity and standardization while helping leaders overcome resistance (both principled and interest group)**	Uniformity and standardization less than they would otherwise be; space left for dissent, shirking, and resistance (both principled and interest group)	Lack of control means standardization and uniformity will be low; significant space for dissent, shirking and resistance (both principled and interest group)	N/A	N/A
Doctrinal assessment mechanism	N/A	N/A	N/A	**Easier for senior leaders to detect need for change and to select an appropriate alternative**	Harder for senior leaders to detect need for change and to select an appropriate alternative

CAT theory brings the organization back to the forefront of analysis. Organizational factors have largely fallen out of vogue in international relations and international security.[33] Although most people agree that there are better and worse ways to organize (at your next

[32] Kristen Harkness and Michael Hunzeker, "Learning and Tactical Decision-Making During a Counterinsurgency Campaign: The British in the Southern Cameroons," in *Archival Research on National Security Decision Making* (presented at the 2013 International Studies Association, San Francisco, 2013), 10.

[33] A quick glance at recent dissertations in the field suggests that this tendency may be reversing. See Joseph Roger Clark, "Innovation Under Fire: Politics, Learning, and US Army Doctrine" (Ph.D., Political Science, The George Washington University, 2011).; Matthew Alan Tattar, "Innovation and Adaptation in War" (Ph.D., Politics, Brandeis University, 2011).; and Benjamin M Jensen, "Military Innovation in the U.S. Army: Anarchy, Bureaucracy, and the Forging of Doctrine, 1975--1995" (Ph.D., The American University, 2010). Michael Horowitz's work on how innovations diffuse through the international system also has a strong organizational component. Michael C Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton, NJ: Princeton University Press, 2010).

staff meeting, try recommending that your workplace needs to stove pipe), scholars tend to overlook systematic differences in how security institutions organize themselves. Existing theories tend to model bureaucracies in general, and armies in particular, as self-serving, risk averse, and procedure-bound. These are all taken as factors that inhibit their ability to respond to new challenges.[34]

Yet we know that reality is more complex. Armies structure themselves in different ways. And while some armies pathologically resist change, others have a rich history of innovating, adapting, and emulating.

III. Methodology and case selection

There is an immediate problem in selecting cases to test CAT theory. Wartime outcomes are inconceivably complex, so much so that the outcomes we care most about are often over-determined. This characteristic is especially true at the tactical level of war. War and combat involve so many factors that it becomes difficult to figure out what caused what or to isolate the most important factors.[35] Military effectiveness has many fathers.[36]

One example (discussed at length in chapter 7) is the French Army's Chemin des Dames offensive in the spring of 1917. This story begins when the French army's newly appointed Commander in Chief, Robert Nivelle, convinced his government that he had 'the formula' to

[34] Graham T Allison, *Essence of Decision: Explaining the Cuban Missile Crisis*, 2nd ed (New York, NY: Longman, 1999).; Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984).
[35] Gartner, *Strategic Assessment in War*, 8.
[36] For a brief review of the literature on military effectiveness, see Risa A. Brooks, "Making Military Might: Why Do States Fail and Succeed?: A Review Essay," *International Security* 28, no. 2 (2003): 149–191.

rupture German lines. Granted approval based mainly on his best-case predictions, Nivelle organized and launched a series of massive attacks based on this doctrine in April 1917.[37] It was a catastrophe. The attacks dragged on for nearly a month. The much promised rupture failed to materialize as French units bogged down against the German Army's new defense-in-depth. In the aftermath, Nivelle lost his job; the French people were outraged; and the French Army was wracked by mutinies that rendered it ineffective for the rest of 1917.[38]

So why were the offensives such a disaster? Was it because Nivelle's doctrinal principles were unsound? Was it because he selected a zone of attack (the Aisne) wholly unsuited to the type of maneuver he hoped to achieve? Was it because the French were never able to achieve the level of air superiority that the plan required? Was it because the Germans had recently adopted a new defensive doctrine – one that would prove far more effective against the kind of massive artillery strikes and deep penetrations advocated by Nivelle? Was it because Nivelle knew about the new German defenses, but deliberately chose to leave his plan unaltered? Or was it simply because the Germans captured a copy of Nivelle's plan before the offensive?

The answer to these questions is unclear and most likely unknowable. That is the point. Combat outcomes are rarely the product of a single variable. It is therefore exceedingly difficult – if not outright impossible – to identify the one or two variables which were 'most

[37] Nivelle believed he could penetrate German lines in 48 hours. They had stood firm for close to 32 months at that point.

[38] The standard explanation is that the offensives created a manpower crisis in the French army. However, at 15,000 killed or missing between 16 April and 9 May, the casualties were actually low by First World War standards. In reality, the offensives were a public relations disaster given the limited gains achieved after Nivelle's lofty promises.. See Pascal Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, trans. P. Kieffer (Paris, FR: Berger - Leorault, 1923), 100–105.

important.' Perhaps Nivelle might have ended the war in April 1917 if only he had selected a different salient, achieved air superiority, adopted a different doctrine, or just kept his plan a secret. Maybe he would have won the war simply by doing one of those things. We can never know.

I strive to avoid ascribing complex outcomes to parsimonious explanations in three ways. First, I acknowledge from the outset that CAT theory's variables are not always optimization's most important determinants. There are situations in which strategic imperatives, resource constraints, and genuine disagreement between leaders stymie change. Part III discusses this point in detail.

It is enough to prove that an army's command culture and training structure exert a *predictable and consistent* influence on its ability to change, even in cases where they are not the dominant factor. Unfortunately, it does not seem possible to predict the conditions under which CAT theory's variables will dominate *ex ante*. These statements are not designed to undercut CAT theory's importance. If anything, Part II demonstrates that command cultures, assessment mechanisms and training structures were the *primary* reason armies optimized – and failed to optimize – on the Western Front in the First World War.

Second, this dissertation selects cases that control for as many potentially confounding factors as possible. Since no single case can possibly control for every conceivable variable that could be at work, this dissertation uses three different types of case studies, each with

its own strengths and weaknesses. The goal is to use different types of cases such that the cumulative effect offsets individual shortcomings.

Part II comprises the bulk of this dissertation, and for an important reason: the First World War allows for the most rigorous test of CAT theory's internal validity. Part II accomplishes this task by selecting three army-cases that share a single context: the Western Front from 1914 to 1918. This shared context controls for many of the important alternative explanations for organizational change: prewar doctrines, technology, resources, war duration, and organizational size. Part II therefore relies on John Stuart Mill's method-of-difference, selecting army cases (the British, French and German armies) that shared many of the same background characteristics, but varied in terms of the variables of interest (the independent and dependent variables).[39]

There is a second benefit to using the First World War as a test for CAT theory: between 1895 and 1918, all three armies varied along the key independent variables as well.[40] This fact allows for in-depth process tracing.[41] In sum, by looking at the British, French and German armies as they struggled to break the deadlock, this dissertation leverages both cross case and within case variation to test CAT theory's casual mechanisms.

[39] Stephen Van Evera, *Guide to Methods for Students of Political Sciences* (Ithaca, NY: Cornell University Press, 1997), 57.
[40] This fact means one 'case' (e.g. the First World War or the German army) does not merely equal one observation on the dependent and independent variables. At a minimum, this approach yields 18 separate observations (each army in the prewar era, 1914, 1915, 1916, 1917 and 1918). For more on why cases do not equal observation in qualitative research, see Jack S. Levy, "Case Studies: Types, Designs, and Logics of Inference," *Conflict Management and Peace Science* 25, no. 1 (2008): 3.
[41] Ibid., 11–12.

Germany
Outcome: Optimization
Table 1.2

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Mod Centralized	Mod Decentralized	Mod Decentralized	Mod Decentralized
Assessment mechanism	Yes	Yes	Yes	Yes	Yes
Training structure	Mod Centralized	Mod Centralized	Centralized	Centralized	Centralized

Britain
Outcome: Near optimization
Table 1.3

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Centralized	Centralized	Mod Centralized	Mod Decentralized
Assessment mechanism	No	No	Dev	Yes	Yes
Training structure	Decentralized	Mod Decentralized	Mod Decentralized	Mod Centralized	Mod Centralized/ Centralized

France
Outcome: Incomplete optimization
Table 1.4

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Centralized	Centralized	Mod Centralized	Mod Centralized
Assessment mechanism	No	No	No	No	No
Training structure	Decentralized	Decentralized	Decentralized	Mod Decentralized	Mod Decentralized

Consistent with CAT theory's expectations, the Germans were the first to adapt a solution to the stalemate, which came in the form of a nascent combined arms doctrine. The British stagnated for the first two years of the war, but virtually caught up with the German army by the war's end. The French army, which started the war with the most advanced tactical

doctrine (at least in terms of its proximity to the optimal doctrine on the Western Front) lagged behind its ally and adversary for the entire war.

Of course, history is no laboratory and a controlled comparison of three different armies cannot account for every confounding variable. It could simply be that the Germans were culturally open to change. Nor can the First World War rule out a link between regime type and change. One plausible explanation is that Germany was the only autocracy, and autocracies might be better at navigating military change. Finally, it could be that CAT theory captures what happened on the Western Front, but that what happened on the Western Front does not tell us much about warfare today.

For this reason, Part III introduces two brief shadow cases to augment and refine the conclusions drawn from the First World War. Put another way, where Part II tests CAT theory's internal validity, Part III tests its external validity. The two shadow cases under consideration are the U.S. Army in Vietnam, from 1965 to 1972 (chapter 10); and the U.S. Army in Iraq, from 2003 to 2011 (chapter 11). Looking at how a single army adapted to two wars of the same type over time controls for national culture and regime type. It also begins to suggest that CAT theory can capture how optimization works in unconventional wars.

The U.S. Army had a moderately decentralized command culture, a doctrinal assessment mechanism, and a centralized training structure in both Vietnam and Iraq. As chapter 11 suggests, the Army optimized in Iraq. Although it invaded Iraq in 2003 expecting a short,

conventional fight, within three years it reoriented itself to wage a highly unconventional one.

Chapter 10's take on Vietnam is more controversial. It contends that the Army failed to optimize because other factors overwhelmed its ability to learn. The standard narrative, which finds the Army's leaders and culture culpable for its failure to adapt to counterinsurgency warfare, ignores the depths of the Army's true strategic dilemma. American soldiers had to fight three wars: a conventional, limited war against the People's Army of North Vietnam (PAVN); a counterinsurgency against the Viet Cong; and a Cold War of deterrence against the Soviet Union and Communist China. On the horns of a dilemma, U.S. forces adopted and implemented the best doctrine that they could; and when it failed, they adjusted as best they could. In retrospect, the U.S. Army may have fought as well as possible. As is often said about democracy, the optimal doctrine may sometimes be the worst alternative except for all of the others.

V. Looking ahead

The remaining chapters are organized as follows:

Chapter 2 reviews the existing security literature on military change, pointing to its major findings and gaps.

Chapter 3 describes CAT theory in detail, including its predictions, and the kinds of evidence that confirm or reject its validity. Chapter 3 concludes with a more detailed discussion of the case selection strategy and scope conditions.

Part II describes the First World War case study and is divided into five chapters. Chapter 4 describes the situation facing the British, French and German armies on the Western Front and identifies the optimal doctrine for ending the tactical stalemate. Chapters 5, 6, and 7 are the German, British and French case studies, respectively. Chapter 8 concludes by discussing alternative explanations and unresolved questions.

Part III is divided into four chapters. Chapter 9 describes the optimal counterinsurgency doctrine. Chapter 10 looks at the U.S. Army's experiences fighting and adapting to a counterinsurgency role in both Vietnam (1954 – 1973). Chapter 11 does the same for the U.S. Army in Iraq (2003 to 2011). Chapter 12 concludes by summarizing key findings, suggesting future ways to extend CAT theory and exploring what all of this means for military policy.

Chapter 2

The Sources of Military Change

"We will make the observation that changes in tactics will occur not after the introduction of new arms as is necessary, but also that the period of time between the two changes is relatively very long; this, undoubtedly, is caused by the fact that the improvement of arms has its origin in the skill of one or two individuals, while for the change in tactics the inclination to stick to customs on the part of an entire class has to be overcome."[1]

I. Overview

Security scholars devote considerable time and energy searching for the sources of military change. Broadly speaking, the literature identifies five key drivers: power shifts in the international system; domestic and institutional politics; organizational dynamics; cultural factors; and major shifts in technology.[2] In many ways to read the literature on military change is to get the impression that *everything* drives change. There may be some truth to this.[3]

This chapter is divided into into six sections. The first five summarize the literature according to these aforementioned categories. The sixth concludes with a brief summary of the literature's major points of consensus and enduring gaps.

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[1] A. T. Mahan, *The Influence of Sea Power Upon History, 1660-1783* (Boston: Little, Brown, 1906).

[2] This approach builds on Adam Grissom's "four primary schools of thought" in the innovation literature: civil-military relations, inter-service politics, intra-service politics, and organizational culture. Grissom's inter-service politics is placed under the broader heading of institutional arrangements; his intra-service politics category is collapsed into a broader organizational factors heading; and his organizational culture category is now a stand-alone group that include strategic culture). Given the different focus of this dissertation, categories for technology driven change and balance of power have also been added. See Grissom's excellent review essay "The Future of Military Innovation Studies," *Journal of Strategic Studies* 29, no. 5 (2006): 905.

[3] There seems to be a growing consensus about this in the literature. See Rebecca Damm Patterson, "The U.S. Army and nation-building: Explaining divergence in effective military innovation" (Ph.D., Public Policy and Public Administration, The George Washington University, 2009), 33–34; and Suzanne Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform" (Ph.D., Harvard University, 2003), 41–43. & 340 - 455, for similar takes on multi-causality and military innovation.

II. The balance of power and the power of parsimony

Scholarship that looks for the sources of military change in the nature of the international system focus on how power, shifts in power, and the pursuit of power shape the demand for change. Such theories usually start with the quintessential realist observation that the international system is anarchic. [4] Anarchy has two consequences. First, it forces states to be rational, since non-rational actors are defeated or otherwise marginalized by those that are. [5] Second, self-defense becomes every state's top priority, because anarchic systems lack a higher power to punish or protect. This means war is a constant possibility. The degree to which a state can credibly threaten, use or deter violence depends on how much power it has in general, and how much military power it has in particular.[6]

In this view innovation, adaptation and emulation are important because they affect military power.[7] States that innovate novel weapons, tactics, doctrines, and strategies can

[4] What follows is largely based on K. Waltz, *Theory of International Relations* (Reading, MA: Addison-Wesley, 1979). Anarchy is defined as the absence of a higher authority to protect the peace, enforce agreements, regulate interactions, and punish transgressors.

[5] Defined as having a set of stable, ranked preferences and the ability to develop a benefit maximizing (or cost minimizing) strategy for maximizing those preferences.

[6] These theories typically define power as anything a state can use to compel another state (or sometimes its own people) to do what they otherwise might not have done. For the most part balance of power theories focus on "hard" (as in quantifiable) power, including geography (including proximity and access to trade routes as well as vulnerability to threats), population (both in terms of size and education), natural resources (like oil, minerals, and even a clean environment), wealth, and raw military strength (itself variously defined). See Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton Univ Press, 2006). (reviewed in a later section) for a discussion about what should and should not consider when trying to determine military power. See R.J. Art, "American Foreign Policy and the Fungibility of Force," *Security Studies* 5, no. 4 (1996): 7–42. for a discussion about the degree to which the various types of state power can be transformed into military power.

[7] But they are not the only – or even the most common – way. Other options include forming alliances (referred to as external balancing) and producing more weapons (called internal balancing). See S.M. Walt, *The Origins of Alliances* (Cornell Univ Pr, 1987). for a more extensive discussion of internal and external balancing options. See also Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984), 62.; Robert Powell, *In the Shadow of Power: States and Strategies in International Politics* (Princeton, NJ: Princeton University Press, 1999), 176 – 179.; and M. C Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton Univ Pr, 2010), 26–28.

enjoy decisive, if fleeting, advantages in the game of great power politics.[8] States that fail to copy the best new weapons, tactics, and doctrines risk defeat on the battlefield and at the bargaining table. [9]

The key finding in this view is that change is most likely during periods of intense competition and major power transitions in the international system. Shifts create incentives to innovate militarily to stay ahead of potential competitors, to take advantage of new opportunities, or to hedge against new threats.[10] States then converge around the innovations that prove themselves effective in war.[11]

Recent work bears out this prediction that states copy the best military innovations. Analyzing mechanization rates among 153 states from 1979 to 2001, Todd Sechser and Elizabeth Saunders find that system-level variables (including strategic threats, past combat outcomes, alliance patterns, and gross domestic product) do a better job of predicting military preferences for mechanized warfare than regime or institutional variables.[12] Joao Resende-Santos similarly finds that competitive security concerns drove 19th century Latin American states to copy the world's leading military powers at the time,

[8] In essence, at least in the short run innovations allow innovators to generate more military power per dollar spent on defense than they could before.
[9] This means that any advantages derived from innovating will be ephemeral at best.
[10] Posen, *The Sources of Military Doctrine*, 79. Waltz, *Theory of International Relations*.; Powell, *In the Shadow of Power*, 3.
[11] The paradigmatic structural realist, Kenneth Waltz, is also the most well-known proponent of these views. See Waltz, *Theory of International Relations*, 127. Audrey Ammons finds support for Waltz's predictions in her dissertation on how and why the French, Japanese, Brazilians, Indians, Chinese, and Russians have attempted to emulate America's remote sensing capabilities. See Audrey Ann Ammons, "Competition Among States: Case Studies in the Political Role of Remote Sensing Capabilities" (Ph.D., Politics, The Catholic University of America, 2010).
[12] Todd S Sechser and Elizabeth N Saunders, "The Army You Have: The Determinants of Military Mechanization, 1979–2001," *International Studies Quarterly* 54, no. 2 (June 1, 2010): 481–511.

Prussia and France.[13] He also contends that these factors explain the extent to which, and the speed with which, different Latin American countries copied their European models. All things equal, those with the most aggressive neighbors, least defensible geography, and weakest allies were more likely to undertake rapid and wholesale emulation than were those with weak neighbors, advantageous geography, and strong allies.[14]

Balance of power theories are a useful starting point for thinking about military change. It is hard to imagine why states would bother with expensive and risky changes in a world where they could make credible commitments, did not care about relative gains, and were unworried by security competition.

At the same time these explanations are incomplete.[15] We know this because balance of power theories generate clear predictions, but it is easy to find important historical cases that defy them. The historical record is replete with states that failed to innovate in the face of a rising threat (interwar France); states that ignored best practices (the British failure to develop aircraft carrier tactics before World War II)[16]; states that undertook massive and costly reform efforts in the absence of an objectively compelling threat (Meiji Japan)[17]; or states that opted not to change even after a major wartime failure (U.S. counterinsurgency

[13] João Resende-Santos, *Neorealism, States, and the Modern Mass Army* (New York: Cambridge University Press, 2007).
[14] Ibid., 5 – 10.
[15] Theo Farrell and Terry Terriff, "The Sources of Military Change," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, 2002), 16.
[16] Geoffrey Till, "Adopting the Aircraft Carrier: The British, American, and Japanese Case Studies," in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Allan Millett (New York, NY: Cambridge University Press, 1996), 191–226.
[17] Emily Goldman, "Western Military Models in Ottoman Turkey and Meiji Japan," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff, Making Sense of Global Security (Boulder, CO: Lynne Rienner, 41-68), 53–61.

doctrine after Vietnam). Moreover, balance of power theories do a poor job of explaining how states choose from among many equally viable innovation alternatives.[18]

Ultimately, balance of power theories are an incomplete, but important part of the story. Shifts in the balance of power clearly create the conditions that make change more or less likely. Still, we need other variables to predict specifically when it will happen. Perhaps France failed to respond to the Nazi threat because it misperceived Hitler's intentions, thought it had an effective alliance network to deter him, or misread the nature of modern war. More likely it was some combination of the three. Perhaps Saddam failed to train his troops properly because the social implications of doing so were too dangerous. [19] And as Suzanne Nielsen points out, the United States did innovate after Vietnam – just not in a way that enhanced its counterinsurgency prowess because it was fixated by the Soviet threat in Europe. We can debate the merits of these alternative explanations, but all require us to go beyond the international system to look at variables within state or unique to the technologies themselves.

III. Looking inside the state: Civil-military and institutional relations

It is easier to say that shifts in the international system set the conditions for military change than it is to specify which of the potential state-level variables drives change. The possibilities are endless. After all, modern nation-states are stunningly complicated social

[18] Williamson Murray, "May 1940: Contingency and Fragility of the German RMA," in *The Dynamics of Military Revolution: 1300 - 2050*, ed. Williamson Murray and MacGregor Knox, New York, NY (Cambridge University Press, 2001), 156.
[19] This is one of Michael Horowitz's major findings: some weapons simply cost too much. Horowitz, *The Diffusion of Military Power*. Stephen Biddle makes a similar point about modern force employment

organisms. They encompass an entire range of attributes that could plausibly drive, shape, or otherwise influence their proclivity and ability to change. Wealth, regime type, population size, educational systems, bureaucratic practices, economic conditions, tax codes, investment levels, electoral systems, infrastructure, and historical experience are but a few possible candidates. For reasons that are not entirely clear military innovation scholars focus on four: civil-military relations, inter-service rivalries, institutional structures, and regime type.[20]

Civil-military relations: serendipitous intervention versus splendid isolation

Military dictatorships notwithstanding, in most modern states civilians exercise control over the military and the decision to use force. Despite this basic consensus we still see differences in how statesmen exercise their perogative. Where leaders like Abraham Lincoln and Georges Clemenceau injected themselves deeply in military affairs,[21] others

[20] Innovation scholars writing in the operational research, economics, and business traditions have not restricted themselves to these three variables. For example, see See John E. Ettlie and Albert H. Rubenstein, "Firm Size and Product Innovation," *Journal of Product Innovation Management* 4, no. 2 (June 1987): 89–108; J. T. Hage, "Organizational Innovation and Organizational Change," *Annual Review of Sociology* 25 (January 1, 1999): 597–622; Richard R Nelson and Nathan Rosenberg, *National Innovation Systems a Comparative Analysis*, ed. Richard R Nelson (New York: Oxford University Press, 1993); Bengt-Åke Lundvall et al., "National Systems of Production, Innovation and Competence Building," *Research Policy* 31, no. 2 (February 2002): 213–231; Wesley M. Cohen and Steven Klepper, "Firm Size and the Nature of Innovation Within Industries: The Case of Process and Product R&D," *The Review of Economics and Statistics* 78, no. 2 (May 1, 1996): 232–243; Fariborz Damanpour, "Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators," *The Academy of Management Journal* 34, no. 3 (1991): 555–590; Oliver E. Williamson, "Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization," *SSRN eLibrary* (n.d.), accessed June 3, 2011.

[21] It was Clemenceau who coined the phrase "war is too important to be left to the generals." Allegedly he intent on finding out what was going on in the trenches that he was nearly hit by shrapnel from German artillery fire during one of his regular visits to the front lines during World War I. E. A Cohen, *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (Free Pr, 2002).

preferred to leave the military to its own devices.[22] Social scientists have long been divided over which approach is most effective.[23]

This reflects a similar division in the literature on military change. Barry Posen's *The Sources of Military Doctrine* is emblematic of one side of the debate.[24] Posen argues that militaries are like other bureaucracies in that they prefer the status quo and adopt new doctrines only when it clearly increases their autonomy or prestige.[25] It follows that we should expect very little change during periods of prolonged peace and stability. In the absence of an immediate threat civilian leaders pay little attention to what the military is doing, focusing on more pressing issues instead. However, when a security crisis looms civilians start paying attention again. When they perceive a gap in the military's ability to meet the new threat civilian leaders will intervene, imposing change on the military when necessary. [26] Because they are novices at military affairs, civilians typically turn to high-ranking mavericks inside the military to help them manage the process of change.

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[22] Eliot Cohen calls refers to this latter approach as the normal theory of civil military relations. Ibid., 4–7.

[23] There is a well-established security literature on civil military relations, especially as they relate to military effectiveness. The pre-eminent works include Carl von Clausewitz, *On War* (Princeton, N.J: Princeton University Press, 1976).; Samuel P Huntington, *The Soldier and the State; the Theory and Politics of Civil-Military Relations* (Cambridge: Belknap Press of Harvard University Press, 1957).; and Morris Janowitz, *The Professional Soldier, a Social and Political Portrait* (Glencoe, Ill: Free Press, 1960).

[24] At first glance Posen's theory might look a lot like it belongs with balance of power theories (he does call it a balance of power theory after all). It is true that he thinks shifts in the balance of power create the conditions for innovation. But such shifts are not themselves sufficient to explain innovation. Indeed, his entire theory hinges on a critical civilian intervention mechanism. Posen (1984), Chapter 2. See also Joseph Roger Clark, "Innovation Under Fire: Politics, Learning, and US Army Doctrine" (Ph.D., Political Science, The George Washington University, 2011). Clark agrees, "civilian intervention is critical" as "it provides the resources and opportunity necessary for innovation, " Ibid., 11. I review Clark's argument in greater detail later in this chapter.

[25] For a similar point in the sociological literature, see Kurt Lang, "Military Organizations," in *Handbook of Organizations*, ed. James G. March, Rand McNally Sociology Series (Chicago: Rand McNally, 1965).

[26] Mark Hewitt similarly finds that civilian intervention played a key role overcoming institutional resistance during the early stages of the Predator and Global Hawk unmanned aerial vehicle (UAV) programs. Mark S Hewitt, "Early-stage Military Technology Innovation: A Network Analysis" (Ph.D., Public Policy and Public Administration, The George Washington University, 2010).

On the other side of this debate are scholars who challenge the intervention thesis. In *Winning the Next War* Stephen Rosen argues that change must come from within. He finds Posen's maverick problematic since mavericks are outsiders by definition. [27] As a result, they lack the credibility, influence, and pull needed to force change on an otherwise resistant organization.

Other scholars share Rosen's skepticism and point to the institutional, political, legal, and historical barriers that also stymie outside-in reform. Deborah Avant argues that institutional structures made it hard for Kennedy and Johnson to impose a counterinsurgency doctrine on the U.S. Army. She points out that the 1947 National Security Act increased Congress' role in military affairs, giving Army leaders "significant leeway in resisting presidential attempts to force change."[28] Looking at the U.S. Army's experiences with nation building in World War II, Korea, Vietnam, and Iraq, Deborah Patterson concludes that change was rarely the direct product of civilian action. Rather, while "political leaders may set the conditions" for change, "they rarely determine the content or effectiveness of the innovation."[29] Suzanne Nielson echoes this view, arguing that American political leaders had an indeterminate impact on Army modernization programs in the late 1970s.[30] In his analysis of forced innovation Christopher Savos finds

[27] Stephen Peter Rosen, "Military Effectiveness: Why Society Matters," *International Security* 19, no. 4 (April 1, 1995): 15 – 18. I discuss Rosen's alternative approach in greater detail in the section on organizational theories.
[28] Deborah D. Avant, "The Institutional Sources of Military Doctrine: Hegemons in Peripheral Wars," *International Studies Quarterly* 37, no. 4 (December 1, 1993): 416. I think Avant's work is better seen as an institutional theory, but regardless of its categorization she does spend a lot of time wrestling with civil-military relationships.
[29] Rebecca Damm Patterson, "The U.S. Army and Nation-building: Explaining Divergence in Effective Military Innovation" (Ph.D., Public Policy and Public Administration, The George Washington University, 2009), 33.
[30] Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform." 341.

that the more civilians threaten institutional identities, autonomy, and budgets, the more likely their military subordinates are to resist.[31]

There is the also the issue of civilian interest and competence. Even an ardent 'interventionist' accepts that civilian leaders only intervene when they see a need to do so. Some scholars challenge the idea that civilians are more responsive than the military to new threats and opportunities. In his study on post-revolutionary Ireland Theo Farrell finds that politicians neglected security needs at a peak moment of vulnerability in Irish history. He points out that it took the civilian government over three years to develop a defense policy. "In the end, army leaders had to send a memorandum to the Executive Council to remind civilian policymakers of 'the urgent and absolute necessity for placing us in the possession of at least the outlines of the defense policy of the Government.'"[32] Similarly, Kimberley Zisk's work on Soviet doctrine suggests civilians were as susceptible to parochial interests as their generals. Tracing Soviet responses to shifts in American doctrine in the 1960s, 1970s, and 1980s, she finds that neither civilians nor generals were impervious to institutional bias. [33] Both groups tended to be most responsive to changes in American doctrine when such shifts threatened to neutralize their standard operating procedures.

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[31] Christopher Savos, "The Irresistable Force Vs. the Immovable Object: Civilian Attempts to Force Innovation on a Reluctant Military" (Ph.D., Massachusetts Institute of Technology, 1993).

[32] Memorandum from Defense Council to Executive Council, "Defense Policy for Saorstat Eireann," 22 July 1925, UCDA, Blythe Papers, P24/107, Pg. 1. As cited by Theo Farrell, "World Culture and the Irish Army, 1922-1942," in *The Sources of Military Change: Culture*, *Politics*, *Technology*, ed. Theo Farrell and Terry Terriff, Making Sense of Global Security (Boulder, CO: Lynne Rienner, 2002), 83.

[33] These time periods correspond to Flexible Response, the Schlessinger Shift, and AirLand Battle. In particular, Soviet military leaders were inspired to innovate sans civilian intervention when the shifts in American doctrine threatened their own war plans. Kimberly Marten Zisk, *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955-1991* (Princeton, N.J: Princeton University Press, 1993).

Regimes, rivalries, and institutions

Where civil-military theories focus on how soldiers and statesmen interact with one another, institutional theories take a broader view by looking at how domestic laws, political arrangements and inter-agency competition over resources shape change.[34] There are essentially three strands to the institutional perspective: regime type, inter-service rivalry, and institutional context.

Regime type

Regime type theories argue that the nature of a state's political systematically affects how it undergoes military change. For example, Dan Reiter and Curtis Meek argue that regime type has a consistent impact on doctrinal choice.[35] Looking at doctrinal preferences among states from 1903 to 1994, they find that democracies are statistically more likely to adopt maneuver doctrines, while autocracies are more likely to adopt attrition doctrines.[36] Stephen Biddle similarly argues that modern, capitalist democracies may be the only type of state that can afford to adopt what he calls modern force employment doctrines, because of its onerous monetary and social costs. [37] This is important, because Biddle also argues

[34] There is of course overlap between civil-military and institutional theories. Civil-military affairs are undeniably part of the larger institutional milieu. Nevertheless, institutional theories deserve their own category simply because they go beyond civil-military dynamics to explore the role played by legislative actors, inter-service rivalries, and regime-type characteristics.
[35] Dan Reiter and Curtis Meek, "Determinants of Military Strategy, 1903-1994: A Quantitative Empirical Test," *International Studies Quarterly* 43, no. 2 (June 1, 1999): 363–387.
[36] The way they distinguish between these two extraordinarily broad and loose categories is problematic.
[37] Biddle suggests this is because to execute modern force employment doctrines militaries need to have high levels of inter-unit trust, decentralization, and professionalization. Modern, capitalist democracies have little problems meeting these requirements. But autocracies, poor states, and states with deep social divisions can find it much harder to employ. Biddle, *Military Power*; Rosen, "Military Effectiveness."

that armies that use modern force employment doctrines are more likely to win on the battlefield, even if they are outnumbered and technologically inferior. [38]

All things equal, Reiter's, Meek's and Biddle's work suggests that autocracies are at a decided disadvantage in the game of military change. Matthew Evangelista builds on this point, arguing that the U.S. out-innovated the Soviets throughout the Cold War. This was in large part because of differences in each country's state-societal arrangement. America combined a strong society with a weak state,[39] creating an open and decentralized system ideal for innovative thinking and action. In contrast, the Soviet Union combined a strong state with a weak society, an arrangement which inhibited novel thinking because of its "obsessive secrecy and centralization." At the same time, centralization did allow Soviet leaders to rapidly concentrate resources in response to American innovation. This meant that the Soviets were good at quickly neutralizing successive American advantages.[40]

Inter-service rivalry

A second strand uses competition between military services over resources and budget share facilitates change. This argument is counterintuitive. We tend to think of inter-service rivalry as bad for military effectiveness.[41] Nevertheless, work by Samuel Huntington, Michael Armacost, Harvey Sapolsky and Andrew Bacevich suggests that under

[38] At least on the conventional battlefield.
[39] M. Evangelista, *Innovation and the Arms Race* (Cornell univ. press Ithaca, 1989).
[40] Ibid., 269.
[41] Owen Reid Cote, "The Politics of Innovative Military Doctrine: The United States Navy and Fleet Ballistic Missiles" (Ph.D., Massachusetts Institute of Technology, 1996), 38.

certain conditions fights over the budget fosters innovative thinking.[42] All four find that strong evidence that turf wars and budget fights inspired innovative thinking in the post-war American military establishment.[43] Owen Cote reaches a similar conclusion. Comparing the development of the Polaris and Trident II submarine launched ballistic missile (SLBM) programs in the 1960s and 1970s he finds that while inter-service competition between the Navy and Air Force was key to the innovative Polaris missile system, cooperation between the services undercut the Trident II's innovative potential. Cote's study is particularly fascinating because it highlights an unanticipated downside to 'jointness' and inter-service cooperation.[44] Finally, Timothy Moy tells a similar story in his dissertation on the interwar U.S. Marine Corps and Air Corps. He finds that Darwinian competition over resources fostered innovation in both services. Marine and Air Corps leaders created new forms of warfare (amphibious assault and strategic airpower), designed new doctrines to conceptualize them, and acquired the tools and technologies necessary to wage them. In doing so both services secured for themselves protected niches and guaranteed budgets within the American defense establishment.[45] As he aptly frames it, "more than ideas, more than weapons, bureaucracy drove military development between the wars."[46]

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[42] Grissom, "The Future of Military Innovation Studies," 910; Samuel P. Huntington, *The Common Defense: Strategic Programs in National Politics* (Columbia University Press, 1966).
[43] Michael Armacost, *The Politics of Weapons Innovation: The Thor-Jupiter Controversy*. (New York and London: Columbia Univ. Press, 1969); H. M Sapolsky, *The Polaris System Development* (Harvard University Press, 1972); Andrew Bacevich, *The Pentomic Era: the US Army Between Korea and Vietnam* (Washington DC: National Defense University Press, 1986).
[44] Cote, "The Politics of Innovative Military Doctrine," 36.
[45] Timothy David Moy, "Hitting the Beaches and Bombing the Cities: Doctrine and Technology for Two New Militaries, 1920-1940" (Ph.D., University of California, Berkeley, 1992), 14.
[46] Ibid., 7.

Institutional Context

A third strand in this literature focuses on the complex interactions between civilian agencies, military organizations, and private sector firms. Deborah Avant's work comparing British innovation in Malaya against American stagnation in Vietnam exemplifies such an approach.[47] She argues that the ability to change in both wars was a function of the long-term oversight and incentive structures the British and American armies faced. When executives and legislators were unified, innovation was likely. When they were divided, stagnation was the result as political infighting helped military leaders evade scrutiny and resist change.

In Avant's view the story of the America's failure in Vietnam starts with the end of the American Civil War, when the U.S. Army began aggressively copying the Prussian Army. Over time this led to an institutional fixation with conventional, offensive warfare. This obsession inevitably led Army officers to marginalize and ignore doctrines that were either unconventional or defensive. Although civilian control over the U.S. Army increased during the 20th century, and especially after the Second World War, the preference for conventional, offensive operations were by this time well entrenched. Ironically, Avant argues that the 1947 National Security Act, implemented with the explicit goal of increasing Congressional oversight over the Armed Forces, actually made it harder for civilians to control the American military. This was because these reforms led the President and

[47] Avant, "The Institutional Sources of Military Doctrine."

Congress to spend even more time fighting each other than they did monitoring the military.[48]

By comparison, British civilians had a long history of keeping their army in check by keeping it micromanaged, under-funded, and divided (via the regimental system). This prevented British soldiers from developing a similar bias towards conventional, offensive action. Moreover, the British Army only answered to one civilian master during the 19th century – the Cabinet. This concentrated lines of control, increasing effective oversight and making the British Army more responsive to new missions and new tasks.[49]

Joseph Clark's dissertation on the American experience with counterinsurgency in Vietnam and Iraq updates Avant's institutional approach. He argues that doctrinal innovation unfolds in a three-step process – all three of which are necessary for innovation to take root.[50] First, internal advocates must start a debate about the organization's status quo doctrine. This usually requires a looming defeat or major failure. Next, the innovators must turn outside the organization to forge strong networks with civilian leaders and outside agencies. This step is crucial because it generates material and political resources to overcome internal resistance. In the final stage innovators must turn their attention back to the organization to disseminate their ideas, incentivize compliance, and eliminate opposition.

[48] Avant, Pg. 415
[49] Ibid., Pp. 416 - 426
[50] Clark, "Innovation Under Fire," 11.

IV. Organizational determinants

Where the civil-military and institutional literatures look at how interaction and competition *between* defense agencies affects adaptive behavior, the organizational literature looks *inside* them. The focus is therefore on how standard operating procedures, promotion practices, and internal politics foster and impede change.

Economics, industrial relations, management and even political science researchers (outside of security studies) have a long tradition of using organizational-level variables to understand innovation.[51] Nevertheless, it was not until Stephen Rosen's 1992 *Winning the Next War* that this approach gained traction in security studies.[52] *Winning the Next War* challenges the realist approach, which, before its publication, had largely dominated the study of military change. Rosen does this by taking issue with the assumption that military organizations are monolithic actors with highly predictable pathologies. Far from simplistic and unitary, armies, navies, and air forces are complex, vibrant political communities replete with internal interest groups competing for power and prestige. The fact that military organizations are made up of numerous sub-groups (i.e. fighter pilots, bomber pilots, and rocketeers in air forces; pilots, surface ship officers, and submariners in navies;

[51] This is curious, since virtually every other literature on innovation, adaptation, and emulation devote considerable attention to organizational level variables. A recent literature review in the *Journal of Management Studies* found that fully 52% of the top 524 papers written on innovation in the last three decades focused on organizational level variables. See Mary M. Crossan and Marina Apaydin, "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature," *Journal of Management Studies* 47, no. 6 (2010): 1159 - 1162.
[52] For a sample of this much, much larger literature (discussed at some length in chapter 3) see Damanpour, "Organizational Innovation"; Fariborz Damanpour and Shanthi Gopalakrishnan, "Theories of Organizational Structure and Innovation Adoption: The Role of Environmental Change," *Journal of Engineering and Technology Management* 15, no. 1 (March 1998): 1–24; Michael T. Hannan and John Freeman, "Structural Inertia and Organizational Change," *American Sociological Review* 49, no. 2 (April 1, 1984): 149–164; Harvey M. Sapolsky, "Organizational Structure and Innovation," *The Journal of Business* 40, no. 4 (October 1, 1967): 497–510.

and infantrymen, tankers, artillerymen, and intelligence officers in armies) constantly competing for institutional resources, control, and prestige also has an important consequence. Change is, by definition, disruptive to the status quo. Change is especially threatening to those who currently sit atop the organizational hierarchy. Furthermore, those who are on top of the organization have a powerful tool to resist change – they control the promotion process. Promotions determine which groups will be favored, which will be marginalized, and which will be ignored.

Taken together these facts have several profound implications for military change. First, it means that innovative change is usually generated from within the organization. Civilians simply lack the time, energy, and expertise to control such large and complex organizations. Meanwhile, uniformed leaders have far too many tools and opportunities to resist 'forced innovation,'[53] and they usually have exclusive control over the highly specialized and esoteric knowledge needed to generate change in any case. Second, innovations almost always need an internal advocate – a high ranking officer who supports change and is willing to create protected promotion pathways for younger, reform minded officers. Without an internal advocate reformers and their followers are likely to find themselves under a glass ceiling. Finally, for all of these reasons peacetime innovation is more likely than wartime innovation. Seeing the need for change; generating new ideas; testing and validating them; and creating protected avenues for promotion – the entire innovation process takes time and resources that are in short supply during a war.

[53] Of the type Barry Posen predicts. See the earlier discussion about military mavericks in this chapter's introduction.

Scholars continue to build on Rosen's groundbreaking work. Much of this work comes from outside traditional academic circles.[54] For example, in her work on Special Operations Command Susan Marquis - a former Pentagon official and current dean of Rand's graduate school - finds that the creation of a stand alone command in the late 1980s helped American commandos achieve higher levels of efficiency and effectiveness by creating new promotion opportunities (and protecting careers) in a field that was once a career killer.[55] Looking at the U.S. Army's historical responses to low-intensity conflict, Richard Downie, a former U.S. Army officer, argues that external demands and civilian intervention are unlikely to spur change in the absence of bottom-up organizational learning and consensus.[56] Gregory Engel suggests that the Tomahawk cruise missile was made possible only because collaboration between various sub-groups within the U.S. Navy's officer corps allowed pro-cruise missile advocates to overcome resistance from the naval aviators.[57] And Blair Haworth makes the argument that infighting between the U.S. Army's infantry and armor communities undermined the M2 Bradley's development and implementation.[58]

Recent scholarship suggests a renewed interest in the organizational sources of change. In her dissertation on the U.S. Army's Training and Doctrine Command (TRADOC) reforms, Suzanne Nielson finds that innovation becomes increasingly likely when a single entity "with broad authority over the entire organization that is capable of creating, critically

[54] i.e. from policy and defense research
[55] Susan L. Marquis, *Unconventional Warfare: Rebuilding US Special Operations Forces* (Washington, D.C.: Brookings Institution Press, 1997).
[56] Richard Duncan Downie, "Military Doctrine and the 'Learning Institution': Case Studies in Low-Intensity Conflict" (Ph.D., University of Southern California, 1995).
[57] G. A. Engel, B. Hayes, and D. Smith, "Cruise Missiles and the Tomahawk," *The Politics of Naval Innovation* (1994): 16–41.
[58] W. B. Haworth, *The Bradley and How It Got That Way: Technology, Institutions, and the Problem of Mechanized Infantry in the United States Army*, vol. 180 (Westport, CT: Greenwood Press, 1999).

analyzing, and implementing a coherent program of reform" exists to facilitate institutionalization.[59] Matthew Tattar's work on innovational adaptation (what he defines as an organization's ability to respond to a game-changing innovation) suggests that the military services with the greatest capacity to adapt to an opponent's innovation are those with slack resources to divert to the problem; and a dedicated sub-unit free to work exclusively on solving it.[60] Writing on the British Army's most recent experience in Afghanistan, Theo Farrell finds that although military organizations tend to exploit existing tactics, techniques and procedures (TTPs), under certain circumstances we can expect them to engage in exploration.[61] Military units tend to switch to exploration when they have poor organizational memory, operate in a highly decentralized setting, and experience regular turnover in personnel and leadership.[62] This was very much the situation facing the six British task forces assigned to Afghanistan's volatile Helmand province between 2006 and 2009. As Farrell describes it, this is why these British units were ultimately able to adapt to Helmand's unique and ever evolving conditions.[63]

[59] Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform," 43. In many respects my dissertation is building on her core premise, although I believe that a central training authority explains only half of the phenomenon.
[60] Matthew Alan Tattar, "Innovation and Adaptation in War" (Ph.D., Politics, Brandeis University, 2011), 10–13.
[61] By exploitation and exploration, Farrell is referring to James March's seminal theory of how and when organizations learn. See James G. March, "Exploration and Exploitation in Organizational Learning," *Organization Science* 2, no. 1 (January 1, 1991): 71–87.
[62] Theo Farrell, "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006–2009," *Journal of Strategic Studies* 33, no. 4 (2010): 567–594.
[63] Sergio Catignani argues that Farrell's overstates the degree to which British forces adapted to a non-kinetic COIN doctrine in Afghanistan. Catignani asserts that while minor changes have taken place, these failed to lead to a major re-conceptualization of COIN operations. He further contends that Farrell did not see this lack of change because he relied on after action reports from higher level commands. Had Farrell used small unit level after action reporting, he would have noticed that the units actually conducting operations failed to fully grasp the ideas espoused by their parent units. See Sergio Catignani, "'Getting COIN' at the Tactical Level in Afghanistan: Reassessing Counter-Insurgency Adaptation in the British Army," *Journal of Strategic Studies* 35, no. 4 (2012): 513–539.

V. Culture: The power of norms, identity, and legitimacy

Virtually everyone agrees that groups have cultures – shared norms, values, and assumptions that make sense of, and give meaning to, the world around them.[64] There is less consensus about the degree to which culture shapes, constrains, or otherwise drives change. On one side of the debate historians, anthropologists, and sociologists have long suspected that a connection between culture and behavior exists. Put another way, they believe that two groups, identical in every respect except for culture, will respond in a fundamentally different way to the same situation. On the other side of the debate most political scientists (especially those who study military affairs) adopt a rationalist perspective. In the rationalist view culture may influence how people think and act when the stakes are low. But when making critical decisions, especially those which involve state security, leaders and organizations can rise above culture's influence,[65] This is because when it comes to war, peace, strategy, and change the stakes are simply too high to let norms and traditions trump hard nosed, cost-benefit analysis.

In recent years this chasm between anthropologists and rationalists has started to close, especially in security studies. A culture-centric research agenda emerged in the 1970s, one that takes very seriously potential links between culture and military change.[66]

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[64] Put more precisely, "cultural norms are inter-subjective beliefs about the social and natural world that define actors, their situations, and the possibilities of action… the are beliefs rooted in, and reproduced through, social practice… In addition, norms regulate action by defining what is appropriate (given social rules, moral codes, etc.) and what is effective." Farrell and Terriff, "The Sources of Military Change," 2002, 7.

[65] According to this perspective, the logic of rational analysis may not be immutable. In other words, some groups of people may cling more tightly to their cultural predilections than others. But over time groups that are willing and able to adopt purely rational strategies will defeat them. Thus, the modern nation-state system is dominated by actors who can rise above their cultural preferences and perspectives in matters of military and strategic competition.

[66] In IR parlance such this approach is called constructivism. For a good background on the history of the cultural approach in security studies see Alastair Iain Johnston, "Thinking About Strategic Culture," *International Security* 19, no. 4 (April 1, 1995): 32–64; A. Wendt, *Social Theory of International Politics* (Cambridge University Pr,

Three themes connect this diverse and growing literature. The first has to do with how scholars define culture. Typically, they think of it as a distinct, deeply held, and enduring set of norms, beliefs, and assumptions about how the world ought to operate. It is worth taking a moment to explore what it means to say that cultures are 'distinct, deep, and enduring'. Cultures are distinct because factors unique to the group, including history, ideology, and geography, are usually assumed to shape them.[67] Obviously, since no two groups share the exact same past, believe in the same set of ideas, or live in the same geographic area, this seems a rather safe assumption.[68] Cultures are seen as deeply held in that the norms, expectations, and beliefs that comprise them are frequently assumed and rarely questioned. This means that culture shapes and constrains decisions in subtle ways that are hard to detect – especially by those subject to their influence. Finally, cultures are thought to endure because they are 'sticky' – slow to change even in periods of rapid political, economic, and social upheaval. This is an important point. After all, if culture changes in lockstep with these other factors then there is no need to go through all the trouble of trying to look at culture in the first place. [69]

1999). See also A. Wendt, "Anarchy Is What States Make of It: The Social Construction of Power Politics," *International Organization* 46, no. 02 (1992): 391–425. As this research agenda is relatively new, few of the theories address military innovation explicitly. Most, however, have an obvious implication for how, when, and why we should expect militaries to innovate. Grissom, "The Future of Military Innovation Studies," 916.

[67] Jeffrey Record, "The American Way of War: Cultural Barriers to Successful Counterinsurgency" no. No. 577, CATO Policy Analysis Series (September 1, 2006): 3. Johnston, "Thinking About Strategic Culture," 34.

[68] Work on global culture stands out as a noteworthy exception to this statement. See Farrell, "World Culture and the Irish Army, 1922-1942."

[69] If cultures changed as quickly as the factors that shape them – i.e. geography, ideology, political systems, etc – then we would not need to look at culture to explain shifts in outcomes – we could save a lot of time by just looking at the shifts in geography, ideology, and political systems directly.

Second, most scholarship in this literature recognizes that even within a single group cultures are not monolithic. Multiple sub-cultures often co-exist, even in relatively small groups and organizations. While these sub-cultures sometimes overlap and complement, they can also contradict and compete. In theory this means that scholars would need to sift through dozens (if not hundreds) of distinct sub-cultures to determine which has the strongest impact on decision-making. However, in practice it means that scholars typically focus on elite sub-cultures, since elites typically get to make the most important security decisions.

The third and most important theme in this literature is its overarching interest in using culture to *explain* strategic decision-making. In other words, these scholars ascribe *causal* power to culture. From this perspective culture is more than just a superfluous phenomenon that helps explain interesting – but ultimately marginal – differences in group behavior (for instance, why funeral traditions or rules about wearing shoes in the home differ between groups). Rather, in this view cultures help explain *fundamental* differences in how groups think about and react to the world around them. This is the key difference between cultural theories of international relations and security and its rationalist competitors. [70]

Rationalists (e.g. those who use the balance of power, regime type, institutional design, etc. to explain strategic choices) agree that groups have cultures, which are distinct, deeply held, and enduring. But they would not go so far as to agree that culture determines or

[70] Cultural explanations are not necessarily incompatible with some rationalist accounts. See Alastair Iain Johnston, *Cultural Realism: Strategic Culture and Grand Strategy in Chinese History* (Princeton University Press, 1998), 1–4.

shapes military or strategic decisions. As mentioned earlier, paradigmatic rationalists like Kenneth Waltz and Barry Posen argue that states converge on rational strategies precisely because they have learned that rational strategies will, on average, outperform culturally determined ones. Thus, we should not expect states or their leaders to risk assessing their strategic situation and options through a cultural lens because the cold logic of international competition means they will risk being defeated by those states that are capable of objective assessment.[71]

In contrast, cultural theorists believe that culture shapes behavior by establishing shared, persistent and patterned ways that people think about the world around them.[72] Over time these beliefs and assumptions become enshrined in norms, expectations, procedures, and laws. By this point, as Terry Terriff and Theo Farrell tell us, these norms "are either taken for granted or enforced by powerful sanctions."[73] Moreover, cultural beliefs dictate preferences, suggesting certain courses of action while rejecting others about some of the most important issues in human relations. This includes the about role, purpose, and utility of strategy and violence in international affairs.[74]

Although cultural theories have their own shortcomings, ultimately they fill an important gap in how we think about military innovation. Put simply, history is full of armies that

[71] Note that neither Waltz nor Posen would argue that states never adopt irrational strategies. Rather, they would only argue that states which consistently engage in irrational decision making will, over time, tend to disappear from the international system as they suffer repeated defeats at the hands of their rational competitors.
[72] James Q Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It* (New York: Basic Books, 1989), 93.
[73] Theo Farrell and Terry Terriff, eds., *The Sources of Military Change: Culture, Politics, Technology*, Making Sense of Global Security (Boulder: Lynne Rienner, 2002), 7.
[74] Johnston, *Cultural Realism*, 46.

adopted weapons, tactics, and doctrines wholly at odds with any objective assessment of their security needs, and armies that failed to adopt best practices.[75] In this way cultural theories help us understand how, why and when concerns about legitimacy, identity, and appropriateness might trump the pursuit of effectiveness in military decision making.[76]

For the most part we can categorize cultural theories of strategy, military decision-making, and innovation as either organizational (focusing on differences in organizational culture among a given state's military forces) or national (looking at cultural differences between states).[77] This is interesting insofar as it is a rather narrow way of thinking about culture. As mentioned, almost any group can develop a culture, and there are almost certainly important ways that familial, ethnic, and other corporate identities might influence strategic thinking. Even among elite decision makers we should expect to see multiple cultural identities at play – norms, values, and assumptions, which do not necessarily pull in the same direction.[78] Nevertheless, the field has yet to expand in these directions.[79]

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[75] See especially Martin Van Creveld's chapter entitled "Irrational Technology" in Martin Van Creveld, *Technology and War: From 2000 B.C. to the Present* (New York: Free Press, 1991), chap. 5.; see also Emily O. Goldman's work on Ottoman and Meiji military emulation in Emily Goldman, "Western Military Models in Ottoman Turkey and Meiji Japan."

[76] Theo Farrell and Terry Terr, "Military Change in the New Millennium," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff, Making Sense of Global Security (Boulder, CO: Lynne Rienner, 2002), 266.

[77] See Farrell and Terriff, "The Sources of Military Change," 2002, 18.

[78] Thomas Adams, "Military Doctrine and the Organization Culture of the United States Army" (Ph.D., Syracuse University, 1990), 23.

[79] There exceptions to this. Victor David Hanson and John Keegan argue that there is a distinct *Western* way of war tracing back to ancient Greece. (For a critique of the Hanson/Keegan formulation see John Lynn, "Forging the Western Army in Seventeenth-century France," in *The Dynamics of Military Revolution: 1300 - 2050*, ed. MacGregor Knox and Murray Williamson (New York: Cambridge University Press, 2001), 54–55. Alastair Ian Johnston also acknowledges that there may be ways to conceptualize a strategic culture, which stretches across multiple nations. Johnston, "Thinking About Strategic Culture," 56. And Theo Farrell argues that the "worldwide prevalence of a single form of military organization, namely standing and standardized militaries structured around major weapons systems," was driven by a global norm of professionalization. See Farrell, "World Culture and the Irish Army, 1922-1942," 85.

Organizational culture

Theories of organizational culture start with the premise that military organizations possess unique norms, values, and expectations. As such they condition the attitudes and actions of an organization's leaders, leading different military organizations react differently to budget cuts, inter-service rivalries, shifts in the balance of power, and civilian oversight.[80] Organizational cultures can also diverge sharply from the overarching cultural preferences of the nations (and the elites) they protect, the leaders they serve, and the adversaries they fight.[81]

Carl Builder was one of the first scholars to think explicitly about the service cultures of the American military. He argues that each of the three major U.S. military services possess a distinct personality,[82] which consistently influence how they react to civilian direction, the kinds of weapons they prefer, and the types of doctrines they are likely to adopt.[83] In Builder's view the air force sees itself as "the keeper and wielder of the decisive instruments of war" and acts to "ensure the independence of those who fly and launch

[80] Terry Terriff, "'Innovate or Die': Organizational Culture and the Origins of Maneuver Warfare in the United States Marine Corps," *Journal of Strategic Studies* 29, no. 3 (2006): 478.

[81] Some of these theories assume that militaries have a single, dominant corporate identity that shapes, constrains and otherwise influences how their top leaders see the world. There are others which treat armies, navies, and air forces as complex organizations, replete with sub-groups and sub-cultures. See in particular S. P Rosen, *Winning the Next War* (Cornell Univ. Press, 1994); Downie, "Military Doctrine and the 'Learning Institution'"; Benjamin M Jensen, "Military Innovation in the U.S. Army: Anarchy, Bureaucracy, and the Forging of Doctrine, 1975--1995" (Ph.D., The American University, 2010); Christopher K Ives, "Knowledge and Strategy: Operational Innovation and Institutional Failure, United States Army Special Forces in Vietnam, 1961--1963" (Ph.D., The Ohio State University, 2004); Clark, "Innovation Under Fire." Bryon E Greenwald, "Understanding Change: An Intellectual and Practical Study of Military Innovation. United States Army Antiaircraft Artillery and the Battle for Legitimacy, 1917--1945" (Ph.D., The Ohio State University, 2003). and John Douglas Harrington, "Neglected United States Military Missions: Contending Theories of Bureaucratic Politics and Organizational Culture and the Case of Airlift Mobility" (Ph.D., Georgetown University, 1996).

[82] Although Builder does not explicitly use the term culture, his definition of service personality is largely identical to most prevailing definitions of culture. Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Washigton, D.C.: Johns Hopkins University Press, 1989).

[83] Ibid., 8.

these machines to have and use them for what they are – the ultimate means for both the freedom of flight and the destruction of war."[84] More tradition-bound, the navy thinks of itself as the most strategically independent agency in the U.S. government, in large part because it alone acts to preserve America's command of the commons,[85] to protect its sea-based commerce links, and to provide it with the ability to project force.[86] Finally, the army views itself as the most flexible and neutral instrument of state power. "It exists to carry out the government's orders and when ordered into action does not ask 'why' or 'what for?'"[87] Everything it does is premised on maintaining the ability to mobilize the nation, forging everyday citizens into capable soldiers ready and able to fight America's enemies.

Elizabeth Kier argues that organizational culture drove the interwar French and German armies to adopt fundamentally different doctrines.[88] Certainly, civilian leaders set the 'rules of the game' in both countries. Yet German and French politicians lacked the expertise and time to completely control their armies' doctrinal choices. Culture filled this void. Its effect was particularly pronounced in this case because the offense / defense balance was uniquely ambiguous during the interwar period. There was simply no consensus among strategists as to whether new technologies, including strategic bombers, tanks, and radios, could overcome the firepower that had led to stalemate just a few decades earlier. In France interwar politicians set the rules of the game by mandating short-term conscription. This forced French generals to build an army around draftees. Culturally pre-disposed to

[84] Ibid., 33.
[85] i.e. America's domination over major sea lanes and air transit routes
[86] Builder, *The Masks of War*, 31–32.
[87] Builder, Pg. 33
[88] Elizabeth Kier, "Culture and Military Doctrine: France Between the Wars," *International Security* 19, no. 4 (April 1, 1995): 65–93. See also her book-length treatment of the subject, E. Kier, *Imagining War: French and British Military Doctrine Between the Wars* (Princeton University Press, 1997).

believe that short term conscripts did not want to fight and were not under arms long enough to learn how to be real soldiers in any case, French generals adopted a defensive doctrine. After all, in their view defensive operations were easier to learn and control and were therefore ideal for an army of amateurs. The German Army lacked a cultural bias against conscripts and reservists. Although the Wehrmacht also relied on conscripts and reservists to fill out its ranks (after 1933) German officers did not share French reservations about how well conscripts could fight. As a result, the German Army actively integrated them into their bold blitzkrieg doctrine.

Other works affirms these basic findings about the link between organizational cultures and strategic outcomes. In his study of Anglo-German cooperation during World War II, Jeffrey Legro argues that German and British military culture explains why both nations showed a modicum of restraint in an otherwise existential war of annihilation.[89] John Douglas Harrington finds that fighter-bomber dominated culture drove the U.S. Air Force to consistently neglect its strategic airlift mission (i.e. moving troops and equipment between theaters) through the second half of the 20th century.[90] Isabel Hull asserts that the Imperial

[89] He is specifically interested in explaining shared restraint in terms of strategic bombing, sinking merchant ships, and the use of chemical weapons, which was widespread in the First World War. Jeffrey Legro, *Cooperation Under Fire: Anglo-German Restraint During World War II*, Cornell Studies in Security Affairs (Ithaca: Cornell University Press, 1995).

[90] Harrington makes a compelling argument that neither bureaucratic politics nor systemic threats do a good job of explaining this negligence. Bureaucratically, airlift represents the perfect opportunity for the Air Force to expand its "empire," because the Army is legally prohibited from purchasing strategic airlift equipment; and the issue rarely invokes high-level attention. Therefore, Air Force officers could easily buy more airlift assets without invoking scrutiny or opposition. Systemically, analysts have long seen the lack of strategic airlift capacity as the Achilles' heel in American power projection capabilities. See D. Menarchik, *Powerlift–getting to Desert Storm: Strategic Transportation and Strategy in the New World Order* (Praeger Publishers, 1993). as cited in Harrington, "Neglected United States Military Missions," 4. Harrington also predicts that any mission which does not mesh well with a service's dominant culture will tend to be neglected. Ibid., 489-491.

German Army developed a preference for annihilation warfare, explaining many of its actions and missteps in the First World War.[91]

An entire sub-genre of this literature focuses on the U.S. Army and its experiences in Vietnam. Andrew Krepinevich argues that the U.S. Army's predilection for conventional warfare and firepower undermined its ability to wage an effective counterinsurgency campaign in Vietnam,[92] a point echoed more broadly in John Nagl's *Counterinsurgency lessons from Malaya and Vietnam: Learning to eat soup with a knife*.[93] The U.S. Army's Special Forces' sub-culture a large, if implicit, role in Christopher Ives' account of the Strategic Hamlet Program and other operational innovations in Vietnam.[94] And Thomas Adams argues that the Army's culture led it to define war and adopt doctrines that were increasingly at odds with the actual nature of conflict after World War II.[95]

More recent scholarship on organizational cultures focuses more explicitly on how organizational factors can affect innovative behavior. Terry Terriff argues that the Marine Corps' organizational paranoia decisively affected its decision to develop maneuver warfare doctrine in the 1980s as well as that doctrine's ultimate shape and content.[96]

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[91] Isabel V Hull, *Absolute Destruction: Military Culture and the Practices of War in Imperial Germany* (Ithaca, N.Y: Cornell University Press, 2005).
[92] Andrew F Krepinevich, *The Army and Vietnam* (Baltimore: Johns Hopkins University Press, 1986).
[93] John A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam: Learning to Eat Soup with a Knife* (Chicago, IL: University of Chicago Press, 2005).
[94] Ives, "Knowledge and Strategy."
[95] Adams makes the case that despite war's growing complexity (which, given its ever evolving "conflict spectrum" the Army acknowledges) "little useful adaptation has taken place in Army doctrine…and much of what has taken place is essentially an accommodation to technological change." This is largely because Army culture defines war as an a-political, state-centric conflict between formal, professional military organizations. Adams, "Military Doctrine and the Organization Culture of the United States Army." 2-3; 30 – 33.
[96] In particular, the leaderships' unwillingness to abandon the Corps' amphibious capability led them to reject calls to add more armor and more tanks (as this type of equipment would make them look more like a second army and

Assessing American intelligence before World War II, Thomas Mahnken finds that ethnocentrism, incomplete information, preconceptions, and organizational culture prevented the American military from anticipating 13 major German, British, and Japanese technological innovations during the interwar period.[97] In Mahnken's view intelligence officials used assumptions based on American doctrine to fill information gaps and to choose between contradictory evidence.[98] Returning to the American experience in Vietnam Richard Lock-Pullan connects the Army's loss in that conflict to its subsequent doctrinal innovations in the 1970s and 1980s. Specifically, Lock-Pullan argues that Vietnam and the subsequent transition to an All-Volunteer military shaped the Army in two ways. First, it undermined its image of itself as a citizen's army. Second, it created a schism between the Army's culture and that of the nation it served. Struggling to find a new identity the Army ultimately settled on one that emphasized its status as a small force of professionals. This identity shift shaped the Army's subsequent doctrinal innovation, AirLand Battle, and eventually fed back into the broader American strategic culture.[99] This was particularly evident in how Americans came to view their interventions in Kosovo, Afghanistan, and Iraq.

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was unsuitable for expeditionary operations given its weight and size in any case. Terriff, "'Innovate or Die'," 498–500.

[97] Thomas Gilbert Mahnken, "Piercing the Fog of Peace: United States Intelligence and Foreign Military Innovation, 1918--1941" (Ph.D., The Johns Hopkins University, 1997).

[98] "US Military Intelligence Innovation Mahnken.pdf," n.d., 394.

[99] Richard Lock-Pullan, *US Intervention Policy and Army Innovation: From Vietnam to Iraq* (Psychology Press, 2006). Lock-Pullan goes on to suggest that these cultural and doctrinal shifts in turn shaped how American's thought about military interventions.

Strategic culture

If organizational cultures cause different militaries to react in different ways to the same conditions, challenges, and stimuli, then the same might also be true of states. Indeed, in the 1970s a number of historians and political scientists showed a renewed interest in thinking about whether countries exhibited unique "ways of war."[100] Russell Weigly's *The American Way of War* is the paradigmatic example of this approach.[101] As the title suggests, Weigly argues that during the Civil War American elites came to define conflict, war, and victory in a way that privileged annihilation over attrition; overwhelming force over proportionality; decisive engagement over maneuver; and the destruction of opposing military forces over other types of objectives.[102] While the First and Second World Wars appeared to vindicate this 'Sherman-esque' approach to warfighting, it also clearly undermined American performance in the unconventional conflicts that followed.[103]

Even as Weigley was publishing his groundbreaking work a similar research agenda was taking root in American international relations. Called the strategic culture literature – a term coined by Jack Snyder and popularized by Colin Gray[104] – the earliest work in this vein

[100] Of course the idea that different political entities think differently about war is as old as war itself. I use the 1970s as the starting point for three reasons. First, ethnocentrism and outright racism permeate much of the older writing on national or strategic cultures. Not only are such views worse than worthless, they are also a-rigorous and therefore not worth considering in a policy/political science dissertation. Second, the renewed interest in national cultures in the 1970s was a direct response (and in many ways a direct challenge) to the a-historical, acultural, purely rational-choice/cost-benefit that dominated American strategic thinking through much of the Cold War. Third, I have to start somewhere, and the 1970s is an easier (and more logical) starting point than say ancient Greece.

[101] Russell Frank Weigley, *The American Way of War; a History of United States Military Strategy and Policy*, The Wars of the United States (New York: Macmillan, 1973).

[102] For a modest critique of Weigley's work see Brian M. Linn and Russell F. Weigley, "'The American Way of War' Revisited," *The Journal of Military History* 66, no. 2 (April 1, 2002): 501–533.

[103] It is worth pointing out that Weigley came to see his own attrition versus annihilation typology as overly simplistic. See Ibid., 538.

[104] Alastair Iain Johnston traces the term back to Jack Snyder's 1977 RAND report on Soviet nuclear doctrine. See J.L. Snyder, *The Soviet Strategic Culture: Implications for Limited Nuclear Operations* (Santa Monica, CA: Rand

was motivated by an important and practical policy issue: by the 1970s it had become clear that Soviets and Americans were thinking about nuclear weapons in fundamentally different ways. Rationalist theories could not explain this. After all, in the rationalist view the stakes were so high with nuclear weapons that everyone ought to be hyper-rational and converge on the same basic beliefs and nuclear doctrines.[105]

Instead, by the late 1970s we saw the opposite. The Soviets were far more willing to plan for a nuclear war than were Americans, who took it as axiomatic that the threat of mutually assured destruction inexorably led everyone to accept nuclear war's futility.[106] According to Gray, American strategists failed to see this divergence because they had been socialized into framing the nuclear problem in rationalist terms, ignoring both historical and cultural context. Throughout the Cold War this led American planners to assume that nuclear weapons were only useful for deterrence and to put tremendous faith in the prospects for international arms control. It also blinded them to the possibility that the Soviets were basing their nuclear weapon plans along an entirely different logic, one informed by Russia's unique history, ideology, and geography.

Corporation, 1977). Ironically, according to Johnston, Snyder has since tried to disassociate himself with the concept. Johnston, *Cultural Realism*, 5.

[105] See Kenneth Waltz' response to Scott Sagan, in Sagan and Waltz, S.D. Sagan, "Kenneth N. Waltz," *The Spread of Nuclear Weapons: A Debate Renewed* (2003).

[106] Colin S. Gray, "National Style in Strategy: The American Example," *International Security* 6, no. 2 (October 1, 1981): 21. See also C.S. Gray, "Comparative Strategic Culture," *Parameters* 14, no. 4 (1984): 26–33. Alastair Iain Johnston makes the apt point that a policy agenda may have been motivating Gray and other early 'strategic culturalists.' They were often highly critical of extant American nuclear policy and tended to be advocates of adopting a counterforce doctrine. See Johnston, *Cultural Realism*, 7–8.

Although it inspired a new research agenda this early strategic culture literature has a number of inter-related problems.[107],[108] First, these theories are all but impossible to falsify. This flows in large part from their tendency to define culture in a way that makes it hard to distinguish what culture is from what it is not. These early studies posited that culture involves "technology, geography, organizational culture and traditions, historical strategic practices, political culture, national character, political psychology, ideology, and even international system structure."[109] The problem with this approach is that if strategic culture encompasses everything then it becomes impossible to identify the conditions under which it does not explain behavior. Second, these early strategic culture theories tend to be deterministic.[110] Even when they suggest that behavior was only a partial function of culture, they did not specify the way in which – or the degree to which – culture caused specific outcomes. Nor did these theories distinguish between situations in which culture drives decision-making and situations in which decision makers used culture to justify decisions already reached. Finally, early work assumed that strategic cultures were monolithic and homogenous, and that countries possessed only one.

Alastair Iain Johnston's more recent analysis of Chinese strategic culture corrects many of these problems. As a result it stands out as the definitive work on strategic culture to date.

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[107] For other examples of early work on strategic culture see K. Booth, *Strategy and Ethnocentrism* (Croom Helm London, 1979); D.R. Jones, "Soviet Strategic Culture," *Strategic Power: USA/USSR, Basingstoke: Macmillan* (1990); C. Lord, "American Strategic Culture," *Comparative Strategy* 5, no. 3 (1985): 269–293. For an updated version of Gray's strategic culture argument see C.S. Gray, "The American Way of War: Critique and Implications," *Rethinking the Principles of War* (2005): 27–28.

[108] I borrow both of these critiques from Johnston's excellent literature review. See Johnston, *Cultural Realism*, 5–22. Note that many of the articles he considers 'second generation' strategic culture theories I treat as organizational culture theories (which I distinguish from the strategic culture camp because they focus on culture at the organizational – not national – level).

[109] Ibid., 12.

[110] Johnston, "Thinking About Strategic Culture," 38.

Johnston begins by building a sharper set of definitions. In his view strategic cultures are comprised of two elements: a central paradigm that frames how leaders think about threats, conflicts, and the efficacy of armed force in human affairs; and a set of ranked strategic preferences that flow logically from this paradigm.[111] Tracing a definitive set of ancient Chinese military tests across time he finds evidence that there are actually two Chinese strategic cultures. The first, which he calls Confucian-Mencian, sees violence as a unnecessary and avoidable part of human affairs. It therefore outlines a set of strategic preferences that "place accommodationist strategies first, followed by defensive and then offensive strategies."[112] The second, called parabellum, assumes that war and violence are an inevitable part of human affairs. The resulting strategic preferences privilege offensive action over defensive; and defensive action over accommodation. Although interesting in its own right, perhaps Johnston's most important finding is his conclusion that the parabellum and Confucian-Menian strategic cultures are not co-equals. Indeed, he suggests that parabellum strategies dominated their Confucian-Mencian alternatives for much of China's history, and especially after the Communist revolution.[113]

The strategic culture literature's implications are striking, especially insofar as they challenge traditional, purely rationalist accounts of Great Power politics and strategy.[114]

[111] For example, if we assume that a strategic culture's central paradigm is that violence is highly effective in helping a state achieve its objectives, then will (or should) prefer a strategy that calls for starting wars over one which calls for brinksmanship; and it should prefer a strategy of brinksmanship over one of international cooperation. This is of course my stylized example, not Johnston's. See Johnston, *Cultural Realism*, 37–39.
[112] Ibid., 249.
[113] For striking figures on the prevalence of military action in the post-revolutionary period see Ibid., 256. It is worth pointing out that at the end of *Cultural Realism* Johnston acknowledges that the conclusions and predictions made by his strategic culture theory are not radically different from those made by a structural-realist theory.
[114] For a slightly different take on a cultural argument see Christopher P Twomey, *The Military Lens: Doctrinal Difference and Deterrence Failure in Sino-American Relations*, Cornell Studies in Security Affairs (Ithaca, N.Y: Cornell University Press, 2010). Twomey argues that military doctrines shape culture by "creating norms and

Unfortunately, they have less to say about military innovation. Although these theories ought to have clear implications for innovation, neither the historical nor political science literatures have gone in this direction. Dima Adamsky's work on the American, Soviet, and Israeli's diverging responses to precision guided weapons stands out as a rare exception to this non-trend.[115] He points out that different states and different professional communities possess different cultural and cognitive characteristics. As a result some countries will have "a greater propensity than others to grasp paradigmatic change in the nature of war."[116] Specifically, states with holistic-dialectic cultures will be quicker to recognize a revolution in military affairs (RMA) than those with logical-analytical cognitive styles. Such was the case with the advent of precision-guided weapons in the 1970s. Looking at the world through a holistic-dialectic lens the Soviets recognized that microprocessors, lasers, networks, optics, and comuters (none of which they yet possessed) might revolutionize war.[117] This put Soviet theorists like Marshal Ogarkov nearly a generation ahead of their American peers in building a coherent doctrine around precision weapons. Ironically, the Soviet industry was in no way equipped to manufacture these technologies. Instead, the Americans were the first to build new weapons with revolutionary potential. It was not until the late 1970s when Dr. Andrew Marshall, a civilian strategist in the Pentagon's Office of Net Assessment, picked up on Soviet thinking about the precision technology RMA that

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expectations about patterns of behavior" (28). Once civilian political leaders are "indoctrinated" by their military's doctrines it becomes hard for them to identify and understand their opponents' doctrines and strategies, especially in cases where they are radically different. Put another way, "states look at the world through the lens of their own military doctrine" (ix). Thus, by shaping culture military doctrines complicate perception, signaling, and interpretation. See especially pp. 18 – 40.

[115] Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia*, *the US*, *and Israel* (Stanford, Calif: Stanford University Press, 2010). See also his article-length treatment of the same subject, D.P. Adamsky, "Through the Looking Glass: The Soviet Military-Technical Revolution and the American Revolution in Military Affairs," *The Journal of Strategic Studies* 31, no. 2 (2008): 257–294.

[116] Adamsky, Pg. 15

[117] Adamsky, *The Culture of Military Innovation*, 27 – 29.

the United States started developing a new doctrine to complement its advanced weapons systems.

VI. Technological sources of innovation

As described up to this point, in the quest to explain military innovation the literature looks to everything from the distribution of power between states; to the institutional arrangements within them; to the cultures that permeate them at every level. Admittedly, by this point it already feels as though the kitchen sink is only possible missing variable. Nevertheless, there are still two additional groups of theories standing between the kitchen sink and us. The first of these is technological change.

Technological changes are often at the core of larger military changes. Heavy cavalry needed the stirrup to rob the phalanx and shock infantry of their battlefield dominance. A few centuries later, the longbow allowed infantrymen to exact their revenge on the cavalry, knocking it from a pedestal to which it would never return. Strategic bombing was little more than a theoretical dream before the development of reliable, long range, heavy lift aircraft. And as I argue in my chapter on the First World War, both the stalemate on the Western Front and the massive breakthroughs of 1918 are impossible to make sense of without referencing an entire slew of technological and scientific advances over the course of the preceding century.

Of course not every military innovation is primarily technological. Revolutionary France's *levee en mass* changed the face of warfare for at least 150 years by ushering in the age of

massive national armies. Technology played a marginal role in this revolution. [118] In fact the *levee en mass* was close to being a pure social and organizational phenomenon. It was social insofar as the entire population embraced the belief that every citizen had a stake in France's wars. It was organizational insofar as it made use of a novel type of military unit – the division – to give French military leaders a way to manage what would otherwise be an unwieldy mass of soldiers on the battlefield.

Nevertheless, Revolutionary France's experience is more exception than rule.[119] More often it is the case that technology factors into the equation. Therefore, the challenge for scholars is to specify the *causal* relationship between new technologies and new ways of war – a relationship that is complex and messy under the best of circumstances.[120] Even when the link seems quite straightforward there are any number of intervening and confounding factors.

Take firearms as an example. Introduced on European battlefields in the 14th Century, firearms undoubtedly revolutionized warfare.[121] But the path they took before changing the face of war was far from direct. It would take four hundred years before firearms completely replaced the pike, spear, and sword in infantry formations.

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[118] For a discussion of the leading role played by social and organizational factors, see MacGregor Knox, "Mass Politics and Nationalism as Military Revolution: The French Revolution and After," in *The Dynamics of Military Revolution, 1300-2050* (Cambridge University Press, 2001), 57 – 73; Eliot A. Cohen, "A Revolution in Warfare," *Foreign Affairs* 75, no. 2 (March 1, 1996): 37–54; Andrew Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest* (1994): 30.

[119] This is probably not a bad thing

[120] Lynn, "Forging the Western Army in Seventeenth-century France." Spears, swords and pikes would continue to find widespread use by cavalry units through the 20th Century. And it is a bit inaccurate to say that they disappeared completely from infantry formations. Rather, they morphed into the fusiliers and bayonets we still see in use today.

[121] Van Creveld, *Technology and War*, chap. 6.

Often the link between technical and military change is even less straightforward. This was the case with the development of precision-guided munitions (PGMs).[122] Precision weapons were the culmination of over 100 years of diffuse technical and scientific discoveries.[123] In other words, the precision weapons revolution was only possible because of dozens of preceding advances in computing, micro-processing, lasers, rocketry, and radio-communications. Throughout this century long process the relationship between technical progress and military innovation was highly convoluted. Sometimes new technologies developed for purely civilian and commercial use triggered greater interest in precision weapons by military leaders. Sometimes it worked in the opposite way, with interest in precision weapons driving the demand for, and investment in, new technology. At no point was it obvious whether new technologies inspired innovative thinking, or the other way around.[124]

A revolution in military affairs

The 1991 Persian Gulf War inspired one of the earliest efforts by academic and policy researchers to untangle the complex link between technological advance and military innovation.[125] The speed and precision with which American forces annihilated Iraq's

[122] What follows is based on Gillespie, "Precision Guided Munitions."
[123] The first attempts to guide a remote control bomb into an enemy formation were made on the Western Front in 1918. Paul G Gillespie, "Precision Guided Munitions: Constructing a Bomb More Potent Than the A-bomb" (Ph.D., Lehigh University, 2002), 13–16.
[124] Rosen, *Winning the Next War*, 42.
[125] It is not quite accurate to say "the earliest work." Indeed, a number of political scientists *outside* security studies and international relations - as well as historians interested in military affairs - have written on the links between technology and innovation. For examples see Bernard Brodie and Fawn Brodie, *From Crossbow to H-Bomb* (Bloomington: Indiana University Press, 1973); J. F.C Fuller, *The Conduct of War: 1789-1961* (Rutgers University Press, 1961); Wilson, *Bureaucracy*; Sapolsky, "Organizational Structure and Innovation." For an overview of relevant work on technological innovation in the economics, industrial relations, and operational design literatures,

hitherto vaunted military took almost everyone by surprise. To many it even suggested a new era in warfare. Thus, a research agenda that started out as an attempt to explain America's surprising victory had, by the mid-1990s, evolved into a distinct set of theories about the revolutionary implications of technological change.[126] Collectively referred to as the revolution in military affairs (RMA) literature, much of the scholarship built on work done by Nikolai Ogarkov, Chief of the Soviet General Staff, and Dr. Andrew Marshall, Director of the Pentagon's Office of Net Assessment on military technical revolutions.

Four core themes unify the RMA literature.[127] The first is that wars tend to look remarkably similar for long periods of time, only to undergo a dramatic transformation in a matter of years. RMA scholars call these periods of rapid change military revolutions. It is a concept that shares a lot with the idea of punctuated equilibrium in evolutionary biology. "Rapid, disruptive, and profound," military revolutions 'change the rules of the game.' [128] Wars look fundamentally different before and after one has occurred. Examples of military

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see Wesley M. Cohen and Richard C. Levin, "Chapter 18 Empirical Studies of Innovation and Market Structure", vol. Volume 2 (Elsevier, 1989), 1059–1107. For an overview of the historiography on technological innovation see Sarah Janelle Rittgers, "From Galloping Hooves to Rumbling Engines: Organizational Responses to Technology in the United States Horse Cavalry" (Ph.D., The George Washington University, 2003), 9-16.

[126] S. Metz and J. Kievit, "Strategy and the Revolution in Military Affairs: From Theory to Policy" (1995): 1; Dima Adamsky and Kjell Inge Bjerga, "Introduction to the Information-Technology Revolution in Military Affairs," *Journal of Strategic Studies* 33, no. 4 (2010): 463–468.

[127] What follows is based on Cohen, "A Revolution in Warfare"; Metz and Kievit, "Strategy and the Revolution in Military Affairs: From Theory to Policy"; Krepinevich, "Cavalry to Computer"; William Owens, "Creating a U.S. Military Revolution," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff, Making Sense of Global Security (Boulder, CO: Lynne Rienner, 2002), 205–219; Chris Demchak, "Complexity and Theory of Networked Militaries," in *The Sources of Military Change: Culture, Politics, Technology* (Boulder, CO: Lynne Rienner, 2002); MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution, 1300-2050* (Cambridge, UK: Cambridge University Press, 2001); C. J. Rogers, *The Military Revolution Debate: Readings on the Military Transformation of Early Modern Europe* (Boulder, CO: Westview Press, 1995); Max Boot, *War Made New: Weapons, Warriors, and the Making of the Modern World* (New York, NY: Gotham Books, 2007).

[128] Michael Vickers, "The Structure of Military Revolutions" (Ph.D. Dissertation, Johns Hopkins University, 2010), 1.

revolutions include the gunpowder/firearms revolution, the airpower revolution, and the nuclear revolution.

While the concept of a military revolution seems straightforward enough, problems arise when it comes to agreeing on a definition that distinguishes between revolutionary change and incremental change. Such important distinctions lead scholars to disagree about how many such military revolutions we can consider to have happened in the past. For example, Andrew Krepinevich thinks that there were ten between the 15th and 20th centuries. Michael Vickers counts 11 over the same period.[129] Given their significance, even the difference between 10 and 11 becomes quite important. Definitional issues pose an even bigger dilemma when it comes to predicting and identifying military revolutions in the future.[130]

The second theme uniting the RMA literature posits that most military revolutions start with technological change.[131] This is not to say that RMA theorists see change as purely the result of technical progress. Revolutionary and Napoleonic France are an exception. Yet, for the most part new technologies set the stage for revolution. Of course, technical advances only translate into increased military effectiveness when they are combined with new operational concepts (i.e. military doctrines) and organizational adaptation.[132]

[129] Ibid., 5.
[130] This is an especially important shortcoming given that the RMA literature makes strong policy prescriptions.
[131] Although the RMA literature does not seem explicit on this point, it seems safe to surmise that most RMA scholars would agree that most military revolutions begin with a shift in technology.
[132] Krepinevich, "Cavalry to Computer," 30.

The third theme is that states pay a price when they fail to recognize or respond to military revolutions. Like other types of revolutionary change, military revolutions lock in new winners and new losers. The military organizations that dominated warfare before a revolution may not be – and indeed often are not – the ones who dominate afterward. This means that RMAs are important determinants of state power in the international relations system. RMA scholars also point out that the pace and rate of RMAs has quickened over time, due largely to the speed with which technology changes. As a result, the 'victors dividend' from being quick to adopt new technologies and processes is increasingly short-lived. This means today's armies have to constantly be on the lookout for new technologies which might upend the system once more.

Finally, RMA scholars agree that history is in the midst of a military revolution right now. Microcomputers, satellite communications, real-time networks and unmanned technology are behind this sweeping change. On the ground long range, precision weapons will make it impossible for large units to move or mass undetected.[133] In the air unmanned aircraft will be able to loiter longer, think faster, and reach farther, than those with human pilots, while stealth technology make them virtually undetectable. At sea long-range stand off weapons will destroy transport and attack ships from hundreds of miles away, neutralizing the surface ships which have dominated warfare since the first navies.

[133] Admiral Owens, the former Assistant Chairman of the Joint Chiefs of Staff, has been a particularly vociferous proponent this argument. See W. A. Owens and E. Offley, *Lifting the Fog of War* (Washington, D.C.: Johns Hopkins University Press, 2001).

This final point leads RMA scholars to advocate for a particular set of defense policies. They argue that the U.S. military needs to transform its military, replacing traditional weapons platforms like tanks and ships with modular weapons that can be quickly updated as technologies change; by downsizing ground forces in favor of smaller, faster, and fully networked special operations units; by replacing pilots with unmanned aircraft; and by creating entirely new types of units to deal with cyber and space warfare.

Blowback

Unsurprisingly, the RMA research agenda engenders a lot of criticism. These critiques generally fall into one of three groups. The first group agrees with the general idea that military revolutions happen from time to time, and that it pays not to fall behind when they happen. However, they do not agree that the world is in the middle of such a revolution right now. For example, Stephen Biddle acknowledges that precision weapons, real-time networks, and unmanned vehicles have made war faster and more lethal. However, he does not think that these technologies will fundamentally change the nature of war. Rather, the combined arms doctrines that have dominated warfare since WWI will continue to do so until technology makes it literally impossible for soldiers to hide. Biddle points out that for all the advances in technology soldiers can still effectively protect themselves from detection and destruction by hiding behind micro-terrain (i.e. small undulations in the ground), under rubble, and inside densely wooded areas. As insurgents in Iraq and Afghanistan have proven, they can also just blend in with the surrounding population.[134] Chris Demchak suggests that the revolutionary technologies touted by RMA scholars will

[134] Biddle, *Military Power*, 198–208.

actually make the militaries that adopt them more vulnerable to disruption and preemption.[135]

The second group, which includes Martin Van Creveld, Rupert Smith, among others, argues that a military revolution is indeed unfolding, but has nothing to do with precision weapons or computers.[136] Instead, this military revolution is one of insurgency and asymmetry. As a result, heavy investment in technology, which scholars in this camp see as better suited to mid and high intensity conventional warfare, represents a huge misallocation of resources and capabilities.[137]

The third group challenges the RMA paradigm on a more fundamental level. Where RMA theories encourage states to predict and take advantage of military revolutions, historians Williamson Murray and MacGregor Knox argue that genuine military revolutions transform state, society, technology, and the military. This characteristic makes them unpredictable and uncontrollable.[138] As a result, there is no point in trying to 'get ahead of the power curve,' because states are as likely to get it wrong, as they are to get it right.

[135] Demchak, "Complexity and Theory of Networked Militaries."
[136] Van Creveld, *Technology and War*; Rupert Smith, *The Utility of Force: The Art of Warfare in the Modern World* (London ; New York: Allen Lane, 2005); Emile Simpson, *War from the Ground up: Twenty-first Century Combat as Politics* (New York, NY: Columbia University Press, 2013).
[137] Van Creveld, *Technology and War*; Smith, *The Utility of Force*.
[138] Knox and Murray, *The Dynamics of Military Revolution*, *1300-2050*.

This critical debate remains unresolved. Seemingly discredited by the wars in Iraq and Afghanistan,[139] and more recently undercut by a global recession and American fiscal retrenchment which makes transformation less affordable, the RMA literature is now largely ignored in academic circles.[140] We should not take this to mean that the question has been answered or no longer matters.

Beyond revolution

The most recent work on the link between technological change and military change steps back from making sweeping claims about the nature of this relationship. It instead focuses on narrower and ultimately more tractable elements of this relationship, including how new technologies spread, how states develop new military technologies, and how organizations respond to them.

In *The Diffusion of Military Power* Michael Horowitz focuses on this issue of how new technologies spread.[141] He starts by making an obvious point overlooked by most security

[139] Both of which started as showcases for an American military transformed along RMA-like lines. Whether the U.S. military really had transformed or not; and whether those two conflicts truly discredited the RMA paradigm, is a matter of debate – a debate which by and large has not occurred.

[140] It is important to distinguish the RMA literature's policy implications from its theoretical ones. It may have overstated the case for precision technologies – not least in their ability to deliver fogless, frictionless war. But this should not distract us from the larger theoretical contribution it made in directing our attention to technology's important and potentially revolutionary role in military affairs. In fact, RMA enthusiasts can be wrong about the precision revolution (although given how long past revolutions took to unfold it is equally likely they were simply wrong about the speed with which the precision revolution would unfold) without being wrong about their larger and far more important points about the relationship between technology and innovation. Nor is it necessarily clear that they were wrong about the impact which precision weapons might still have on warfare. As was the case in World War I, many of the technologies that ultimately revolutionized warfare in 1914 made their debut nearly 100 years earlier. It is entirely possible that 'RMAists' are correct, but just got ahead of themselves.

[141] It is important to note that Horowitz does not apply his theory only to new technologies. Ostensibly, his argument applies to organizational and doctrinal innovations as readily as it does to technological ones. Unfortunately, he does not thoroughly test this proposition, as only one of his four core case studies examines a non-technological innovation (suicide terrorism – which, except for 9/11, has not been a major determinant of military power in any century). In many respects, his theory is indeterminate (or in his terminology, medium) as to how most innovations

scholars: states – even great powers – do not always bother to acquire the newest weapons, even after they have proven their worth in combat. This was the case with some of the most important and powerful weapons of the 20th century, including battleships, air craft carriers, and nuclear missiles. This contradicts a central tenet in both realism and the RMA literature, which holds that states will tend to uniformly converge on the most effective new technologies.[142]

Horowitz's argues that new military technologies actually spread at a rate determined by the financial and organizational costs they impose on the states that try to adopt them. Financial costs are driven by how expensive the weapon is to procure or develop. Organizational costs are a function of how much the military has to change to absorb the new technology. This leads Horowitz to predict that new technologies, which are financially and organizationally cheap, will spread faster and wider than those that are financially and organizationally expensive. This explains why battleships spread more quickly and more widely than aircraft carriers. Financially, battleships, though by no means cheap, were far less expensive to build than aircraft carriers. Organizationally, navies could more or less use regular sailors to man battleships, but they had to create an entire corps of pilots to use aircraft carriers.

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in ground warfare – an important category – will diffuse, since the most important ground innovations impose high organizational costs, but relatively low financial ones. While this theory addresses an important gap in security studies, it also leaves an impressive one of its own. It is remarkably a-strategic. In other words, the theory leaves no room for strategic considerations to influence the kinds of weapons states will buy – cost (organizational and financial) is the only determinant. To buy this theory wholesale is to predict that a land locked state will still buy a new type of warship if it is cheap enough and can somehow be used by its army.

[142] Because failure to copy the best weapons and best practices will lead to defeat in war.

Peter Dombrowski and Eugene Gholz approach technological innovation from the supply side, looking at how major shifts in military technology affect the defense firms who compete to produce them.[143] In doing so they shed light on the bureaucratic and political forces, which, at least in the United States, kept post-Cold War technological innovations in the hands of status quo defense firms. Immediately after the Cold War's end most analysts predicted a major shift in the American arms industry, assuming the military's demand for information technology and precision weapons would favor upstart technology firms over the staid, bloated and backward looking producers that dominated Cold War arms production.[144]

Dombrowski and Gholz argue that these expectations were misguided for three reasons. First, over the preceding fifty years traditional arms producers developed and nurtured remarkably strong political coalitions with both the Department of Defense and Congress. This gave them tremendous advantages in how research spending and acquisitions decision-making. Thus, business theories developed to explain private sector innovation did not apply to weapons production because political considerations trumped economic ones.[145] Second, despite the disruptive potential in the new precision and information technologies the non-political barriers to entry were high for new firms. Arcane regulations and niche requirements deterred competition.[146] The newer technology firms had no idea how to navigate the maze of bureaucratic processes and hurdles that dictated acquisitions

[143] Peter J Dombrowski, *Buying Military Transformation: Technological Innovation and the Defense Industry* (New York: Columbia University Press, 2006).
[144] Ibid., 138.
[145] Ibid., 20.
[146] It is probably safe to say that at least some of the bureaucratic hurdles were erected as a result of political lobbying by traditional arms manufacturers.

decision-making. In contrast, over the preceding fifty years traditional arms producers created entire departments that hired former military officers and Pentagon officials to perfect the art of bureaucratic navigation and circumvention. Finally, Dombrowski and Gholz point out that only so-called disruptive innovations were likely to create a demand for the kinds of weapons that existing firms were ill-suited to produce. Despite their many advantages on the battlefield, precision munitions and information technologies tended to augment – not replace – traditional weapons platforms. New sensors and computers made tanks more lethal, but they did not obviate the need to buy tanks in the first place.

Mark Hewitt's dissertation on the Predator and Global Hawk unmanned aerial vehicle programs looks at how social networks of scientists, contractors, defense civilians and military officers foster technological innovation. Hewitt theorizes that innovative technologies typically proceed through seven stages: basic research, applied research, advanced development, demonstration, manufacturing development, acquisitions management, and operational systems development.[147] The most imposing barriers to technical innovation occur in the early stages of this process, when any number of challenges unique to the defense sector– including complex regulations, the extremely specialized nature of technical development, the highly esoteric requirements of the military services, infighting between defense bureaucracies – operate individually and collectively to impede progress. [148] To be successful a program must simultaneously develop both the technologies and the concepts for their use. Meanwhile, proponents have to generate political support inside and outside the defense community, a task made even

[147] Hewitt, "Early-stage Military Technology Innovation," 3.
[148] Ibid., 7–8.

more complicated by the fact that nascent technologies are failure prone. Social networks help new technologies navigate these pitfalls by facilitating the diffuse transfer of ideas, knowledge, funding, and experience between the scientists who develop the technology, the soldiers who must use it, and the politicians who have to find a way to pay for it all.[149] Hewitt shows in that with both the Predator and Global Hawk, social networks proved most useful in overcoming non-technical (i.e. doctrinal and political) obstacles.[150]

Finally, in her work on how American horse cavalry responded to the mechanization and motorization technologies that ultimately replaced them Sarah Rittgers sheds light on the link between technological innovation and organizational response.[151] In broad terms her work validates one of the RMA literature's core tenets: new technology will not spur a broader innovation in the absence of organizational and doctrinal change. This was certainly true of the horse cavalry. American cavalrymen resisted mechanization and horses were still being used as late as the Second World War.[152] However, Rittger's research goes further than typical RMA studies in highlighting several important sources of – and solutions to – organizational resistance to change. Perhaps her most striking finding is that symbolism and emotion were as much a source of resistance to mechanization as institutional rigidity or bureaucratic interests. As she describes the transition, "it was emotionally difficult for the cavalry to give up its horses and sabers, both of which constituted the cavalry's symbolism and identity. As a result, the cavalry modernized, in

[149] Ibid., 50.
[150] Ibid., 402–403.
[151] Rittgers, "From Galloping Hooves to Rumbling Engines."
[152] Ibid., 342–356.

part, to maintain its efficiency and therefore keep the horse."[153] This is a useful rejoinder to potential innovators who buttress their calls for change with appeals to efficiency and efficacy. Second, the fact that technical progress was uneven created opportunities and reasons for cavalrymen to resist change.[154] Indeed, for much of the interwar period horses were more reliable than their mechanical competitors. Third, cavalrymen did not reject new technologies out of hand. In fact, they could be quite progressive at adopted new tools… so long as they could be put to use augmenting instead of displacing existing capabilities. Finally, in a conclusion that speaks to the civil-military literature, Rittgers argues that cavalrymen were ultimately incapable of generating change from within. It took active intervention by civilians and leaders from outside the cavalry to complete the transition towards mechanization.[155]

VII. Moving Forward

Points of consensus: Leaders, threats, and resources

Security scholars have struggled for the better part of three decades to understand why, when, and how militaries change. Their diverse approaches and findings are reflected in a sprawling literature defined by disagreement and debate. This presents a challenge for moving the literature forward. After all, where does one begin when those who have gone before disagree on everything from first principles to basic definitions?

[153] Ibid., vi.
[154] Ibid., 383.
[155] Ibid., 392 – 393.

A useful starting point is to focus on the points of consensus that do exist in the scholarship. Taking a step back from the fray it seems safe to say that *most* scholars of military change agree on at least three points:

Leaders matter

This is as close as the literature comes to unanimity. For change to succeed, senior leaders must provide support.[156] Most of the studies cited in this review make this point, even if the precise reason why senior leaders matter varies from theory to theory.[157] Proposed roles include working on the behalf of civilians trying to impose change from above; developing a coherent vision to facilitate purposive action by subordinates; protecting the careers of those who support innovation; generating external allies and resources; and punishing or co-opting internal opponents to change.[158]

[156] This mirrors similar findings in the business, management and psychological literatures on organizational change. See Dong I. Jung, Chee Chow, and Anne Wu, "The Role of Transformational Leadership in Enhancing Organizational Innovation: Hypotheses and Some Preliminary Findings," *The Leadership Quarterly* 14, no. 4–5 (August): 525–544; Taly Dvir et al., "Impact of Transformational Leadership on Follower Development and Performance: A Field Experiment," *The Academy of Management Journal* 45, no. 4 (2002): 735–744; Michael D. Mumford et al., "Leading Creative People: Orchestrating Expertise and Relationships," *The Leadership Quarterly* 13, no. 6 (December 2002): 705–750; Michael D. Mumford and Brian Licuanan, "Leading for Innovation: Conclusions, Issues, and Directions," *The Leadership Quarterly* 15, no. 1 (February 2004): 163–171.

[157] There is only one significant exception to this statement. In his study of innovation in the First World War, Robert Foley argues that the German Army engaged in horizontal innovation. That is, individual units innovated and disseminated new practices without top level direction or endorsement. I of course dispute this claim in my chapter on the First World War. See Robert T. Foley, "A Case Study in Horizontal Military Innovation: The German Army, 1916–1918," *Journal of Strategic Studies* 35, no. 6 (2012): 799–827.

[158] Clark, "Innovation Under Fire"; Jensen, "Military Innovation in the U.S. Army"; Rosen, *Winning the Next War*; Posen, *The Sources of Military Doctrine*; Zisk, *Engaging the Enemy*.; Patterson, "The U.S. Army and Nation-building."; Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform"; Nagl, *Counterinsurgency Lessons from Malaya and Vietnam*, 195.

Threats and adversaries help

A second point of consensus in the literature (albeit one which is largely unacknowledged) is that change becomes *easier* as threats and adversaries grow less ambiguous. This is not an uncontroversial point, especially because it appears to endorse Barry Posen's original theory of military innovation – the theory much of the subsequent literature positions itself against. Still, taken as a whole, most studies suggest a strong link between threats and change. Threats alone do not *always* – or even usually – trigger change. Perception matters and the failure to recognize a new adversary is clearly one major reason for stagnation. Nor is it to say that Barry Posen's causal mechanism is correct. We can (and virtually every subsequent innovation scholar does) take issue with his rather weak prediction that innovation only happens when civilians impose change from above.

This correlation suggests that clear threats and adversaries make change easier than it would have been in their absence. Obviously, more work needs to be done to flush out the causal significance of this association. Perhaps Williamson Murray and MacGregor Knox's work on the subject offers a useful starting point for future research in this direction. [159] Looking at major interwar innovations they suggest that clear adversaries foster innovation because war planners can identify concrete strategic, operational, and tactical objectives. Coherent objectives help leaders identify where their existing capabilities fall short. When gaps are found the search for new solutions can begin. Moreover, clear adversaries and objectives limit the search for new ideas and capabilities. Anyone who has

[159] Murray and Knox are an exception to this, as they rather clearly make the case that clear threats are important to innovative behavior. Williamson Murray and MacGregor Knox, "The Future Behind Us," in *The Dynamics of Military Revolution: 1300 - 2050*, ed. Williamson Murray and MacGregor Knox (New York, NY: Cambridge University Press, 2001), 180–182.

ever sat in on a brainstorming sessions knows there is always a risk of sliding into never-ending quest for increasingly unrealistic solutions.

Resources do not

Finally, a review of the literature suggests an unclear link between organizational change and slack resources.[160] Some militaries change in times of fiscal plenty. The U.S. Navy's ICBM programs and the U.S. Army's work with precision-guided munitions in the 1970s and 1980s are two such examples. However, change also occurs during periods of severe fiscal austerity. Some were quite remarkable. The German Army's work on maneuver warfare; the U.S. Navy's carrier program; and the U.S. Marine Corps' amphibious assault innovations all came to fruition despite severe budgetary constraints. Finally, there are examples of militaries that failed to innovate, adapt, or emulate despite the fact they had access to nearly unlimited budgets. The U.S. Army in Vietnam stands out as one extreme example. A large-N, quantitative study of the subject, which has yet to be done, would certainly offer more definitive results. In the meantime it suffices to say that nothing yet uncovered by three decades of intense research on military innovation buttresses the fear often cited by contemporary pundits that cuts to the American defense budget will undercut future innovativeness. Based on what we know now fiscal resources are an exceptionally weak predictor of innovative behavior.

[160] For a sociological perspective on this, see Ian Roxborough, "Organizational Innovation: Lessons from Military Organizations," *Sociological Forum* 15, no. 2 (June 1, 2000): 367–372.

Directions for future research

If the foregoing analysis is correct, it suggests that we can be reasonably sure that leaders matter, threats help, and resources are probably spurious when it comes to military change. Similarly, it means that the balance of power, regime characteristics, institutional structures, organizational factors, culture, and technology also matter, although when, how, and to what degree depends on whom you talk to.

So where does this leave us? This chapter concludes with the suggestion that four questions should frame future work on military change in all of its forms.[161]

Where do pro-change leaders come from?

Although the finding that leaders matter enjoys widespread support in the literature it also begs an entirely new set of questions. Chief among these is whether we should think of pro-innovation leaders as mavericks (outcast visionaries who team up with civilians to fight for change),[162] or consummate insiders (mainstream leaders who follow a traditional path to power within the organization only to advocate change once their have reached the top).[163]

Both views have shortcomings. As Stephen Rosen points out, mavericks are outsiders.[164] Since militaries are notoriously closed-off it is not clear how an outsider manages to convince, cajole, or co-opt skeptical peers; or why civilians would trust an officer who is

[161] Of course I have tried to position my dissertation to address as many of these as possible.
[162] Posen, *The Sources of Military Doctrine*.
[163] Rosen, *Winning the Next War*., 10 – 13.
[164] Ibid., 21.

already on the fringes of his or her professional community to be their leading advocate in the first place.[165]

Perhaps we can get around the problem of figuring out how a pro-innovation leader comes to power if we think of them as consummate insiders. But this raises a new set of questions. If insiders are status quo players by definition, why do they become pro-innovation in the first place? Since every military organization has a leader what explains why one leader becomes pro-innovation while another does not? You could argue that insiders support innovation when they know it will work, but such an explanation is riddled with hindsight bias. All innovations are untested and risky. *A priori* no one knows with confidence which will work and which will fail. Moreover, even leaders who support innovative thinking often have to choose between multiple innovations, leaving it unclear why they back one innovation over another.[166]

At present, the view that consummate insiders are more effective at facilitating innovation than mavericks enjoys widespread support in the literature. Future work should therefore focus on helping us say something systematic about where these leaders come from and what makes them more or less likely to come to power. Without more work the literature's most consistent finding risks becoming a *deus ex machina*.

[165] Ibid.
[166] You can open up virtually any modern professional military journal and find someone suggesting a newer, better way of doing business.

Certainly, a dizzying array of factors influences human behavior. It is probably impossible to develop a general theory that can precisely capture how an individual military leader thinks and acts. At the same time we can certainly identify factors and forces, which make it more or less likely that a given military leader will endorse change. This is how I approach the issue of leadership and change. Command, Assessment and Training (CAT) theory predicts that armies with a decentralized command culture and a centralized training structure tend to foster leaders who are willing to support change. Chapter 3 and the case studies go into further detail.

Is it time to move beyond competitive theory testing?

As mentioned several times, to survey the literature is to think that everything matters when it comes to military change. This may be true. Military adaptation is a complex, messy phenomenon that resists easy explanation. It stands to reason that it should have many drivers, shapers, and determinants. This makes the field's preference for competitive theory testing (whereby a scholar pits his preferred theory against another's) curious.

The ancient Indian fable in which six men blind men try to describe an elephant while each touches a different part is an apt analogy. In this story each of the six men tries to describe an elephant by touching only a part of it. Because one touches its trunk, another its leg, another its tail and so forth they are quickly reduced to squabbling about what kind of animal they are touching and how best to describe it.

If we assume that we as scholars are to change as blind men are to elephants (as in not capable of seeing the entire phenomenon at one time or from one vantage point), then competitive theory testing leads us down the same fruitless path. While the field has long followed Stephen Rosen admonishment to avoid seeking a grand theory of military innovation, we might be better served to avoid a parsimonious one. Instead of trying to prove that military change is primarily driven by shifts in the balance of power; institutional arrangements; organizational features; and so on, a better approach would be to focus on determining the conditions under which we should expect one variable to matter more than another. Alternatively, instead of focusing on the one or two variables that matter in every case, scholars should set a more modest goal of determining whether specific variables exert a consistent impact on change – even if their effects are not always the dominant ones.

Why rely on single case studies?

With only a few notable exceptions single, qualitative, or small-n case studies dominate the military innovation literature.[167] This approach is not without merit: it helps with theory generation, process tracing and plausibility testing. Yet it also has limits. The most important of these is that it limits our ability to generate broader generalizations about how and why military organizations change. [168] It also makes it hard to determine whether or not we can expect consistent relationships between variables (in other words, it is hard

[167] Work by Stephen Rosen and Michael Horowitz stand out.

[168] The security studies literature on military change is not alone in this respect. A similar critique was levied with respect to the business and economics literatures on innovation… 30 years ago. See J. R. Kimberly and M. J. Evanisko, "Organizational Innovation: The Influence of Individual, Organizational, and Contextual Factors on Hospital Adoption of Technological and Administrative Innovations," *Academy of Management Journal* (1981): 689–713.

to establish controls – or to 'hold all things equal' – in qualitative work.) If nothing else, the single case/qualitative methodology is at odds with the dominant approach in other literatures on innovation, including those found in economics, psychology, sociology, and business. When compared to these literatures it might seem like military innovation scholars need a unique theory to explain each and every innovation instance.

Future work should eschew single case studies for those of a comparative or quantitative nature. Where theories and data allow it future scholars would even be well served to incorporate large-N, econometric studies. Although my own approach is to use multiple comparative case studies, quantitative research might prove useful in generating consistent, stable, and generalizable findings. This could be especially true with regards to how resources and budgets affect innovativeness.

Should we differentiate between armies, navies, and air forces?

Mirroring a similar trend in the broader organizational change literatures,[169] scholars of military change tend to divide the phenomenon along a number of analytic lines (i.e. innovation versus diffusion; technological versus doctrinal; incremental versus radical) and develop unique theories to explain each. However, these same scholars have yet to make theoretical distinctions along service lines. Instead, the implicit assumption remains that theories of diffusion, emulation, and adaptation apply equally to armies, navies and air forces.

[169] Damanpour, "Organizational Innovation."

This characteristic is curious because it ignores important differences between these three types of organizations. Organizational scholars in economics, business, and psychology have long recognized that theories that explain change in one type of firm may not generalize well to other types of firms.[170]

From this perspective, armies, navies and air forces do represent different types of firms. They have different missions, use different weapons, face different kinds of civilian oversight, and organize themselves in different ways. For example, compare the U.S. Army with the U.S. Navy. If you paint with a broad enough brush the two would appear to have many similarities. Both are charged with protecting national security; both have large budgets; both organize their personnel (all volunteers divided among an officer and enlisted class) into warfighting and support teams; both answer to the same civilian overseers; and both have traditions and histories that date back to the American Revolution.

Yet to probe even a little deeper is to find important differences. It is true that both are responsible for protecting national security, but the Army wages war on the ground while the Navy maintains command of the commons. While both have large budgets, the Navy spends far more of its budget on platforms (ships, aircraft and the like), than the Army (which devotes a far larger percentage to its human capital). Both fight in teams, but

[170] Keith Pavitt, "Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory," *Research Policy* 13, no. 6 (December 1984): 343–373; Fariborz Damanpour, "The Adoption of Technological, Administrative, and Ancillary Innovations: Impact of Organizational Factors," *Journal of Management* 13, no. 4 (Winter 1987): 675 – 688; Cohen and Levin, "Chapter 18 Empirical Studies of Innovation and Market Structure." As Cohen and Levin point out, the fact that technological change has different implications for different firms and industries is a major reason for distinguishing between them. Cohen and Levin, Pg. 1087.

ground combat under modern conditions gives extraordinary latitude to each individual soldier. In contrast, sailors fight with machines as machines, with each sailor serving as a small cog in a much larger human-mechanical organism. Genuine independence exists at the level of the ship (controlled by a single captain) rather than with each individual. Both answer to the Pentagon, but the Pentagon has a far easier time tracking the Navy's 200+ ships than it does the Army's 500,000 personnel and tens of thousands of individual vehicles, tanks, and helicopters.[171] And although both services have long lasting traditions, their traditions are fundamentally distinct (leading to Carl Builder's aforementioned thesis that each service possesses a distinct organizational culture).

In the final analysis armies, navies, and air forces are distinct from one another in enough ways that it would be a bit surprising if these differences did not affect how they change. Therefore, it is worth generating distinct theories to address doctrinal change in each. Such an approach may generate new insights.

[171] Each of which has the firepower to create a fiasco worthy of the nightly news.

Chapter 3

Command, Assessment and Training Theory

"It is not merely the tools of warfare but the organizations that wield them that make for revolutionary change in war."[1]

I. Overview

Change is hard. Changing in the middle of a war is even harder. Nevertheless, some armies are better at managing the challenge than others. This chapter describes how Command, Assessment and Training (CAT) theory captures an important reason for such variation. As briefly introduced in chapter 1, CAT theory uses three organizational-level variables to explain why some armies optimize faster than others: command cultures, assessment mechanisms, and training structures. It predicts that armies with moderately decentralized command cultures, a highly centralized training structure, and an autonomous assessment mechanism will be better at aligning their prewar doctrines with wartime realities than armies that combine these variables in any other way

This chapter is organized as follows: section two describes CAT's core assumptions. Section three summarizes how business, management and psychology scholars think about organizational change. Section four builds on their insights to develop CAT theory in detail. Section five tackles measurement issues. Section six discusses confounding variables and alternative explanations. Finally, section seven concludes with a discussion of the theory's scope conditions.

[1]Eliot A. Cohen, "A Revolution in Warfare," *Foreign Affairs* 75, no. 2 (March 1, 1996): 46.

II. Core assumptions

Like all theories, CAT is based on a set of assumptions about how the world works. In this case there are two: First, *CAT assumes that in any given conflict there is a single, optimal warfighting doctrine that, if adopted, maximizes the probability an army will achieve its battlefield objectives at the lowest possible cost.* Put simply, this assumption suggests that in every war there is always a single, 'best' way to fight. It is important to point out that the 'best' way to fight may not be the same for both sides, as is especially the case in asymmetric conflicts.[2]

Second, *CAT assumes that armies prefer to achieve their desired goals at the lowest possible cost to lives and materiel.* This assumption means armies care about efficiency.[3]

What these assumptions imply

Together, these assumptions imply that we can to distinguish an optimal doctrine from a sub-optimal one.[4] Optimal doctrines give armies the best chance to achieve its goals at the lowest possible cost. Ultimately, optimal doctrines are similar to a Platonic ideal. They exist independent of whether or not an army manages to approximate one. However, the closer an army comes to adopt one, the more likely it is to achieve its goals at the lowest possible cost.

[2] CAT assumes that each army has its own optimal doctrine, although the more any two armies are alike (in terms of size, resources, objectives, culture, technology, etc.) the more likely they are to share the same optimal doctrine.
[3] This assumption has nothing to say about whether moral and ethical considerations drive the pursuit of efficiency, or whether the desire to conserve resources for future contingencies.
[4] I discuss why it is nevertheless hard to distinguish optimal from sub-optimal doctrines momentarily.

What these assumptions do not imply

Adopting an optimal doctrine increases the *probability* that an army will achieve its military goals at the lowest possible cost. It does not mean that the army will always do so. Nor does it always mean that having an optimal doctrine will always lead to victory. Wars are also highly stochastic phenomena. They remain a game of chance – a single draw from a set of possible outcomes. The closer an army gets to the optimal doctrine, the better its chances are. But just as a card player armed with the perfect strategy and total knowledge of the odds can still lose any given hand, so too can armies with the perfect doctrine can still lose in war. At the end of the day, even optimal doctrines do not protect armies from getting lost in sandstorms; soldiers from getting drunk on post; generals from adopting inappropriate strategies; or asteroids from destroying critical command and control nodes at the most inopportune moment imaginable.[5] War outcomes are the result of complex factors, and no single factor always assures victory. This fact, more than any other, is what makes it so hard to ascertain what works and what does not work on the battlefield in the first place.

These assumptions also do not say anything about when the optimal doctrine will change. It could change for every army in every war. Or it could remain remarkably consistent over time.[6] The factors and forces that determine what the optimal doctrine will be for a given army are virtually endless. They can include political objectives, military objectives,

[5] This was written several months before the February 2013 meteor strike in Russia.
[6] See Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton University Press, 2004) for an extreme version of this point. He argues that there has been a single optimal warfighting doctrine (for mid- to high intensity warfare) since the end of the First World War. Although I tend to agree with his argument, it is not necessary to make this bold a claim for the purposes of building and testing CAT theory.

resources, technology, audience costs, culture, and, of course, the nature (and optimal doctrine) of the adversary. When these factors change, the optimal doctrine will change as well.

Furthermore, these assumptions do not imply that the relationship between these aforementioned inputs (e.g. technology, goals, etc.) and the optimal doctrine is proportionate. A major advance in technology might have a small impact on the optimal doctrine. This seems to have been the case with atomic weapons, at least vis-à-vis ground warfare. Conventional warfighting doctrines have remained remarkably consistent in the nuclear age.[7] Similarly, there is no reason that a small change in technology will not trigger a major change in the optimal doctrine. The breech-loading rifle is an example.[8] At the end of the day, the mechanism by which change occurs exists just as surely as the optimal doctrine, but is just as unknowable as well.

This last point has an important implication for prediction. At first blush it might seem that these assumptions place CAT theory firmly in the revolution in military affairs (RMA) camp. After all, if we can detect shifts in technology or objectives we should also be able to predict shifts in the optimal doctrine. However, there is a significant difference between knowing

[7] Of course, this could change if nuclear countries start re-visiting their reluctance to use tactical nuclear weapons on the battlefield. In the 1950s the U.S. Army considered adopting a revolutionary new doctrine to prepare for the nuclear battlefield. Within a few years they returned to their standard, conventional doctrine. For an in depth discussion, see Andrew Bacevich, *The Pentomic Era : the US Army Between Korea and Vietnam* (Washington, D.C.: National Defense University Press, 1986).

[8] For those who may not be familiar, breech-loading rifles meant soldiers no longer had to load their weapons from the front end of the barrel. In turn, this meant they no longer had to stand up to re-load, ushering in the ability to fire and load while lying down. When combined with metal cartridges (i.e. bullets as we now think of them) the result was a radical increase in rates of fire and lethality. This was to have enormous consequences for attacking forces by the late 19th century (since defenders could lay down, but attackers, by virtue of their task, had to stand to advance).

that the optimal doctrine has changed, and predicting the degree and direction to which it has changed. To reiterate, these aforementioned assumptions simply imply that a change in technology and/or objectives always leads to a shift in the optimal doctrine. They say nothing about whether this relationship is proportionate, or if proportionality (if any) is fixed. As chapters 4 through 11 demonstrate, when it comes to doctrine, being off by even a little bit can prove costly.

Are these assumptions sound?

These might seem like bold assumptions, but it is only because they are deliberately stated at the outset. The same basic assumptions underlie any scholarly work that criticizes how an army fought. To argue that an army did a poor job of waging a war (e.g. most work on the U.S. in Vietnam; the Soviets in Afghanistan; the early phases of the U.S. occupation of Iraq; and the French Army in World War II) presumes an alternative and superior option was available in the first place.

In terms of the assumption that wartime armies share an interest in efficiency and economy: peacetime armies obviously pursue a myriad of goals, many of which may have nothing to do with efficiency, let alone effectiveness.[9] However, the incentives to operate with efficiency are magnified once the fighting starts. Institutional self-interest suggests that the efficient use of resources will deter political and civilian interference by keeping human and materiel costs to a minimum. It likewise conserves resources for coping with

[9] Some regimes deliberately build ineffective militaries – especially those at risk of a coup. See Kristen Harkness, "The Origins of African Civil Military Relations: Ethnic Armies and the Development of Coup Traps" (Ph.D. Dissertation, Princeton University, 2012).

unforeseen contingencies. There is also the issue of altruism. Military leaders are at least as interested as anyone else – and perhaps more so – to risk as few lives as possible, given that the decision to go to war has already been made.

What it all means

If you accept these foregoing assumptions, then the challenge of change is one of iterative learning once the fighting starts. To align their prewar doctrines with wartime realities armies must adapt, innovate, and emulate as needed to maximize the probability that they will attain their battlefield objectives at the lowest possible cost.

Armies as evolutionary search engines

The process through which optimization occurs is obviously complex and varies in its details from case to case. A set of analogies briefly introduced in chapter 1 may be an intuitively useful starting point.[10] War acts like a natural selection mechanism. It imposes higher costs on armies that fail to adapt to its particular characteristics than it does on those that do adapt. Mutation is the only way to survive as war itself changes. There is an ideal rate at which mutation should occur. Species that mutate at too high a rate tend to die off, since most mutations do not work. Species that do not mutate at all also tend to die off, since they fail to adapt at all. The species that tend to do best are those that mutate at a steady rate and in an incremental way bound rather tightly about the status quo.

[10] I am in debt to Professor Stephen Biddle for suggesting this analogy in an early discussion about CAT theory.

Of course, natural selection is an unconscious process, and armies are organizations, not organisms. This is where the search engine analogy becomes useful. Organisms mutate (or fail to mutate) whether they want to or not. Organizations have to be deliberate, if only because they can stop undesirable mutations and we know about bureaucracies prefer the status quo.[11] To distinguish between when change is necessary or desirable and when it is not an army must act like a search engine, scouring its environment for information that validates or refutes the status quo. [12]

This process is iterative, like a modern search engine. It is also more complex than a simple feedback loop, since armies are large organizations with hundreds – if not thousands – of front line units. [13] Each unit generates information as it operates. Armies monitor how these units perform and push this information to upper echelon decision makers. Where this information suggests either a gap in performance, or a better way of doing things, leaders can decide to initiate a change organization-wide. The act of changing itself entails further refinement and adjustment. And once the change has been implemented, the search begins again.

Three potential problems can complicate the cycle. First, if all front line units operate exactly the same way the lack of variation will not generate useful information for processing. Second, if there is absolutely no overlap in how front line units operate then

[11] James Q Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It* (New York: Basic Books, 1989); S. P Rosen, *Winning the Next War* (Cornell Univ. Press, 1994).
[12] Note that I am not saying every army does this. I am simply saying that change becomes highly unlikely if it is not done.
[13] E.g. Stephen Rosen's thermostat analogy

there will be too much information (plus, as mentioned, the army is likely to fail a lot, since most mutations do not wind up working). Third, the army must have a well-defined process by which information generate on the front lines is translated into useful and coherent data for higher-level leaders. Otherwise, leaders will find themselves buried under a mountain of raw and ultimately meaningless data.

III. The theory of organizational change

Optimization as a linear process

While this mixed analogy is a useful way to intuitively describe CAT theory, it does not help with theory testing. A better way to tease out testable hypotheses and observable implications is to think of this cycle of evolutionary searching as a single, linear process. This approach is how most business, management, and public administration scholars think about organizational change.[14] In general, these scholars divide organizational change into at least six steps:[15]

[14] In the 1960s and 1970s organizational change scholarship conceptualized the process as linear and sequential. See Terry N. Clark, "Institutionalization of Innovations in Higher Education: Four Models," *Administrative Science Quarterly* (1968): 1–25; W. J Abernathy and J. M Utterback, "Patterns of Innovation in Technology," *Technology Review* 80, no. 7 (1978): 40–47; Lloyd A. Rowe and William B. Boise, "Organizational Innovation: Current Research and Evolving Concepts," *Public Administration Review* 34, no. 3 (May 1, 1974): 284–293. Subsequent work in the 1980s and 1990s cast doubt on this simplistic model, arguing instead that the process interactive and multidirectional. In his seminal work on this topic, James March argued that all organizations simultaneously engage in exploitation (of existing practices) and exploration (of new practices), although specific conditions usually ensure that only one is dominant at a time. SeeJames G. March, "Exploration and Exploitation in Organizational Learning," *Organization Science* 2, no. 1 (January 1, 1991): 71–87. For other perspectives on this point, see also Stephen J. Kline and Nathan Rosenberg, "An Overview of Innovation," *The Positive Sum Strategy: Harnessing Technology for Economic Growth* 14 (1986): 640; Bengt-Åke Lundvall, "National Business Systems and National Systems of Innovation," *International Studies of Management & Organization* 29, no. 2 (July 1, 1999): 60–77. However, the most recent scholarship on organizational change suggests that the original linear approach, while not entirely accurate, manages to capture the basic causal process. Moreover, because the linear model is far more parsimonious, it has the added virtue of bringing clarity to a highly complex phenomenon. See Mary M. Crossan and Marina Apaydin, "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature,"

Environmental change

A change in the environment usually initiates the process.[16] In terms of warfare, such changes follow new technologies, new rivals, new goals, or the simple realization that the old way of doing business is not working (i.e. defeat looms).[17] The source of these shocks is less important than the fact that they render an army's status quo strategies, processes, and products outdated *in objective terms.*[18] In the wake of such exogenous shifts the army must change to remain competitive, whether it knows it or not.[19]

Journal of Management Studies 47, no. 6 (2010): 1166. For this reason, CAT theory models doctrinal change as an essentially linear process, while acknowledging that feedback loops and reverse causality may also be at play.

[15] What follows is a summary and simplification of findings from the economics, business and management, public administration, and psychological literatures on the process of change. Obviously, there is some disagreement about the precise number of steps and the boundaries between them. The six identified here are consistent with the prevailing view.

[16] Fariborz Damanpour and William M. Evan, "Organizational Innovation and Performance: The Problem of 'Organizational Lag'," *Administrative Science Quarterly* 29, no. 3 (1984): 392–409; Louis G. Tornatzky, Mitchell Fleischer, and Alok K. Chakrabarti, *The Processes of Technological Innovation* (Lexington Books Lexington, 1990); Fariborz Damanpour, "Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators," *The Academy of Management Journal* 34, no. 3 (1991): 555–590. As described in chapter 1, such changes can be both endogenous and exogenous to the intense competition between organizations.

[17] Richard R Nelson and Nathan Rosenberg, *National Innovation Systems a Comparative Analysis*, ed. Richard R Nelson (New York: Oxford University Press, 1993), 7.

[18] It is worth noting that in the economics, business and management literatures on organizational change once emphasized a difference between shifts in production (i.e. outputs) and shifts in process (i.e. the way outputs are made). The argument was that each changed according to a distinct logic, and therefore each needed its own theory. See Wesley M. Cohen and Richard C. Levin, "Chapter 18 Empirical Studies of Innovation and Market Structure," vol. Volume 2 (Elsevier, 1989), 1006; Anthony Arundel and Isabelle Kabla, "What Percentage of Innovations Are Patented? Empirical Estimates for European Firms," *Research Policy* 27, no. 2 (June 1998): 127–141; Mark S. Freel, "Sectoral Patterns of Small Firm Innovation, Networking and Proximity," *Research Policy* 32, no. 5 (May 2003): 751–770; Damanpour, "Organizational Innovation." The most recent work in these fields pushes back on this disaggregation, arguing that shifts in production and process are complementary rather than distinct. See Fariborz Damanpour, "An Integration of Research Findings of Effects of Firm Size and Market Competition on Product and Process Innovations," *British Journal of Management* 21, no. 4 (December 1, 2010): 1008; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation," 1168.

[19] Constance E. Helfat et al., *Dynamic Capabilities: Understanding Strategic Change in Organizations*, 1st ed. (Wiley-Blackwell, 2007).

Detection

Not every organization recognizes that its environment has changed, and detection is a prerequisite for action.[20] An entire range of problems can inhibit detection.[21] It follows that organizations that are receptive to new information;[22] have leaders or a culture that tolerate ambiguity, dissent, and alternative viewpoints;[23] and have information collection processes (i.e. feedback loops) in place before the environmental shift are more likely to recognize when one occurs.[24]

Generation

Next, an organization needs to generate alternative courses of action.[25] Options include maintaining the status quo, innovating a new capability, emulating another organization, or adapting existing processes. Scholars debate whether ideas generate from the top-down, from the bottom-up, or both.[26] Regardless, there is a great deal of consensus that decentralization, a culture that encourages vigorous debate and discussion, and leaders

[20] John E. Ettlie, "Adequacy of Stage Models for Decisions on Adoption of Innovation," *Psychological Reports* 46, no. 3 (1980): 991–995.
[21] For example: too much information; too little information; the absence of information collection processes; inappropriate metrics; the ambiguous nature of the information generated by the shift; and organizational traditions, practices and standard operating procedures that stymie information flow and objective analysis.
[22] Rowe and Boise, "Organizational Innovation."
[23] Damanpour, "Organizational Innovation"; Teresa M. Amabile et al., "Assessing the Work Environment for Creativity," *The Academy of Management Journal* 39, no. 5 (October 1, 1996): 1154–1184; F. Patterson, *Innovation Potential Predictor* (Oxford: Oxford Psychologists Press, 1999); Michael D. Mumford and Brian Licuanan, "Leading for Innovation: Conclusions, Issues, and Directions," *The Leadership Quarterly* 15, no. 1 (February 2004): 163–171.
[24] Rosen, *Winning the Next War*.
[25] Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."
[26] For a recent discussion of this topic as it pertains to military change, see Adam Grissom, "The Future of Military Innovation Studies," *Journal of Strategic Studies* 29, no. 5 (2006): 905; Theo Farrell, "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006–2009," *Journal of Strategic Studies* 33, no. 4 (2010): 567–594.

who are willing to take risks are all attributes that facilitate the generation of good ideas.[27] Slack resources are also helpful.[28] Common obstacles include excessive centralization, risk aversion, and intolerance of dissent.

Selection

At a certain point discussion must give way to action.[29] In the fourth stage of organizational change leaders must decide on a course of action.[30] This step is almost certainly top down. By now various groups inside and outside the organization will be advocating for and against various options. The 'right' course is usually unclear. Nor is consensus naturally forthcoming, since these groups clash out of both principled disagreement and self-interest.[31] As a result, leaders must usually impose consensus from above. Access to power, resources and authority make it easier for a leader to overcome resistance.

[27] Damanpour, "Organizational Innovation"; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."
[28] Martin M. Rosner, "Administrative Controls and Innovation," *Behavioral Science* 13, no. 1 (1968): 615; Cohen and Levin, "Chapter 18 Empirical Studies of Innovation and Market Structure"; Damanpour, "Organizational Innovation"; Damanpour, "An Integration of Research Findings of Effects of Firm Size and Market Competition on Product and Process Innovations." Links with external organizations (as a source of new ideas) has also been proven useful. See Michael L. Tushman and Thomas J. Scanlan, "Boundary Spanning Individuals: Their Role in Information Transfer and Their Antecedents.," *Academy of Management Journal* 24, no. 2 (1981): 289–305.
[29] For several years this dissertation project existed as an attempt to test this statement.
[30] Organizations can certainly hedge by pursuing multiple options simultaneously. But for all but the most resource endowed, at a certain point they must consolidate behind a single course of action. Rowe and Boise, "Organizational Innovation"; Abernathy and Utterback, "Patterns of Innovation in Technology"; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."
[31] Mancur Olson, *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities* (New Haven: Yale University Press, 1982); Damanpour, "Organizational Innovation," 558.

Refinement

Even good ideas still need to be refined before they are ready for full-scale implementation.[32] Innovations and adaptations need to be tested and validated to make sure they will work on a large scale. Emulated practices need to be reconfigured to fit with existing routines. Once again, slack resources help, especially those that can be shifted from research and development to testing and evaluation. Experimental units and feedback loops are also critical. Both help with evaluation and refinement. Resource limits are often acute during his stage, especially if the organization must simultaneously execute old tasks even as it refines new ones. Continued resistance from interest groups is another impediment.[33] Finally, there is a significant risk that testing will reveal a fatal flaw, forcing the organization to restart its search.[34]

Diffusion

Finally, the organization must implement the new practice or process.[35] Procedurally, this step involves updating manuals; acquiring necessary tools and equipment; and retraining personnel. Politically, internal and external opponents may continue to resist. Some opponents will simply disagree with the chosen course of action, while others will fight change because it threatens their institutional standing and access to resources.[36]

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[32] Clark, "Institutionalization of Innovations in Higher Education"; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."

[33] It is important to point out that interest group opposition can come from both inside and outside the organization. The latter can be especially problematic for public bureaucracies, including militaries.

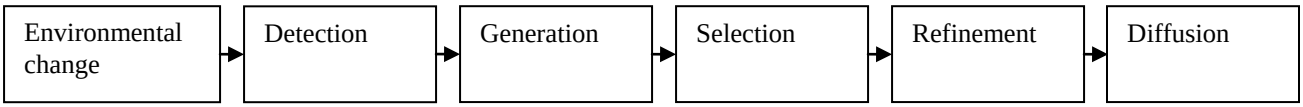
[34] The U.S. Marine Corps' experience with the Expeditionary Fighting Vehicle and the Operational Maneuver from the Sea doctrine based upon its viability are instructive in this respect.

[35] Clark, "Institutionalization of Innovations in Higher Education"; Rowe and Boise, "Organizational Innovation"; Abernathy and Utterback, "Patterns of Innovation in Technology"; Rosen, *Winning the Next War*; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."

[36] Or rents.

Opponents can shirk, refuse, or quit. The larger, more distributed, and more complex an organization is, the easier resistance becomes. Public bureaucracies face another challenge: opponents can appeal to legislative leaders outside the organization. Success in this final stage increases as organizational leaders gain control over routines, resources, promotion systems, and external actors.

Organizational Change as a Linear Process[37]
Figure 3.1



Resource limitations and uncertainty

As the foregoing discussion suggests, the various stages present unique challenges to the organization that wants to optimize. There are also at least two impediments common to the entire process. Resource limitations are the first of these. Change would be far easier if organizations had unlimited time, money, personnel and equipment. Resource limitations create opportunity costs. For example, greater emphasis on exploring new routines comes at a cost to exploiting current ones. Similarly, resources diverted to deal with opponents are resources that cannot be used for fine-tuning, training, and acquisition. They are, in a word, wasted.

Uncertainty is the second major challenge that permeates the entire process. The fact is that perfectly rational people disagree, even when they look at the same information. To read any professional or industry journal is to realize that someone always thinks the

[37] Again, I recognize that there is considerable overlap and feedback between these steps. This diagram is for illustrative purposes only.

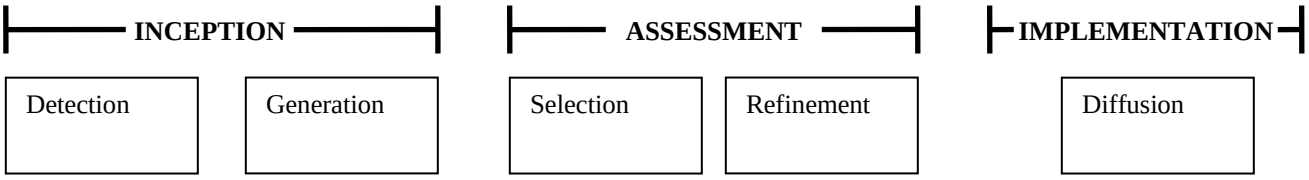
environment is in flux. Consensus may not emerge that a shift really did occur until well after the fact. Every alternative course of action engenders critics, and leaders face doubt long after they pick one to implement. Debate and disagreement also swirl around testing protocols, measures of effectiveness, and evaluation standards.

Inception, assessment, and implementation

For simplicity's sake, these six stages can be grouped into three categories based on the type of challenge they present to a military organization: inception, assessment and implementation.[38] Inception captures environmental change, detection and idea generation – tasks that require the organization to search for information and to be open to new ideas. Assessment involves selection and refinement – tasks that demand rigorous analysis, testing, and evaluation. Implementation revolves around diffusion. Diffusion requires coherent action; consolidated resources and a clear vision to ensure new ideas and practices are transmitted and acted upon across the entire organization.

[38] As mentioned in chapter 1, these are my terms. Organizational scholars have used the terms initiation, decision-making, and concept generations to describe what I call inception; and institutionalization, adoption, diffusion, and commercialization to describe what I call implementation. But broadly speaking, all agree the process can be thought of as occurring in two distinct phases. See G. Zaltman, R. Duncan, and J. Holbek, *Innovations and Organizations* (John Wiley & Sons, 1973); Richard A Wolfe, "Organizational Innovation: Review, Critique and Suggested Research Directions," *Journal of Management Studies* 31, no. 3 (May 1, 1994): 405–431; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation."

Inception, assessment, and implementation
Figure 3.2



The centralization / decentralization dilemma

As the foregoing discussion tries to make clear, inception, assessment and implementation place very different demands on an organization. Inception requires receptivity to new ideas, the ability to collaborate and brainstorm, a willingness to take risks, and an active interest in learning. Assessment requires well-defined feedback processes and rigorous analysis, testing and evaluation. And implementation calls for consensus, access to consolidated resources (arrayed behind the chosen alternative), coherent and unified action, and an ability to overcome resistance.

Structurally, decentralization fosters inception, while centralization helps with with implementation. This implies that the same structures that help an organization navigate detection and generation work against it work during selection, refinement, and dissemination. The same is true in reverse

Harvey Sapolsky was one of the first organizational scholars to explicitly address such a tradeoff. Looking at organizational innovation in the 1960s, Sapolsky followed large

department store chains trying to improve their business practices.[39] Within these various chains, individual stores, as well as individual managers within each store, exercised tremendous control over operations.[40] Sapolsky predictably found that they were good at creative thinking and innovative problem solving.[41] Most stores were eager to experiment. The problem was that these chains were not very good at implementing a new practice that worked in one store across all of them. The decentralization that fostered creativity made it hard for chief executives overcome resistance.

Sapolsky suggests that all organizations face a similar dilemma.[42] Decentralization helps organizations navigate the early stages of change, but complicates the later stages.[43] In contrast, centralization tends to help organizations navigate the later stages of change, but impedes the willingness to experiment needed to come up with good ideas in the first place. Sapolsky concludes that change is inevitably rare, since organizations cannot simultaneously be centralized and decentralized.[44] Subsequent scholarship tends to support his finding. [45]

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[39] Harvey M. Sapolsky, "Organizational Structure and Innovation," *The Journal of Business* 40, no. 4 (October 1, 1967): 497–510.

[40] This was especially true for the managers in charge of actually purchasing the clothes and other merchandise to be sold in each store.

[41] For example, the use of analytics instead of instinct to drive purchasing decisions.

[42] Sapolsky, "Organizational Structure and Innovation," 497.

[43] Sapolsky also notes how decentralization exacerbates the principal-agent problem, giving subunits the ability to shirk and resist change.

[44] Sapolsky, "Organizational Structure and Innovation," 509.

[45] Regarding the effects of decentralization, see Rowe and Boise, "Organizational Innovation"; Ettlie, "Adequacy of Stage Models for Decisions on Adoption of Innovation"; Damanpour, "Organizational Innovation"; Richard Duncan Downie, "Military Doctrine and the 'Learning Institution': Case Studies in Low-Intensity Conflict" (Ph.D., University of Southern California, 1995); Patterson, *Innovation Potential Predictor*; Mumford and Licuanan, "Leading for Innovation"; Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation"; Farrell, "Improving in War." Regarding the effects of centralization, see Clark, "Institutionalization of Innovations in Higher Education"; Teresa Amabile and Teresa M. Amabile, *The Social Psychology of Creativity*, vol. 11 (Springer-Verlag New York, 1983); Rosen, *Winning the Next War*; Susan L. Marquis, *Unconventional Warfare: Rebuilding US Special Operations Forces* (Washington, D.C.: Brookings Institution Press, 1997); Suzanne Nielsen,

IV. From organizational theory to CAT theory

CAT theory suggests that armies, because of their size, scope, and complexity, can escape this dilemma. Most are divided into dozens of specialized units, including: acquisitions,[46] administration,[47] command,[48] communications,[49] education,[50]finance,[51] intelligence,[52] legal,[53] logistics,[54] lobbying,[55] maintenance,[56] operations,[57] recruiting,[58] and training.[59] Armies do not structure these various activities in the same way. For example, one army might centralize logistics planning while another delegates it to subordinate units. Nor do armies centralize or decentralize control over every activity in the same way or to the same degree. For example, a given army might retain top-level control over administration while

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"Preparing for War: The Dynamics of Peacetime Military Reform" (Ph.D., Harvard University, 2003); Crossan and Apaydin, "A Multi-Dimensional Framework of Organizational Innovation." In many respects centralization's positive effects have received less attention than both their negative attributes and the positive effects of decentralization.

[46] Purchasing new gear and equipment, to include bidding, contracting, testing and evaluations, and project development/management.

[47] Maintaining the documents, files, and paperwork needed to run a large organization, to include promotions, punishments, and reports to the Executive and Legislative branches

[48] Coordinating these myriad activities to accomplish both implicit and explicit tasks

[49] Building and maintaining the extensive radio, computing and telecommunications networks that allow different parts of the army to coordinate with one another

[50] Providing academic preparation for new officers (i.e. service academies) and career soldiers (officer and enlisted)

[51] Maintaining an army's budget and fiscal resources

[52] Collecting, processing and analyzing raw data on adversaries and allies so that it can be disseminated as relevant and actionable information

[53] Most armies exercise autonomous legal authority over their uniformed personnel, usually justified on the grounds that it is necessary to have a distinct legal system to ensure good order and discipline given the unique constraints and exigencies of military service

[54] Planning and coordinating to ensure that the right personnel, gear, equipment and enabling supplies (i.e. food, fuel, and lubricants) arrive at the right place and at the right time to support an army's myriad activities

[55] Many armies maintain a cadre of personnel dedicated to advising legislative and executive leaders

[56] All activities necessary to keeping an army's equipment in serviceable order

[57] The actual act of executing an army's coercive mission in the 'real world' (as opposed to in training, even though some training exercises are conducted for their 'real world' impacts – i.e. major joint exercises such as Operation Bright Star and Foal Eagle)

[58] All volunteer armies (and even conscription based armies to a degree) must actively solicit civilians to join their ranks

[59] Teaching soldiers how to do their jobs at every level – from introductory (basic) to advanced. Training is often distinguished from education in that training focuses on teaching personnel how to accomplish rote/routine tasks, while education focuses on teaching personnel how to engage in reasoning and analysis to cope with new and unforeseen tasks.

decentralize control over budgets. The upshot is that armies can be both centralized and decentralized at the same time. Finally, armies can change the degree to which they centralize or decentralize a task over time.

The foregoing means that it is inaccurate to call any given army (let alone all armies) centralized or decentralized. Such simplistic labels glosses over important variations in how armies actually go about their business.[60]

Although modern armies manage a diverse portfolio of activities, three are particularly important for doctrinal optimization: command, training, and assessment. These three functions also cut across virtually everything else an army does. CAT's central prediction is based on how the interaction between these three activities. *Namely, that armies with moderately decentralized command cultures, established assessment mechanisms, and centralized training structures, will be better at optimizing their doctrines in war than armies organized in any other way.*

Command culture

I define *command culture* as the practices, traditions, and expectations within a military organization that collectively structure the latitude given to subordinates when making tactical decisions. Command culture refers to a something much narrower, and much less

[60] Sapolsky himself makes this point in his introduction to a 2009-edited volume on military innovation. He points out that organizations can simultaneously possess centralized and decentralized elements, however he says nothing systematic about how, where, and why such 'dual core' structures might be located to increase the probability that change will occur Harvey M Sapolsky, Benjamin H Friedman, and Brendan Rittenhouse Green, eds., *US Military Innovation Since the Cold War: Creation Without Destruction* (London: Routledge, 2009). If correct, this observation basically undermines Barry Posen's uni-dimensional organizational theory.

sticky than an overarching organizational culture.[61] This is because in practice the amount of autonomy a leader grants subordinates is determined by norms and tradition, not explicit rules. Explicit rules do exist, but they rarely distinguish between the real and observable differences in how militaries issue orders. After all, military organizations are defined by the fact that a superior can 'tell' a subordinate to do something against their will, and that superiors can also coerce compliance if and when they detect non-compliance through removal, disciplinary action, or violence. The real question is how – and how often – leaders exercise this prerogative. Only traditions, norms, practices, and expectations can help us make these important distinctions.

Command cultures range from highly centralized to highly decentralized. In highly centralized command cultures superiors do not trust subordinates to execute mission type orders. They expect that their orders will be carried out, even when circumstances change. As a result, ideas flow from the top-down. Leaders neither solicit nor entertain input from below. Finally, armies with highly centralized command cultures tend to demonstrate uniformity in terms of how they fight on the battlefield (regardless of whether they are uniformly good or uniformly bad). The Iraqi Army on the eve of the 1991 Gulf War stands out as an example of a military organization with a highly centralized command culture.

Armies with highly decentralized command cultures are at the other extreme. In these types of armies units are free to fight as their commander sees fit, no matter how junior he or she might be. As a result, information flows up, down, and laterally. The real question is

[61] Unlike organizational culture – or strategic culture for that matter – I maintain that command culture can change rather quickly. I discuss this further in chapter 3.

whether anyone is paying any attention. These armies demonstrate a complete lack of uniformity – every unit fights in a different way to such a degree that it is hard to say that a common doctrine exists at all. Terrorist groups, insurgent organizations, and 'Fourth Generation' criminal networks approximate military organizations with highly decentralized command cultures.[62]

Most armies fall between these extremes. The midpoint is especially important. In these armies, which I classify as moderately decentralized, relatively junior officers – those commanding platoons and companies (and, in some cases, non-commissioned officers) – can make independent decisions on the battlefield. Moderately decentralized command cultures generate new ideas, but not so many that they cannot be processed. The late 19th and early 20th century German Army is an example of a military organization with a moderately decentralized command culture.

How does command culture influence doctrinal optimization?

Command culture is important to doctrinal optimization because it determines the probability that top-level leaders will detect the need for doctrinal change, and that the army will generate viable alternatives. In other words, command culture affects inception (detection and generation).

[62] For more, see Thomas X. Hammes, "The Evolution of War: The Fourth Generation," *Marine Corps Gazette* 78, no. 9 (1994): 35–44; John Arquilla, David Ronfeldt, and Michele Zanini, *Networks, Netwar, and Information-age Terrorism* (DTIC Document, 1999); Chris Dishman, "The Leaderless Nexus: When Crime and Terror Converge," *Studies in Conflict & Terrorism* 28, no. 3 (2005): 237–252. For a critique, see I. I. Echevarria and J. Antulio, *Fourth-generation War and Other Myths* (DTIC Document, 2005).

Detection Command culture determines the degree to which senior leaders respond to input from their subordinates. This is especially important for detecting exogenous shifts. Detection occurs when an organization identifies a gap in performance. Military scholars tell us that front line leaders are often the first to recognize such gaps.[63] The important question is whether or not their superiors listen to them.

Senior leaders are most likely to listen to their front line subordinates in armies with moderately decentralized command cultures. I make this claim for two reasons. The first is trust. In armies with moderately decentralized command cultures, superiors have no choice but to listen to their subordinates. In part this is a matter of necessity – subordinates already have the authority to deviate from commands. It is also because senior leaders were themselves afforded trust and autonomy when they were subordinates (suggesting that leaders become more receptive the longer an army has a decentralized command culture, since it gives time for yesterday's subordinates to become today's leaders).

Leaders demonstrate less trust in armies with command cultures that are either more or less centralized. In centralized command cultures, leaders have neither the reason nor the need to grant autonomy or to trust their subordinates' input. Furthermore, the leaders themselves were unlikely to have been afforded much autonomy as junior officers. Highly decentralized armies have the opposite problem. Individual units have little need, interest, or desire to listen to one another. Their prerogative is guaranteed. It is worth noting that extremely high levels of decentralization are often the result of need, not desire.

[63] John A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam: Learning to Eat Soup with a Knife* (Chicago, IL: University of Chicago Press, 2005).

Geography, terrain, and manpower and technology constraints often impose extreme decentralization on military organizations.

Task overload poses another problem in highly decentralized and centralized organizations. In armies with moderately decentralized command cultures, senior leaders do not need to micromanage front line commanders, because they know their units will only deviate when needed. This frees senior leaders to focus on 'big picture' issues like doctrine. By comparison, senior leaders in armies with centralized command culture take on far more responsibility, since they delegate little. Enforcement also becomes an issue. Front line units must be monitored to ensure conformity. Both factors place significant demands on senior leaders, distracting them from the 'bigger picture'. Senior leaders in armies with highly decentralized command cultures face a different problem. For these leaders, coordination problems dominate their time and attention, because front line units may not cooperate with one another on the battlefield.[64] Coordinating fiercely independent units likewise distracts top-level leaders from the truly important tasks.

Hypothesis 1 (Detection Hypothesis): Armies with moderately decentralized command cultures should be more likely to detect the need for doctrinal change than armies with more or less centralized command cultures.

Observable implication A: We should see evidence that leaders are most receptive to input from their subordinates in armies with moderately decentralized command cultures.

[64] Recall from chapter 1 that doctrines fill a coordination function.

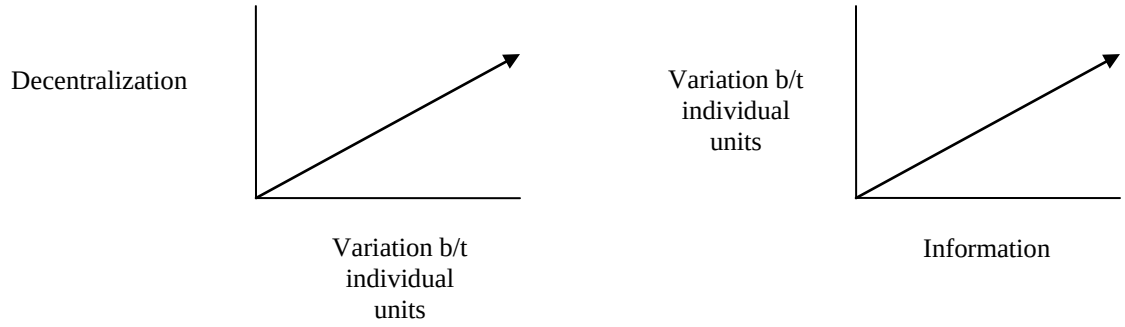
Observable implication B: We should see evidence that the longer an army has a moderately decentralized command culture, the more leaders will become receptive to input from their subordinates.

Observable implication C: We should see evidence that senior leaders pay less attention to input from subordinates as their command cultures grow either more centralized (because they must micromanage) or more decentralized (because must coordinate).

Generation Armies with moderately decentralized command cultures also have an advantage when it comes to generating viable alternatives to its current doctrine. Front line units are a natural source of experimentation. Whether or not an army uses the information generated by these experiments (or whether front line units are allowed to experiment in the first place) is a function of command culture. As decentralization increases, so too does the degree to which front line units are allowed to deviate from orders and doctrine. This means we expect to see greater variation in how front line units fight.

As variation increases, so too does the amount of available information. Again, this is because variation among front line units acts as de facto experimentation.

Relationship between command culture and information generation
Figure 3.3



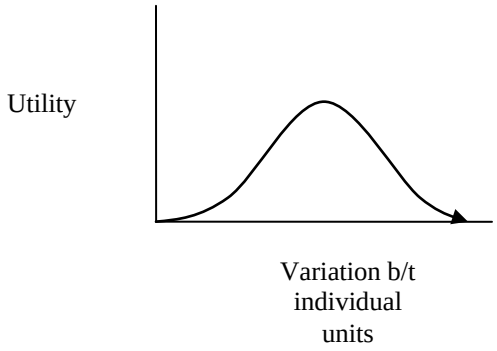
It might seem like more decentralization is always better. It is not. Information comes with two important tradeoffs. First, battlefield experiments are like natural mutations. Most experiments on the battlefield fail, just as most mutations die off. This fact creates an inflection point past which front line experiments cost more in lives and material than they are worth in terms of the information they generate. Second, there is always too much of a good thing. This is even true for information. War is already the most complex and confusion interaction known to man. Fog and friction "make even the simplest task hard." When too many front line units start generating too much information, overload ensues.[65]

The foregoing leads me to predict that armies with moderately decentralized command cultures should generate more ideas faster and more efficiently (in terms of battlefield losses) than armies with command cultures at either extreme. Armies with highly centralized command cultures generate fewer alternatives, while armies with highly decentralized command cultures generate too many to be of practical value. Additionally,

[65] Those familiar with the onslaught of lessons learned publications during recent American conflicts could attest to this point. In some ways it is as though websites and hyperlinks have replaced analysis and assessment, leaving individual leaders and units drown in a sea of competing ideas.

armies with decentralized command cultures risk undue battlefield casualties because of their excessive (relative to armies with moderately decentralized or highly centralized command cultures) experimentation.

Trade-off between decentralization and utility
Figure 3.4



Hypothesis 2 (Generation Hypothesis): Armies with moderately decentralized command cultures should be more likely to generate alternative doctrinal options more quickly, and more efficiently (in terms of battlefield losses) than armies with more or less centralized command cultures.

Doctrinal assessment

Even if front line units generate the ideal amount of information an army still needs to distinguish the 'experiments' that work from the ones that do not. Moreover, even experiments that work need to be tested for validity, since they may have worked for spurious reasons; and for general applicability, since they may not work when applied across the entire organization. Finally, even the best ideas still need to be refined, linked to

appropriate technologies, and transformed into learning standards and doctrinal precepts. Doctrinal assessment mechanisms help senior leaders accomplish these tasks.

I define doctrinal assessment mechanisms as the formal units, agencies, or cells that filter information and help top-level commanders make sense of what is happening on the battlefield. These units must be integrated into the intelligence process; have access to top-level commanders; have the authority to collect raw information about how front line units fight; and possess the capacity to rigorously analyze this information.[66] As I define it, assessment is not synonymous with intelligence. Intelligence assets turn raw information about enemy capabilities and intentions into usable data so commanders can decide how to fight tactically. Assessment assets turn raw information about how friendly *and* enemy units fight so commanders can decide how to change training and doctrine.[67]

How does assessment relate to doctrinal optimization?

Combat generates mountains of information, inundating commanders at all levels. This information is generally incomplete and contradictory. Armies that possess a formal, independent agency to analyze, assess, and filter this information will be better at navigating assessment (i.e. selection and refinement).

[66] On both sides

[67] Note that assessment mechanisms help commanders make decisions. They do not help commanders avoid making them. In other words, simply because an army possesses an agency for collecting an disseminating lessons learned and after action reports does not mean it has a assessment mechanism *if these cells only serve to transmit ideas.* In many ways, simply transmitting ideas only serves to increase confusion and information overload (at the top and bottom of the organization). True assessment mechanisms *filter* information as it moves up the chain of command, such that only a small number of ideas make it into top-level commanders' hands. Whether or not these assessment mechanisms then help transmit ideas back down and across the organization is irrelevant, unless this is a formal part of the training process. It is important to distinguish between simply alerting subordinates about ideas that commanders endorse and requiring them to start executing these ideas (as well as training them on how to use them).

Selection Existing scholarship on military change typically assumes leaders decide to either implement a given doctrinal change or maintain the status quo. Framing the choice in this way ignores an important point – *leaders rarely face a dichotomous choice to change or not to change.* Instead, they have to pick from an entire range of choices and alternatives, of which maintaining the status quo or implementing the doctrinal road eventually taken are only two. Furthermore, top-level leaders are constantly bombarded with calls for change and countless suggestions about what change should look like. To open any professional journal from any army in any war is to see the range of options, ideas, and alternatives under consideration. Compounding matters, top-level commanders are often preoccupied by day-to-day issues that they lack the time, attention and energy to think rigorously about doctrine.

Assessment mechanisms help top-level commanders make doctrinal decisions that are both faster and better. They do this by creating a system for collecting the information generated by front line observation and experimentation. They scrutinize raw and unprocessed information; distinguishing good ideas from flawed ones. And they present top-level commanders with a finite range of options to choose from – options that have already been vetted and refined to some degree.

Hypothesis 3 (Quality Hypothesis): Top-level leaders in armies with assessment mechanisms are more likely to make decisions about doctrinal change that improve combat performance.

Observable implication D: We should see evidence that assessment mechanisms substantively reduce the number of options, ideas, and suggestions that make it into commanders' hands.

Observable implication E: We should see evidence that the ideas will have been tested, vetted, or otherwise improved upon before making it into commanders' hands in armies with assessment mechanisms.

Refinement Selection does not directly lead to implementation. New ideas still need to be tested and refined to ensure that experimental tactics will work on a large scale; to ensure that the army can acquire the necessary equipment; and to develop new training standards. Refinement is an iterative process, one that requires constant feedback between testers, trainers, and decision makers.

Assessment mechanisms abet refinement as well. They establish performance standards and evaluate on progress towards those standards. They serve as a conduit between those testing new tactics and those who will train the rest of the army. Finally, they keep top-level commanders apprised of progress.

Hypothesis 4 (Speed Hypothesis): Armies with assessment mechanisms will refine new doctrinal concepts, ideas and practices faster than those without them.

Observable implication F: We should see evidence that training manuals, acquisition requests, and testing and evaluation all take less time to accomplish in armies with assessment mechanisms.

What are training structures?

By training structures, I refer to the degree to which a single officer, agency, or entity has formal control over training curricula. Training structure affects whether soldiers and units receive uniform training. Where command culture must be inferred from practice, tradition, norms, and expectations, training structure is objectively measurable.

Training is of enormous importance to an army. Armies are unique in that they spend more time practicing for their primary mission than they spend executing it.[68] Training encompasses everything from basic training to introduce new personnel to military life (i.e. 'boot camp'); introductory combat training; technical training (called military occupational specialty training in the U.S. Armed Forces); and unit training (which occurs from the smallest to the highest levels of organization, and includes training on new techniques, tactics and procedures as well as sustainment and pre-deployment training).[69]

Like command culture, an army can organize its training activities along a spectrum that ranges from highly centralized to highly decentralized. In armies with a highly centralized

[68] Rosen, *Winning the Next War*; Dennis Showalter, "Goltz and Bernhardi: The Institutionalization of Originality in the Imperial German Army," *Defense Analysis* 3, no. 4 (December 1987): 313.

[69] Although there is clearly a difference between training and education, for simplicity's sake CAT theory includes professional military education (PME) as part of the training construct., the simplest way to distinguish between the two is that training teaches a soldier how to act, while education teaches a soldier how to think. There is necessarily overlap between the two, which is how I justify including both under the broad heading of training.

training structure a single, high-ranking general officer (or unit led by a high-ranking general) controls all individual and unit training. In practical terms, this means the general in charge of training has the authority to inspect schools, mandate curriculum changes, alter training budgets, and relieve instructors. Moreover, all training and educational activity takes place on a single base, campus, or facility. The modern U.S. Marine Corps comes close to this theoretical extreme insofar as a single general officer commands a training branch; entry-level training for enlisted personnel is consolidated at two boot camps; and all officer training and education takes place in Quantico, Virginia.

Highly decentralized training systems are at the other extreme. Decentralized training structures are defined by the absence of a single high-ranking officer with the aforementioned authorities. Instead, individual unit commanders control training. Moreover, training and education take place across the organization's full geographic span. The regimental systems common in the 19th and early 20th century continental European exemplify a decentralized approach to training. European commanders individual units had complete discretion over recruiting, indoctrination, and combat training.

How do training structures relate to doctrinal optimization?

Training structures make it easier or harder for an army to implement a new doctrine across the entire organization. In other words, it affects diffusion.

Diffusion Armies face two challenges when implementing a doctrinal change. The first is resistance. Change creates new winners and new losers. Because they are so large and

diverse, armies are made up of countless subgroups. Many of these subgroups benefit from the status quo. When the status quo is threatened, these groups may resist. To see this logic in action one need only think about how cavalry forces fought to maintain their position atop European armies long after machine guns and mechanization rendered them obsolete.[70]

Those groups that stand to lose the most from a change in doctrine,[71] as well as those who disagree with change for more principled reasons,[72] have an easy way to resist implementation: they can avoid teaching it to their soldiers. This can be especially insidious in times of war, when top-level leaders have their hands with combat operations and therefore cannot monitor compliance. Moreover, wartime armies receive regular drafts of new soldiers. The more new soldiers learn old methods, the longer doctrinal change takes. Organizational change always becomes easier as older generations exit through retirement (or, in war, transfer, death, and injury). However, this natural tendency is undercut when older members persist in teaching old methods to new replacements before exiting.

Centralized training is an efficient remedy. When top-level leaders have tight control over how new soldiers are trained, and old ones re-trained, they can ameliorate this potent source of resistance. Of course, in war top-level leaders lack the time and ability to personally manage training. So the next best option is to have a dedicated agency or

[70] Sarah Janelle Rittgers, "From Galloping Hooves to Rumbling Engines: Organizational Responses to Technology in the United States Horse Cavalry" (Ph.D., The George Washington University, 2003).
[71] And we should never assume that these 'losers' exist only within the army.
[72] i.e. not everyone who disagrees will do so out of self-interest. Many will disagree because they think the proposed changes will limit battlefield effectiveness.

command (led by a high ranking officer who agrees with the changes) with the power, resources, and authority to either conduct all training, or to monitor it and fire those leaders who do a poor job of it.

Implementation's second obstacle has to do with transmission. Although it is less nefarious than resistance it is also more challenging. This obstacle also stems from the fact that armies are large and complex. Size makes it is hard to communicate new doctrinal concepts across the entire organization without losing something in the process.[73] This problem is akin to the children's game of telephone, where a message delivered to the first child sitting in a line becomes increasingly garbled as it is passed down the line.[74] Ideally, an army could just put every last soldier in a single classroom to teach them the new doctrine at the same time. Realistically, such an approach is hardly possible in peace, let alone in war. Usually, when an army needs to transmit a new set of precepts or lessons it must 'train the trainer.' In this approach, a small group of soldiers learns new methods directly from the experts who designed them. These soldiers then become instructors and teach a larger group of soldiers who, in turn, also become instructors. This 'snowball' method is highly efficient, but leaves much to be desired in terms of quality and uniformity.

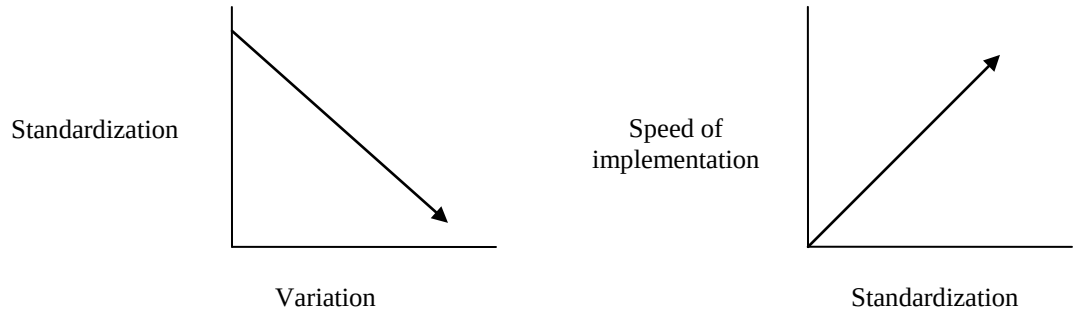
Centralization ameliorates the transmission problem. Even if wartime conditions force an army to rely on 'training the trainer,' a dedicated training command with the authority and

[73] Although they are related, we should keep the obstacles posed by resistance separate from those posed by transmission. Resistance involves people who oppose change refusing to teach their subordinates about it. Transmission problems involve people who agree with the change teaching it the wrong way.
[74] A similar analogy is one of making copies of copies, where at a certain point the copy hardly resembles the original.

resources can monitor quality. Regular inspections, record audits, (as well as the occasional firing) can increase training uniformity.

In sum, more centralization is almost always better for training. It helps top-level leaders overcome resistance from those who stand to lose or simply disagree with the change. And it helps ensure uniformity in training. Thus, unlike with command culture where decentralization/decentralization has an inflection point, with training the relationship is positive and linear.

Relationship between training structure and implementation
Figure 3.5



Hypothesis 5 (Diffusion): The more an army centralizes its control over individual and unit training, the faster new doctrinal concepts will spread across the army.

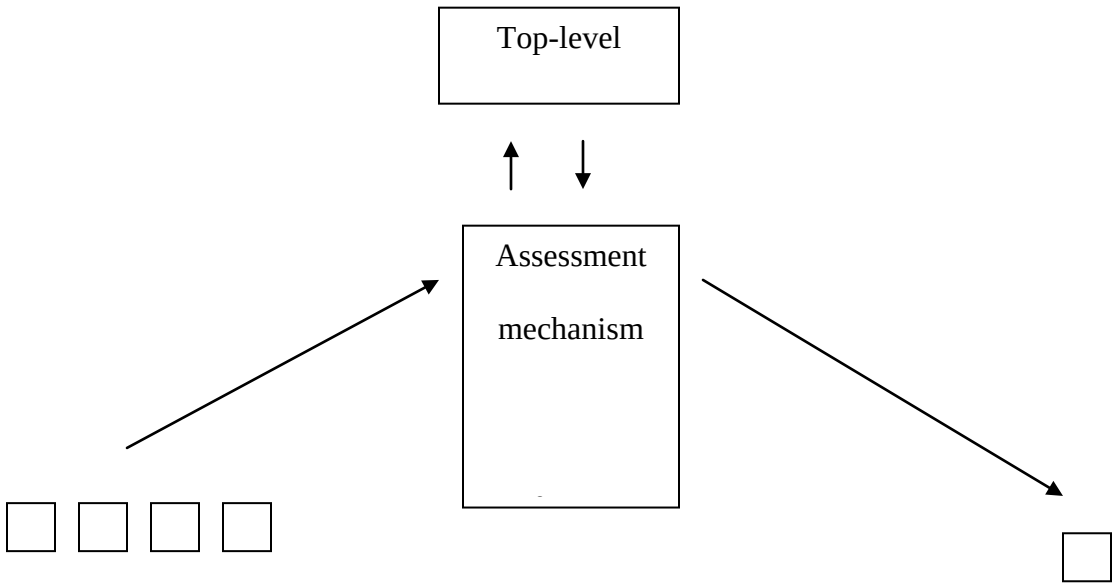
Observable implication G: We should see evidence that training curricula and standards as well as how units operate in the field should grow more uniform as centralization increases (and vice versa).

Observable implication H: We should see evidence that training inspections, audits, and punishments (for deviation) increase as centralization increases (and vice versa).

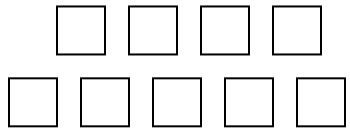
Putting it all together

Cumulatively, these factors lead to this dissertation's core hypothesis: *Armies that combine moderately decentralized command cultures, highly centralized training structures, and a doctrinal assessment mechanism (dichotomously coded) will optimize their prewar doctrines to match wartime realities more quickly and more efficiently than armies that combine these three characteristics in any other way.*

CAT theory's 'ideal' structure for optimization
Figure 3.6



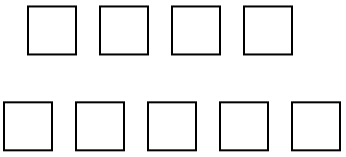
Alternative combinations



Highly decentralized command culture: To much variation leads to excessive battlefield costs and information overload



Highly centralized command culture: No variation leads to little information about how doctrines are working



Highly decentralized training structure: Too much variation in how soldiers are taught and too much room for resisting new doctrines

Are command cultures and training structures endogenous?

At first blush it might seem like these two explanatory variables are themselves endogenous – that centralized training structures lead to centralized command cultures. After all, if an army maintains tight control over what it teaches its soldiers (i.e. perfectly uniform training) then why would we expect those soldiers to then deviate in how they apply this training on the battlefield?

Nevertheless, there is no strong theoretical reason why the two must co-vary. Simply because an army demands a single set of training standards does not mean those training standards cannot teach soldiers to carry out their duties in a highly independent way. A parenting analogy is useful here. As a father I may want to teach my daughter to respect adults. However, the way I decide to teach this lesson (e.g. setting an example for her to follow and hoping she catches on; or sitting her down at the dinner table and lecturing her with power point slides) is not necessarily related to how I decide to monitor, enforce and correct how she applies these lessons in her day to day life. When it comes to monitoring and enforcement I can be extremely controlling (correcting her every time she fails to show respect), extremely lax (never correcting her and hoping the lesson sticks anyway) or somewhere in between.

In practical terms this means that an army can teach all of its soldiers how to make decisions on their own (as we would expect to find in a decentralized command culture), but it could do so in a very centralized way (e.g. relying on a top-level sanctioned

curriculum that is taught in exactly the same way in all of the schools and training centers.) Alternatively, an army can teach its soldiers to always obey every order given to them without hesitation or deviation (as we would expect to find in a highly centralized command culture), but it could do so in a very decentralized way (e.g. giving regimental commanders complete autonomy in how they want to imbue such disciplined obedience in their troops).

Are moderately decentralized command cultures and centralized training structures incompatible?

It is reasonable to wonder why armies with moderately decentralized (and fully decentralized) command cultures would also centralize training. After all, why trust junior leaders in one arena, but not the other? Put another way, does it make sense to micromanage what young officers learn in the classroom, only to 'unleash' them on the battlefield?

The short answer is yes. As the next section discusses, CAT theory coes an army's command culture as centralized, decentralized, or somewhere in between, based on the level of command at which subordinate leaders are allowed to execute *mission type orders*. Mission type orders are not a *carte blanche* to improvise one a whim. When commanders issue mission type orders, they do so with the expectation that their subordinates will try to apply the standard, textbook solution first. Commanders similarly expect that if doctrinal approach fails – or circumstances dictate that it not be attempted in the first place – subordinates will try to act in accordance with the doctrine's spirit. In other words, they

will try to adapt the doctrine to reality, rather than abandon it outright. In this way, mission type orders increase flexibility without completely undermining coherent action on the battlefield.

For this reason it is completely possible that an army might micromanage how its soldiers train while granting them autonomy in how they fight. Such an approach ensures two things. First, it ensures that soldiers – especially junior officers – know what a mission type order is (bounded autonomy contingent on necessity), and what it is not (the freedom to abandon doctrine as soon as the shooting starts). Second, it ensures that leaders at every level know what the army's doctrinal solution *before* they try to adapt it. Again, just as a quarterback cannot call an audible if his or her players do not know the play, a commander cannot issue a mission type order if his or her officers do not understand the doctrine.

V. Measurement and coding

Turning now to the task of explaining how I define, operationalize, and measures CAT theory's key variables.

The Dependent Variable: Doctrinal optimization

As described in chapter 1, optimization involves the act, process, or method of making a doctrine as fully perfect, functional, or effective as possible. I consider doctrinal optimization to have occurred when three criteria are met. First, an army endorses and distributes a doctrinal document prescribing the change. Second, an army provides the resources and equipment; and either establishes new formations or re-tasks existing ones;

needed to disseminate the doctrine across the *relevant* parts of the organization so they can execute the doctrine as prescribed. This point implies that every doctrinal shift does not imply a complete change across the organization. For example, a new counter-terror doctrine may only be relevant to an army's special operations units. Third, the army applies the doctrine in combat.

My criteria beg the question: what counts as doctrine in the first place? After all, doctrines are sometimes hard to distinguish from strategies, war plans, and intellectual musings. Given the potential for confusion and overlap it is worth taking a moment to distinguish doctrines from strategies, war plans, and 'intellectual musings.'

This dissertation only considers something a doctrine when it meets three criteria. First, it must be written down. Second, the highest officer in the organization's chain of command must endorse it. Third, it must prescribe the types of activities, solutions, approaches, and techniques that are most likely to achieve victory on the battlefield.

This dissertation codes outcomes on the dependent variable in one of five categories:

- Status quo: The army does not deviate from the status quo towards the optimal doctrine
- Experimentation: Individual units engage in ad hoc experiments that capture some, many or all of the optimal doctrines core elements

- Development: The army's leaders authorize a sustained effort to refine and validate experimental concepts. Typically this step requires the army to acquire necessary equipment and force structure and to begin writing doctrine
- Large scale demonstration: An army 'unveils' the optimal doctrinal in a major combat operation – in other words a 'proof of concept'
- Implementation: The army is ready to adopt the optimal doctrine across the relevant parts of the organization. This step means an appropriate doctrinal guidance is in place; appropriate weapons and force structure has been acquired; and units have been retrained on new techniques

I rely on primary sources, including after action reports, first-hand accounts, and doctrinal publications; as well as secondary sources to determine when doctrinal optimization did and did not occur. Where applicable I measure and compare armies in terms of the amount of time (in months) that transpired from war onset to the optimal doctrine's implementation.

The optimal doctrine

There is still the issue of how I identify the optimal doctrine. After all, what makes one doctrine optimal and another suboptimal? How do I avoid defining the concept such that whatever doctrine an army with a moderately decentralized command culture, an assessment mechanism, and a highly centralized training structure becomes optimal?

The answer is convergence. When similar armies with similar military and political objectives fight under similar conditions and/or with similar technology, and adopt the same tactical doctrine (either in the same war or over time), this is strong evidence that a doctrine is optimal. This fact means that it is sometimes impossible to know what the optimal doctrine was (or would have been). It also means that the optimal doctrine is usually only obvious in hindsight. For practical purposes, this dissertation looks for consensus among military historians that a certain doctrine would have been ideal, even if it were not adopted. To avoid ambiguity, chapter 4 describes in great detail what this dissertation takes to have been the optimal doctrine in the First World War. Chapter 9 does the same for the U.S. Army in Iraq and the Viet Cong in Vietnam.

The Explanatory Variables

Command culture

I distinguish between centralized and decentralized command cultures in a very specific way. Such distinctions are important, because people – scholars included – often toss the term around without being precise about its meaning.[75]

Centralization / decentralization and mission type orders I categorizes an army's command culture based the level of command at which leaders issue *mission type orders*. Mission type orders are a unique way to task subordinates in that they specify what must

[75] We can imagine that workers are most likely to complain about centralized control and micro-management in a decentralized organization! After all, workers who are socialized in a highly centralized work environment are less likely to see anything wrong with the arrangement.

be accomplished without specifying how it must be accomplished. As a result, unlike traditional orders, mission type orders give subordinate leaders the ability to exercise initiative, judgment and discretion.

What is a mission type order? Though the term mission type order is relatively new, the concept is not.[76] As mentioned, starting with massive national armies in the 19th century, an individual commander could no longer personally control the entire battlefield. From that point forward, every leader had no choice but to delegate tasks to subordinate leaders. They did have a choice, however, as to how much freedom and latitude they gave subordinates. The choice depended in large part on how senior leaders wanted to coordinate action on the battlefield.

One solution was to coordinate by issuing orders that specified what various units were to do as well as how they were to do it. The benefit of such an approach was that it entailed less risk that subordinates – who were younger, had less experience, and, in the case of non-commissioned officers, less educated – could make a bad decision. The cost came in terms of flexibility. Subordinate leaders could not exploit unforeseen opportunities, nor respond to unanticipated setbacks.

Mission type orders freed subordinates to adjust to changing conditions and therefore allowed for greater flexibility. Yet they required more trust and more training. Mission type

[76] In formal terms the concept traces back to at least the 19th century German concept *Auftragstaktik.* As Jorg Muth points out in his study of German command culture, the translation is imperfect at best. Jörg Muth, *Command Culture: Officer Education in the U.S. Army and the German Armed Forces, 1901-1940, and the Consequences for World War II*, 1st ed (Denton, TX: University of North Texas Press, 2011), 168.

orders required more trust because they were riskier. A single bad decision could jeopardize an entire battle. Mission type orders demanded more training because this was the only way commanders could trust that their subordinates would know the right way to make a decision in the absence of detailed guidance.

It is important to remember that mission type orders were not a *carte blanche* granting junior leaders the autonomy to do whatever they wanted. Rather, senior commanders issued mission type orders when they trusted that their subordinates already knew the standard, textbook solution. Improvisation was a last resort, not the first option. Knowing the doctrinal answer was also useful when improvisation became absolutely necessary. In this way, subordinates could adjust their actions in a way that corresponded with the doctrine's spirit, even if it violated its letter.

Coding strategy Returning to the original discussion, this dissertation refers to the level at which commanders issue mission type orders in order to categorize an army's command culture as centralized, decentralized, or in between.[77] In centralized systems, the senior-most commander either trusts no one to exercise personal judgment, or only issues mission type orders to very senior officers (defined as division commanders and above). In moderately centralized systems, only career officers with decades of experience are trusted to carry out mission type orders (defined as battalion commanders and above). In moderately decentralized systems, all officers – and even career non-commissioned

[77] Although this is a continuous variable in theory, for practical purposes this dissertation places command cultures in one of four categories.

officers – are tasked with mission type orders. Finally, in decentralized systems, virtually any soldier is allowed to carry out a mission type order.

Command culture
Table 3.1

Command Culture	**Level at which mission type orders used**	**Effect**
Centralized	Senior generals only	No variation
Moderately centralized	Battalion commanders and above	Some variation
Moderately decentralized	NCOs and company grade officers and above	Optimal variation
Decentralized	All ranks	Extreme variation

To reiterate: as a practical matter armies rarely put the degree to which they plan on letting subordinates exercise autonomy and initiative on paper. Even when they do there is often a large gulf between paper and practice. As chapter 6 discusses, for much of World War I British doctrine called on junior officers to display initiative, 'but woe to the young officer who actually tried.' For these reasons I infer an army's command culture from norms, practice, and expectations as described in primary and secondary resources.

Doctrinal assessment mechanism

To function as proposed by CAT theory, a doctrinal assessment mechanism needs to have three features. First, it must possess systematic conduits to receive information from the front lines and access to the top level of command (the ultimate decision makers). Second, it must possess the capacity to do rigorous analysis. Capacity, in turn, depends on having the institutional prestige to attract top intellectual talent and the training systems in place to teach these people how to analyze. Third, it must possess the autonomy to make

recommendations that go against traditional thinking and parochial interests. Since this is hard to evaluate from the outside, the best proxy are promotion rates for officers assigned to these assessment mechanisms. If they are not promoted at least on par with peers then we can assume they face pressures to conform (because they can be punished in terms of career progression). We can also assume that such positions/assignments are not prestigious.

For the purposes of theory testing, this dissertation codes assessment mechanisms dichotomously. If all three conditions (links, capacity and autonomy) are met, then an army is assumed to have a doctrinal assessment mechanism. If even one of the three is missing, then the army is coded as not having an assessment mechanism. As before, I draw information on how to categorize an army's assessment mechanism from primary and secondary sources.

Assessment mechanism
Table 3.2

Conduits
Capacity (prestige and education)
Autonomy

Training structures

I operationalize an army's training structure as the degree to which a single military officer has control over training and education within the organization; as well as the degree to which all soldiers undergo training and education at the same physical location. The term structure is deliberate. Where command culture must be inferred from practice, tradition,

norms, and expectations, training structure can be objectively measured and is, to some degree, physical.

As with command culture, training structures fall into one of four categories: centralized, moderately centralized, moderately decentralized and decentralized. At one theoretical extreme, the militaries with the most centralized training structures have a single, high ranking general officer with the authority to inspect training schools, change their curriculum, alter their funding, and fire their instructors. Moreover, every training and educational activity takes place on a single base, campus, or facility.

At the other end of the spectrum, decentralized organizations are defined by the absence of any military authority with the power to control curricula, instructors, or budgets. Moreover, training and education take place across the organization's full geographic span. A terrorist and insurgent groups are perhaps one example of this extreme pole.

In moderately centralized training structures a single general officer controls curriculum and has the power to relive instructors, but training is geographically diffuse. Moderately decentralized training structures lack a central authority, but training is geographically consolidated. Thus, the presence or absence of a high-ranking officer is more important (in terms of measuring centralization) than geographic proximity.

As with command culture, training structures ultimately describe the amount of variation in how doctrinal ideas are taught and transmitted. Theoretically, in a perfectly centralized

training structure every soldier receives exactly the same training. At the other extreme, in a perfectly decentralized training structure no two soldiers would receive the same training.

Training structure
Table 3.3

	General in charge of training	**No general in charge of training**
Many schools/ training sites	Moderately Centralized	Decentralized
Few schools/training sites	Centralized	Moderately Decentralized

The same caveats and trade-offs that exist with command culture also pertain to training structures. There are lesser and greater degrees of centralization even among armies with centralized training structures. CAT predicts that the effects of centralization will increase as centralization increases. This dissertation relies on evidence from the historical record, training reports, and the secondary historical literature to categorize each army's training structure.

VI. Confounding variables and alternative explanations

To reiterate: CAT theory does not presume command culture, assessment mechanisms and training structures are the only variables that matter, or that they are always the most important in a causal sense. After all, CAT theory is designed to complement other explanations, not to displace them. It simply predicts that command culture and training

structure will have a consistent impact on how well an army will optimize its prewar doctrine to meet wartime realities, all things equal.

Of course, this presents a problem for theory testing. If one accepts that other factors also drive military change, how can we be sure command culture and training structures – and not some other set of factors – are really doing the causal work?

Case selection

As chapter 1 discusses, case selection is one way to guard against confounding variables, and controls for the following factors:

Nature of the problem

Some optimization problems are harder to solve than others. For example, many scholars argue that conventional warfare is easier to master than counterinsurgency warfare. Others argue the opposite. Certain problems may lack an optimal solution altogether. One can imagine that tactical operations under nuclear conditions may be impossible.

The First World War is a useful case in this regard, since all three armies face the exact same problem: stalemate on the Western Front. However, the other two case studies do not control for the nature of the problem. In these cases, there is strong evidence that the nature of the problem really did shape the speed and probability optimization occurred if we observe multiple armies taking roughly the same amount of time to change their doctrines when faced with the same exact (or same type of) problem.

Resource constraints

Scholars have not identified a convincing link between access to resources and military change.[78] Alternatively, the fact that the economically depressed interwar period was full of major innovations in air, naval, and ground warfare suggests that the opposite might actually be true. In either case, it is important to isolate any independent impact on optimization that access to resources might have. To make a compelling case that resource dynamics are at work we should see evidence that top uniformed leaders either saw doctrinal reform as a way to 'do more with less,' or that they wanted to optimize their doctrines, but lacked the fiscal wherewithal to undertake necessary changes.

War duration

It is easier for an army to change in a long war than in a short one. This makes intuitive sense. Longer wars generate more information. They also give organizations more time to develop appropriate measures of effectiveness and to overcome internal resistance.[79] It would be inappropriate to compare an army that fails to adapt to a 30-day conflict against one that successfully adapted to a 10 year one. It very much seems that in short wars one really does go to war with the army one has. [80] This potential confounding factor is easily

[78] A fact that certainly has not prevented pundits from claiming budget cuts impede innovation.
[79] Rosen, *Winning the Next War*, 38.
[80] It also explains why those who believe that all future (conventional) wars will be brutally short because advances in precision, long-range will enable one side to quickly dominate another are adamant that it will be too late for the U.S.to wait to transform its military forces once the shooting has already started. If they are correct, and all future wars will be over almost as quickly as they have started, then my dissertation is of little use and you can probably stop reading here. I would, however, at least encourage you to skim chapter four on the First World War. There I argue that prior to First World War many military experts were likewise convinced that future wars would be short, in this case because the modern-state could hardly expect to survive a long, drawn out total war that was bound to fracture their often fragile societies and undermine their capitalistic economies. If the First World teaches us anything, it is the degree to which modern-nation states are capable of absorbing abuse, pain, and devastation. If

controlled by case selection. Two of the three case studies in this dissertation examine armies fighting for comparable periods of time. The fact that France, Germany and Britain fought each other in World War I means all three had the same amount of time to optimize.[81]

Both of the major case studies control for war duration. The British, French and German armies battled one another for the exact same amount of time (within a matter of days) on the Western Front during World War I. The U.S. Army was involved in Vietnam for roughly seven years, and Iraq for approximately eight.

National, strategic and organizational cultures

As Elizabeth Kier, Ian Alistair Johnston, and other scholars suggest, differences in culture and tradition may mean armies will be innovative, adaptive, and flexible than others. For example, one could certainly make the case that the Prussian and German armies are culturally innovative, or, alternatively, that the Prussian and German people were simply more innovative.

Disentangling culture and command culture might seem daunting. Yet in practice it should be easy to keep them apart. Command culture only pertains to the subset of organizational norms, practices, and expectations that structure how much latitude subordinates when

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'predictive' military theories seem to share a common flaw, it is in this conviction that the nation-state will prove vulnerable in the face of the 'next' set of weapons or adversaries. Yet nation-states have been remarkably hard to 'kill' (tragically, this imperviousness has not extended to their citizens).

[81] They differed only by the number of days it took for each of them to declare war in the summer of 1914. Chapter 6 discusses the fact that the BEF did not enter the war in full force until at least 1916. I argue that the German Army still optimized faster than the BEF, even if you start the BEF's 'optimization clock' in mid-1916.

making decisions. All other norms, practices, and expectations belong to the broader concept of culture (i.e. organizational, strategic, or national). The key to distinguishing between them is to look for points in time when an army's command culture changes. Such changes occur in all of the case studies. The British, French and German armies' command cultures changed during the First World War, as did the American Army between Vietnam and Iraq.

Where shifts in an army's command culture precedes shifts in its ability to optimize we have strong reasons to believe that command culture, and not culture, caused the change. After all, organizational, strategic, and national cultures are, by definition, 'sticky,' and change slowly.[82] However, where an army's ability to optimize remains stubbornly unchanged even after a shift in its command culture; or where the ability shifts without a preceding change in command culture; we have strong evidence that the broader concept of culture is driving events.[83]

To summarize: each case represents deliberate trade-offs in terms of which of the aforementioned factors can be controlled for. The goal is to *collectively* offer plausible evidence that command cultures, assessment mechanisms, and training structures – and not some other factor or combination of factors – are responsible for causing the observed variation in adaptability.

[82] Recall that this is one of my key distinctions between command cultures and culture in general. Command culture lacks the 'stickiness' that defines other types of culture. It can change in a relatively short period of time – i.e. over the course of a single conflict.
[83] Or, at a minimum, we have evidence that command culture is not exerting a causally significant effect.

Cases and variation
Table 3.4

Variation	Part II: First World War	Part III: U.S. Army in Vietnam and Iraq
Variation in DV over time (between army-cases)	Yes	Yes
Variation in DV over time (within army-cases)	Yes	Yes
Variation in IVs over time (between army-cases)	Yes	No
Variation in IVs over time (within army-cases)	Yes	No
Did prewar doctrine match wartime requirements	No	No
Did optimization occur?	Yes (Germany) Partial (Britain) No (France)	No (Vietnam) Yes (Iraq)

Controls
Table 3.5

Controls	Part II: The First World War	Part III: U.S. Army in Vietnam and Iraq
Political objectives	Yes	No
Strategic objectives	Yes	No
State of technology	Yes	No
Organizational size	Yes	No
Organizational resources	Yes	Yes
Regime type	No	Yes
National (strategic) culture	No	Yes

In this way the case study on the First World War attempts to hold political objectives, strategic objectives, technology, organizational size and organizational resources equal. The tradeoff is that the First World War does not help us control for national culture or regime type, since it looks at three different armies drawn from three different nations. To compensate for this gap, the case on the U.S. Army in Vietnam and Iraq controls for regime

type and culture. It also helps establish CAT theory's external validity by testing whether the theory carries over to unconventional warfare.

Process tracing

Case selection helps control for important variables. Yet history is messy, and even multiple comparative case studies will not completely keep 'all things equal.' For this reason, all of the case studies deliberately highlight the factors most likely to confound, complicate, or otherwise undermine CAT theory's predictions, and to trace out the impact these factors may have had on optimization. These include:

Shifts in the balance of power (i.e. looming defeat)

Shifts in the international balance of power are clearly an important factor when it comes to explaining military change.[84] Rising states have incentives to revisit the existing distribution of benefits and they might obviously have an interest in seeking new military capabilities to realize such ambitions.[85] By the same logic, status quo powers may also seek to update their military doctrines to meet these new challengers.[86]

[84] Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984); João Resende-Santos, *Neorealism, States, and the Modern Mass Army* (New York: Cambridge University Press, 2007).
[85] Robert Powell, *In the Shadow of Power: States and Strategies in International Politics* (Princeton, NJ: Princeton University Press, 1999).
[86] Again, the logic is that change becomes easier as threats and adversaries become less ambiguous. See MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution, 1300-2050* (Cambridge, UK: Cambridge University Press, 2001).

The most likely way such variables will affect wartime optimization (aside from making war more probable in the first place[87]) is through the threat of defeat. As power asymmetries between combatants grow, the losing side faces growing pressure and incentives to change.[88] Situations in which highly salient battlefield defeats or significant changes in one side's access to resources, allies, and other determinants of military power *precede* doctrinal change is a strong indication that balance of power, and not CAT theory's variables, are driving optimization. Evidence that key civilian and/or military leaders initiate a search for new options and alternatives because they perceive defeat as likely likewise casts doubt on CAT's core hypotheses.[89]

Strategic objectives and operational plans

Optimization may not always be optimal, at least in a strategic sense. States and their armies may deliberately choose not to align their prewar doctrines with wartime realities. This is because states usually have multiple military objectives. This is true even in wartime. For example, in the midst of fighting large-scale counterinsurgencies in Iraq and Afghanistan the United States still sought to deter major peer competitors.[90]

In a world of limited resources the logical implication is that states must prioritize certain objectives over others. There will therefore be situations in which attempts to optimize an army's ability to pursue a lesser objective will come at an unacceptably high cost to the

[87] J. D. Fearon, "Rationalist Explanations for War," *International Organization* 49 (1995): 379–379.
[88] Theo Farrell is the most recent scholar to make this argument. See Farrell, "Improving in War."
[89] I recognize that changes in the balance of power and the perception of changes in the balance of the power are distinct phenomenon. For simplicity's sake I treat them as one and the same.
[90] Richard Myers, *The National Military Strategy of the United States of America: A Strategy for Today; A Vision for Tomorrow* (Washington, D.C.: Joint Chiefs of Staff, 2004).

pursuit of a more important one. Hitler's willingness to divert resources from his military forces to pursue his racial policies stands out as a stark example of this logic at play.

Theoretically, there are also situations in which neither political nor military leaders care about the additional costs imposed by fighting with a sub-optimal doctrine. Some leaders do not care about the lives their citizens and soldiers.[91] Others do not care about wasting money or resources. We can even imagine perverse situations in which leaders maximize political goals they care about more than military goals by deliberately allowing the inefficient use of resources. Such goals can include rallying domestic support, undermining political adversaries, or signaling resolution. (This is an extension of the idea that not all militaries are built to be effective on the battlefield. Many, perhaps most, armies are built with other goals in mind, including ensuring regime stability, enhancing social equality, maintaining social inequality, distributing patronage, and reassuring allies.[92])

The bottom line is that even sub-optimality can have a strategic logic. However, we should expect these situations to be the exception, not the rule. Losing wars is costly, even for the most powerful despots. In most situations, *deliberately* forcing an army to fight inefficiently is a risk-laden gamble. As Part II argues, even in the First World War – a conflict that has become synonymous with callous disregard and unnecessary waste in the popular

[91] Or at least discount them heavily.
[92] For an in depth discussion of how this logic plays out in the post-colonial African experience, see Kristen Harkness, "The Ethnic Army and the State: Explaining Coup Traps and the Difficulties of Democratization in Africa," *Working Paper* (2013): 9 – 11; Harkness, "The Origins of African Civil Military Relations: Ethnic Armies and the Development of Coup Traps," 46 – 65; Jonathan Powell, "Determinants of the Attempting and Outcome of Coups D'état," *Journal of Conflict Resolution* 56, no. 6 (December 1, 2012): 1017–1040. Powell argues that attempts to structurally 'coup-proof' an army undermine unity of command, and therefore combat effectiveness (1024).

imagination – military and civilian leaders on all sides were in reality obsessed with maximizing efficiency (or, in their parlance, minimizing wastage).[93] Therefore, to reject CAT theory's predictions in favor of a strategic logic requires compelling and unambiguous evidence that the lack of optimization reflected a *deliberate and intentional* calculation on the part of leaders

Civilian intervention

It is possible that civilian leaders impose optimization on their soldiers, or that they oppose change and therefore prevent it. Abraham Lincoln, Georges Clemenceau, Winston Churchill, Harry Truman, Robert McNamara, and Donald Rumsfeld are all civilians credited with, or criticized for, reforming their militaries from the outside-in.[94] Two types of evidence should be present to make a compelling case that civilian intervention, and not CAT theory's variables, are driving optimization. First, we should see evidence that civilian leaders were aware of, and took an active interest in, changing *doctrine.* It is not enough to simply show that civilian leaders perceived a performance gap or were otherwise unhappy with how the war was progressing. Wartime outcomes, as I have pointed out several times, are the result of many factors. Military doctrine is but one potential cause of poor performance. Economics, industry, alliance politics, and grand strategy are equally plausible culprits. Moreover, civilians generally pay more attention to, and have more leverage over, these non-doctrinal sources of poor performance.[95] Second, we should also see evidence of a mechanism by which civilian leaders impose their will on an army. Principal-agent theory

[93] Chapter 6 spends a great deal of time making the case that this even applies to the BEF under Haig.
[94] E. A Cohen, *Supreme Command: Soldiers*, *Statesmen*, *and Leadership in Wartime* (Free Press, 2002).
[95] This is especially true given the specialized knowledge and expertise needed to supervise modern military operations, doctrine, and training.

tells us that guidance from the top of an organization does not automatically translate into action at the bottom. This goes double for armies, given their size, complexity, and relative isolation from both civil society and other government agencies.[96] While such levers can take many forms, from internal mavericks to threatening budgets to firing insubordinate generals, there must be evidence that civilian leaders had a way to translate intention into action.

Strategy, politics, and power in limited wars Limited wars are especially likely to create a situation in which CAT theory's variables exist and operate as expected, but larger political and strategic factors collude to stymie optimization anyway. This claim might make the theory sound un-falsifiable. After all, it sounds like the prediction is that CAT theory works except when it does not.[97] However, there is a subtle difference between this kind of a statement and what CAT theory claims. CAT theory argues that its variables work in a consistent way *even* when other variables – politics, strategy, or major power imbalances – dominate. Far from being impossible to falsify, this claim can be tested.

If the prediction is correct, then we should see two things in armies that have moderately decentralized command cultures, doctrinal assessment mechanisms, and highly centralized training structures *but nevertheless fail to optimize*. First, we should see the three independent variables behave in the predicted ways. The army should generate a reasonable number of new ideas and high ranking leaders should be receptive to them; the

[96] Even Huntington and Janowitz would agree on this point
[97] In other words "60 percent of the time it works every time." Adam McKay, *Anchorman: The Legend of Ron Burgundy*, Comedy, 2004.

army's assessment mechanisms should collect, analyze, test and refine ideas and pass them along to top-level leaders for endorsement; and the training structure should transmit endorsed practices across the entire organization. If the variables fail to 'behave' as predicted, then this is evidence against CAT theory. Second, we should see another factor 'intervene' in the process to disrupt optimization. Examples include political leaders vetoing a doctrinal concept (as French politicians did vis-à-vis the elastic defense in depth during the First World War); wars that end abruptly before the process can play out (i.e. because of a rapid, major imbalance in the balance of power, such as the acquisition of nuclear weapons in the Second World War); or situations in which the highest ranking officers reject the optimal doctrine (something we should only see in armies that have recently decentralized their command cultures).[98] If an army (with the 'right' combination of variables) fails to optimize in the absence of a clear, intervening factor, then this is also strong evidence that CAT theory is wrong.

Vietnam The foregoing discussion means that it is possible to test CAT theory even in situations when CAT's variables are not the most important. Chapter 10 presents such a case – the U.S. Army in Vietnam. In Vietnam, the U.S. Army had a moderately decentralized command culture (Vietnam's geography, the relative dispersion of troops, and the state of communications technology made it inevitable, even if senior leaders might have preferred to exert more rigid control), possessed a highly rigorous and autonomous analytic capacity (coordinated by Combat Developments Command) and centralized training (under Continental Army Command). Yet it failed to optimize its counterinsurgency doctrine.

[98] Recall that one of CAT theory's key predictions is that the longer an army has a moderately decentralized command culture the more receptive senior leaders will become to input and ideas from below.

Inter-service competition

As Owen Cote suggests, rivalry between the services – and not organizational culture or structure within them – can also drive adaptive behavior.[99] To make a compelling case that inter-service competition drove (or impeded) optimization we need evidence that one or more sister services was, in the middle of a war, actively pushing to take over part (or all) of an army's mission, function, or role; and that the army *deliberately* undertook reform to head this bureaucratic incursion off at the pass.[100] An alternative version of this argument is that inter-service *cooperation* facilitated optimization. For this to be convincing we should see evidence that two services launched a joint reform effort in order to secure a larger budget share for *both*.[101]

Measurement and feedback loop failures

Stephen Rosen, Theo Farrell, and others argue that feedback loops and effective measures of strategic effectiveness are key to military change. [102] To initiate a search for new doctrines an army first has to detect a performance gap. To detect a performance gap, armies need the right indicators and measures of success. And neither are useful in the absence of procedures that ensure the right information gets into the right hands. If these

[99] Owen Reid Cote, "The Politics of Innovative Military Doctrine: The United States Navy and Fleet Ballistic Missiles" (Ph.D., Massachusetts Institute of Technology, 1996).
[100] We should also be able to make a plausible case as to why one service would want to encroach on the other service's mission in the first place.
[101] The entire logic of inter-service dynamics rests on an assumption that military organizations care about budget share. If they compete/cooperate for other reasons (i.e. to win the war or to avoid civilian intervention) then factors other than inter-service dynamics are really 'doing the causal work' (i.e. cooperation and competition become intervening variables, not explanatory ones).
[102] Rosen, *Winning the Next War*, 34–36 and 179–182; Farrell, "Improving in War."

scholars are correct, then how can we be sure command culture and training structures, and not measures of effectiveness and feedback loops, are 'causing' optimization?

These variables are much harder to disentangle from command culture, assessment mechanisms and training structure. In large part this is because feedback loops, and measures of effectiveness is part of what a doctrinal assessment mechanism must use to operate. Thus, the theory of measures and feedback loops works in much the same way and direction as CAT theory. A surefire way to distinguish between these two sets of variables does not exist. This dissertation therefore does its best to point out such indeterminance where it is appropriate in the case studies.

Methodological modesty

The point here is not to draw up an exhaustive list of potential counterarguments and confounding variables. This section simply attempts to capture some of the most important alternative ways of explaining optimization. Again, the goal is not to prove that CAT theory's variables are more important than some other set. The literature on military change has suffered from this kind of regressive competition. The goal is to simply demonstrate that alternative mechanisms and forces exist and are always at play – even in cases where CAT theory's variables rise to the forefront. As chapter 1 described, this dissertation does its best to control for these factors where it is possible, and to admit indeterminance where it is not.

Ultimately, this is a qualitative study that relies on rare events in history (as wars are) to test a general theory with policy relevance. However, as with all qualitative studies, the trade-off is that it will not present the kind of definitive, quantitative evidence we have come to expect from scientific research.

VII. Scope conditions

Every theory has its limits. CAT theory has at least four. The first three are straightforward and have to do with the fact that CAT theory only claims to explain how modern armies optimize their doctrines in war. The fourth deals with the fact that CAT theory does not always claim to dominate all other factors requires a bit more discussion.

Wartime

Organizations change in different ways in under different conditions. A theory built to explain wartime change may not gain much traction explaining it in peacetime. This way of thinking about organizational change reflects the dominant approach in the economics, business and management literatures on organizational change as well. Therefore, CAT theory only explains doctrinal change during times of war.

Armies

CAT theory also claims to only explain how armies change. This limit builds on a point made in chapter 2: armies often have different missions and organizational structures than navies and air forces. Size is one important difference between armies, navies, and air forces. With only a few exceptions, after the 18th century armies were larger and more

organizationally complex than naval and air forces (the latter of which did not exist before the airplane in any case). It is reasonable to think that size and complexity influence innovation, adaptation and emulation in important and unique ways. This means that theories designed to explain ground innovation may not carry over well to air and naval innovation, and vice versa.

Moreover, technology may interact with ground warfare differently than it does with naval or aerial warfare. Ground warfare usually changes because of evolutions in sets of technologies that take place over rather longer periods of time and whose cumulative impact can be harder to detect. For example, think about the number of technologies that went into creating stalemate on the Western Front: the locomotive (to facilitate rapid, mass mobilization); the breech loading rifle (to allow soldiers to shoot while lying down); smokeless powder (to make defensive positions harder to detect); rapid fire artillery (to make it harder for attackers to close within 600 yards); and machine guns (to make it harder for attackers to cover the last 600 yards).[103] Individually, these small, technological innovations unfolded over several centuries.[104] Collectively, neither these technologies' cumulative impact on mobile warfare nor the solution to stalemate was readily discernable. In contrast, naval and air technologies often manifest themselves in single platforms, which are relatively easier to identify, assess, and incorporate into a new doctrine.

[103] M. A. Ramsay, *Command and Cohesion: The Citizen Soldier and Minor Tactics in the British Army*, *1870-1918* (Praeger Publishers, 2002).
[104] Bernard Brodie and Fawn Brodie, *From Crossbow to H-Bomb* (Bloomington: Indiana University Press, 1973); J. F.C Fuller, *The Conduct of War: 1789-1961* (Rutgers University Press, 1961).

There is another reason for focusing on armies: the political science literature on organizational change tends to overlook ground warfare. Naval and air innovations are disproportionately represented in the literature. [105] Even when political scientists do look at ground warfare, they tend to focus on shifts in technology to the detriment of shifts in tactics and warfighting systems.[106] This means we know far more about that tools armies use than we do about how armies put those tools into use.

In some ways this bias is understandable. Ground warfare is, after all, analytically messy. As mentioned, it is harder to link shifts in how armies fight to the introduction of a single new weapon or technology. There is no equivalent to the battleship, aircraft carrier, or jet fighter in modern ground combat. Often this is because it takes a combination of new *sets* of technologies and a corresponding shift in warfighting doctrines to bring about a major shift in ground warfare. Similarly, ground combat is hard for military "outsiders" to analyze and interpret. There are a relatively small number of independent units operating in even the largest naval or aerial engagements. In ground combat, tens to hundreds of thousands of soldiers (subdivided into all sorts of complex smaller units) are in constant motion. Modern ground warfare compounds this observational and interpretive challenge. If you watch real footage from World War II, Vietnam, or the Gulf War "the empty battlefield" will be one of the first things you notice. Ground warfare has become so lethal to exposed soldiers and vehicles that cover, concealment, and dispersion now dominate tactical action. As Stephen

[105] One of Barry Posen's three cases involved air warfare; 14 of Stephen Rosen's 21 cases focus on air or naval innovations; and only one of Michael Horowitz' four cases deals with ground warfare – and this one looked at suicide bombing. This is not true of this historical literature as historians have devoted considerable time and energy looking at changes in ground warfare.
[106] There are a few notable exceptions to this trend. See especially, Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2006).

Biddle aptly describes it, anything that can be seen can also be killed.[107] So the trick – at least among armies that know what they are doing – is to not be seen. Concealment and dispersion are good for combat survival, but bad for scholarly analysis.

Modern era

CAT theory only claims to explain how armies optimize in the modern age, which I defined as after 1870. I make this restriction for three reasons. First, complex (i.e. made up of multiple arms), mass, industrialized armies simply did not exist prior to the late 19th century. Before 1870 a single general could effectively lead and maneuver an entire army in the field. After 1870, modern technology rendered this style of command impossible.[108] Thus, there is no reason to expect that variations in command cultures existed. Even if they did, they were unlikely to be of much causal significance. Similarly, the lack of organizational complexity prior to the 1870s reduced the benefits of centralized training. Indeed, few armies attempted such an approach to training before this period. In sum, neither of CAT theory's variables were likely to have mattered, let alone existed, prior to the modern era.

[107] Ibid.
[108] M. A. Ramsay captures this well when he argues that "the formation of modern armies, like modern societies, de-coupled control from power… here was the great modern irony for the old elites: the higher direction of war had passed from the heroic leader, the great individual, to a bureaucratic enterprise, while the supervision of minor tactics was increasingly falling to soldiers from the very classes once deemed to be suitable to obey orders, nothing more." In effect, in the latter half of the nineteenth century technology removed the commander from the battlefield, isolating him from combat and combatants alike. Ramsay, *Command and Cohesion*, 32 – 33.

Chapter 3 Appendix

Summary of hypotheses and observable implications

Main hypothesis: Armies that combine moderately decentralized command cultures, highly centralized training structures, and a doctrinal assessment mechanism (dichotomously coded) will optimize their prewar doctrines to match wartime realities more quickly and more efficiently than armies that combine these three characteristics in any other way.

Hypothesis 1 (Detection Hypothesis): Armies with moderately decentralized command cultures should be more likely to detect the need for doctrinal change (e.g. because of an exogenous shift) than armies with more or less centralized command cultures.

Observable implication A: We should see evidence that leaders are most receptive to input from their subordinates in armies with moderately decentralized command cultures.

Observable implication B: We should see evidence that the longer an army has a moderately decentralized command culture, the more leaders will become receptive to input from their subordinates.

Observable implication C: We should see evidence that senior leaders pay less attention to input from subordinates as their command cultures grow either more centralized (because they are focused on micromanaging) or more decentralized (because they are focused on coordination problems).

Hypothesis 2 (Generation Hypothesis): Armies with moderately decentralized command cultures should be more likely to generate alternative doctrinal options more quickly, and more efficiently (in terms of battlefield losses) than armies with more or less centralized command cultures.

Hypothesis 3 (Quality Hypothesis): Top level leaders in armies with assessment mechanisms are more likely to make decisions about doctrinal change that turn out to improve combat performance.

Observable implication D: We should see evidence that assessment mechanisms substantively reduce the number of options, ideas, and suggestions that make it into commanders' hands.

Observable implication E: We should see evidence that the ideas will have been tested, vetted, or otherwise improved upon before making it into commanders' hands in armies with assessment mechanisms.

Hypothesis 4 (Speed Hypothesis): Armies with assessment mechanisms will refine new doctrinal concepts, ideas and practices faster than those without them.

Observable implication F: We should see evidence that training manuals, acquisition requests, and testing and evaluation all take less time to accomplish in armies with assessment mechanisms.

Hypothesis 5 (Diffusion): The more an army centralizes its control over individual and unit training, the faster new doctrinal concepts will spread across the army.

Observable implication G: We should see evidence that training curricula and standards as well as how units operate in the field should grow more uniform as centralization increases (and vice versa).

Observable implication H: We should see evidence that training inspections, audits, and punishments (for deviation) increase as centralization increases (and vice versa).

Part II

Optimization on the Western Front

Chapter 4

From Stalemate to Maneuver

"The potential for defensive superiority had not been overlooked by European military thinkers before the First World War. But it is one thing to diagnose that a problem exists, and another to prescribe the proper response."[1]

I. The Puzzle

The First World War was horrific in every possible sense of the word. It killed nearly 10 million combatants and an untold number of civilians. It hastened the collapse of ancient empires, replacing them with 'modern' states that would, in many cases, prove less stable and more violent than their predecessors. It signaled a new stage in total warfare, one that reached its bloody apogee in the Second World War. [2]

The war's tragedy notwithstanding, its Western Front represents a useful optimization puzzle. In that theater three of the world's most advanced armies were pitted against one another as they raced to prevail in a form of warfare none had seriously anticipated. From a social scientific perspective, the war on the Western Front is also the closest thing to a natural experiment as exists in military history.[3] The Western Front's three primary combatants – Britain, France and Germany – had armies that were remarkably similar in several important ways. Except for the British Army, they were the same size.[4] They were

[1] M. A. Ramsay, *Command and Cohesion: The Citizen Soldier and Minor Tactics in the British Army, 1870-1918* (Westport, CT: Praeger, 2002), 55.
[2] As Williamson Murray points out, the First World War marks the point in history where the Industrial Revolution and French Revolutions merged. Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York: Cambridge University Press, 2011), 4.
[3] Ibid., chap. 3.
[4] France had 5 million soldiers and Germany nearly 6 million. The British Army certainly started the war much smaller, with a contingent of 90,000 soldiers in Europe. However, by the war's end almost 5 million British citizens served under arms. In France 700,000 were active and 4.2 million reservists; In Germany 840,000 were active and 5 million were reservists. These numbers come from Stephen Bull, "The Early Years of the War," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 172; Holger Herwig,

organized along similar lines.[5] By 1916 all three relied on conscription to generate manpower.[6] Their weapons were virtually identical.[7] Once they were locked in a stalemate all three shared a common goal (to penetrate the other side's defenses) and faced the same obstacles (firepower, lack of mobility, and command and control). Most important, all three went to war with virtually identical warfighting doctrines.

From 1914 to 1916, the three armies diverged doctrinally as they searched for a solution to the deadlock. Then, in the war's final years all three *began* converging on a new way of war – one organized around modern assault tactics, combined arms, and the elastic defense-in-depth. [8] The German army was the first to make the transition. The British army was not far

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"You Are Here to Learn How to Die: German Subaltern Officer Education on the Eve of the Great War," in *Forging the Sword: Selecting, Educating, and Training Cadets and Junior Officers in the Modern World*, ed. E. V. Converse (Imprint, 1998), 32; Ian Drury, "German Stormtrooper," in *War on the Western Front*, ed. G.D. Sheffield (Oxford, U.K.: Osprey, 2007), 29. Other scholars cite slightly different figures, but none are fundamentally different from those listed above.

[5] All were divided into infantry, artillery, and cavalry branches. All artillery was subdivided into field and heavy. All infantry divisions had 12,000 soldiers, although British divisions were triangular (each division had three brigades; each brigade had four battalions) while German and French divisions were square (each division had two brigades; each brigade had two regiments; each regiment had three battalions). By war's outbreak all three armies had four infantry companies per battalion. Companies were made up of 200 soldiers and were considered to be the smallest unit capable of independent action by all three armies. Stephen Bull, "The Early Years of the War," 175.

[6] To be sure, conscription was a longstanding practice in the German and French armies. The British adopted it reluctantly mid-war.

[7] Down to the number of machine guns per unit: all three armies issued six per regiment in 1914. Stephen Bull, "The Early Years of the War," 176. If there was a difference in weaponry it was that the German Army had acquired more heavy artillery than the French and British. While the Germans planned on using these larger guns to reduce forts on the French and Belgian borders in the event of a war, this did provide them with an inadvertent artillery advantage in the early phases of the conflict, when light guns proved ineffective against trenches, both because of their flat trajectories and their relatively small shells.

[8] In a crude sense, both combined arms and defense in depth have existed for centuries, insofar as generals have always sought to offset the weaknesses of one weapon system by integrating it with the strengths of another (e.g. archers could strike distant targets, but were vulnerable to close in attack and so were integrated with swordsmen; or early 'riflemen' were vulnerable while loading their cumbersome weapons and were integrated with pikemen). Yet both of these practices fell into disuse by the 18th century and, as other military historians have shown, were not to re-emerge in any meaningful sense until the First World War. For a discussion of pre-modern combined arms, see Jonathan M. House, *Combined Arms Warfare in the Twentieth Century*, Modern War Studies (Lawrence, Kan: University Press of Kansas, 2001), 1–3.For a discussion of ancient defenses in depth, see Edward N. Luttwak, *The Grand Strategy of the Roman Empire: From the First Century A.D. to the Third* (Baltimore, MD: Johns Hopkins University Press, 1979), chap. 3.

behind, although the war ended before the transformation was complete. The French army lagged behind.

That any army managed to revolutionize its doctrinal in the middle of a war is surprising given how we normally think about military organizations. It is even more shocking given that the standard narrative surrounding the First World War is one of "stagnation and military incompetence."[9] In literature and textbooks the war is portrayed as mechanized and routinized slaughter. [10]

The standard narrative is a myth. The truth is that the Western Front was not deadlocked because its generals were cold-hearted idiots and cowards. The Western Front was deadlocked because all three armies went to war armed with pre-war doctrines that did not (and as this chapter argues, could not) foresee wartime realities. Nor did it take long for these armies to recognize their shortcomings. The Western Front was not the definition of insanity, with British, French and German generals doing the same thing over and over while expecting different results. By late 1914 all three armies were actively and aggressively trying to find new ways to fight. They did not stop learning, adapting, emulating, and innovating until war's end.[11]

[9] Murray, *Military Adaptation in War*, 74.
[10] Hew Strachan, *The First World War: Volume I: To Arms (First World War*, New Ed (Oxford University Press, USA, 2003), xv.
[11] Indeed, experimentation and learning did not stop on 11 November 1918. No matter how misguided their efforts might seem in retrospect (a la the Maginot Line) the interwar period is best seen as a continuation of doctrinal optimization that began in the mud and mire of the Western Front.

In reality, the Western Front contains one of history's most remarkable case of doctrinal optimization. The story behind the First World War is one of dynamic and continual change. No set of armies has ever changed how they fight as dramatically as did the British, French, and German armies between 1914 and 1918. We should not confuse the lack of movement on the Western Front for a lack of learning as the First World War – not the period between the World Wars – was the birthplace of modern conventional warfare.[12]

That the First World War's static battlefields gave rise to the military doctrines that dominated the Second World War's mobile battlefields is well established in the military historiography.[13] The under-explored empirical puzzle is that the Western Front's three primary combatants pursued roughly the same set of solutions – assault tactics, combined arms, and elastic defense in depth – to the same tactical problem – stalemate – *but did so at different speeds and to varying degrees of success.* To reiterate: the German Army was both the fastest to optimize and the most successful. It was the only army to truly master the elastic defense in depth, which it used to impose a major setbacks to the French at Chemin des Dames (April 1917) and, to a lesser degree, the British at Cambrai. It combined arms to

[12] Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2006), chap. 3.

[13] The first historical analysis of this subject seems to have been Timothy Lupfer's short piece on German storm troop tactics. See Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Diane Publishing, 1981). A range of subsequent work substantiates his basic conclusion, while broadening the view to include doctrinal change in the British and French armies. For 'first wave' work on this subject, see Shelford Bidwell and Dominick Graham, *Fire-power: British Army Weapons and Theories of War, 1904-1945* (London: Allen & Unwin, 1982); B. I Gudmundsson, *Stormtroop Tactics: Innovation in the German Army 1914-18* (Westport, CT: Praeger, 1989); Martin Samuels, *Command or Control?: Command, Training, and Tactics in the British and German Armies, 1888-1918* (London ; Portland, OR: Frank Cass, 1995); Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916-18* (New Haven: Yale University Press, 1994). For more recent arguments, which tend to focus somewhat regressively on whether the British and Germans were more advanced (a historical debate I address in chapters 5 and 6), see Ramsay, *Command and Cohesion*; Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012).

a greater degree, at a lower level, and at an earlier point in the war than either the French or the British.[14] And its assault tactics, although perhaps no more advanced than those used by the British or French, were employed with far greater uniformity in the German Army and to far greater effect in Ludendorff's Spring 1918 offensives.[15]

Date of first large scale demonstration
Table 4.1
(*Length of time from war onset in italics*)

	Assault tactics	Combined Arms	Elastic D-in-D
German	Sep '17 (Riga) *37 months*	Sep '17 (Riga) *37 months*	Apr '17 (Chemin des Dames) *32 months*
British	Experimentation, development and endorsement without large scale demonstration or widespread implementation *N/A*	Nov '17 (Cambrai) *39 months*	Mar '18 (Ludendorff Offensives)* *43 months*
French	Experimentation without systematic use	Aug '18 (Amiens) *48 months*	No systematic use

*There is a significant debate in the historiography about the degree to which the British Army actually understood the elastic defense-in-depth system they attempted to implement prior to Ludendorff's offensive.

[14] To be fair, the British and French were far more advanced in their work on the tank. However, the tank was only one element of combined arms and, more importantly, was not a decisive element in the First World War. See Boff, *Winning and Losing on the Western Front*, 140–145.
[15] For an in depth analysis of the Spring offensives, see David T Zabecki, *The German 1918 Offensives: A Case Study in the Operational Level of War*, Cass Series--strategy and History 16 (London: Routledge, 2006).

Date of widespread implementation (Estimated)
Table 4.2
(*Length of time from war onset in italics*)

	Assault tactics	Combined Arms	Elastic D-in-D
German	Mar ’18 (Ludendorff Offensives) *43 months*	Fall/Winter ‘17 *~40 months*	Passchendaele (Jul ’17) *35 months*
British	Experimentation, development and endorsement without systematic use *N/A*	Amiens (Aug ’18) *48 months*	Not well applied in large-scale demonstration during March offensive. *N/A*
French	Experimentation and development without implementation	Amiens (Aug ’18) *49 months*	Experimentation and development without implementation

In the chapters that follow I argue that this variation is neither random nor inexplicable. Rather, I argue that Command, Assessment and Training (CAT) theory systematically captures why the British, French, and German armies varied in the speed and degree with which they arrived at the optimal doctrine on the Western Front. However, to make sense of this explanation, let alone the optimal doctrine, we must first understand the stalemate. It is to this task that we now turn.

II. Stalemate

The war that came to Europe in August 1914 was supposed to end quickly. Britain, France, and Germany sent their men to war, promising that they would be home in time for Christmas. Such predictions were based on neither unbridled optimism nor inexcusable naiveté. On all sides senior leaders recognized the risk of a drawn out war.[16] Rather, they

[16] This include Lord Herbert Kitchener, Helmuth von Moltke, and the Swiss Colonel Feyler, actually predicted that a future war would devolve into stalemate. See Pascal Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, trans. P. Kieffer (Paris: Berger - Leorault, 1923), 14. But in the mainstream almost everyone was caught off guard by trench warfare.

believed that the war had to be short, because they assumed modern-nation states were too fragile, and too interdependent, to survive a long war.

As a result, all three armies sought a quick victory. The pursuit of speed at the operational (i.e. campaign) level had bizarre, and ultimately tragic, implications. The German Army smashed through Belgium.[17] The decision saved time, but guaranteed British intervention.[18] Meanwhile, the French Army launched a decisive attack of its own, dashing headlong into Alsace and Lorraine, leaving Paris unguarded in the process.[19]

Just as it started to look like 'home by Christmas' was too pessimistic the wheels fell off the German attack.[20] The German army took longer than expected to bypass the forts at Liege. The British Expeditionary Force (BEF) arrived in France faster than expected, slowing the

[17] In retrospect, given its location in between the hostile allies France and Russia, German was probably the only combatant that could not afford a prolonged war. German operations were guided by an updated version of the so-called Schlieffen Plan. The plan was designed as a solution to Germany's geo-strategic dilemma (the fact that it was located between France and Russia) by rapidly defeating France before shifting to face Russia (which the German General Staff assumed would be slow to mobilize its force). There were at least two major flaws in this plan which should have been evident from the outset. First, the plan violated Belgian neutrality, virtually guaranteeing British intervention in a way that would tip the already unfavorable balance of forces. Second, the plan was based on a wildly (this adverb cannot be emphasized enough) optimistic set of logistical assumptions. It called on the army to move 2 million men 400 miles in 40 days while fighting through heavily fortified territory (i.e. the forts at Liege) and laying siege to Paris – all while supplying engaged units that required an average of 2 million pounds of fodder for horses; 5,200 tons of food; and enough ammunition to support individual brigades (of 3,000 men) that could fire as many bullets as Wellington's 60,000 man army at Waterloo… ***per day***. Herwig, "You Are Here to Learn How to Die: German Subaltern Officer Education on the Eve of the Great War," 39; Michael Brian Petersen, "All the Kaiser's Men: German Volunteers and the Great War, 1914-1918" (M.A., Florida Atlantic University, 1997), 36. For an in depth discussion of the Schlieffen Plan's logistical failings see Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge, UK: Cambridge University Press, 2004), chap. 6.

[18] Which they incorrectly believed to have been a foregone conclusion. See chapter 6.

[19] In accordance with the much maligned Plan XVII. For a brief overview of Plan XVII, see Stephen Bull, "The Early Years of the War," 181 – 184. For an in depth discussion by the man who authored Plan XVII, see Joseph Jacques Césaire Joffre, *The Personal Memoirs of Joffre: Field Marshal of the French Army*, vol. 1 (New York and London: Harper & Brothers, 1932), chap. V.

[20] …or at least the trucks that were carrying its supplies. By the Battle of the Marne (5 – 12 September 1914) over 60% of the German Army's trucks were inoperable while its railheads were an average of 80 miles behind the front lines. Holger H. Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," in *Military Effectiveness*, vol. I (Boston: Allen and Unwin, n.d.), 85.

German advance even more at the Battle of Mons.[21] And the closer the German Army drew to Paris, the further the moved from their supply lines.[22] Meanwhile, the French army had time to abandon its futile attack and fall back on Paris.

In the end, the French and British armies combined to halt the German Army at the River Marne. After a momentary pause to regroup, each side moved to flank the other. With no room for maneuver to the south, all three armies looked north. Thus, what started as a race to Paris quickly turned in a race to the sea.[23] The two sides clashed as they moved north towards the Belgian coast. After a final battle near Yser (16 – 31 October 1914) they ran out of space. Trenches stretched from Swiss border to the Belgian coast. There was nowhere else to go in Western Europe, meaning the only path to victory lay through the other side's lines.

A defensive advantage?

With the benefit of hindsight, we now tend to assume that deadlock was inevitable. This is interesting, since very few leaders at the time thought it possible – even those who worried about a long, drawn out conflict. The truth is that stalemate was neither predictable nor inevitable. More important, to appreciate how the armies ultimately broke the stalemate

[21] 22-24 August 1914.
[22] At least one historian, Robert Doughty, argues that General Joseph Jacques Joffre's attack into Alsace and Lorraine actually saved the French army because it failed. Had the French attack been successful, they would have been too far from Paris to reorient and stop the German right hook. Similarly, even a deep penetration into Germany would not have threatened Berlin or the German state's ability to wage war. Chapter 7 discusses these points in greater detail. See Robert A. Doughty, "French Strategy in 1914: Joffre's Own," *The Journal of Military History* 67, no. 2 (2003): 427–454.
[23] Gudmundsson, *Stormtroop Tactics*, 3.

we need to understand how it started in the first place. For all of these reasons it is worth taking a moment to explore the origins of trench warfare.[24]

The standard explanation is that new technologies, like machine guns and rapid fire artillery, made it easier to defend than to attack.[25] Yet this facile explanation overlooks too much. In reality, there were at least four major causes, only one of which involved firepower, and only two of which could have been predicted *ex ante*. Stalemate was a function of the interaction between a high troop to space ratio, an unprecedented increase in firepower, and the relative absence of tactical mobility and communications. Put in simpler terms, deadlock arose because there were too many soldiers fighting in too small a space with too many bullets and too few trucks or radios.

To briefly address each factor in turn:

Too many men

The French Revolution transformed Europe and European warfare, heralding an era of mass national armies. Before, Europe's armies tended to be small and professional.[26] The cost of training and equipping soldiers made big armies too expensive. Armies were also limited in size by the crude logistical systems needed to supply them. Nor could armies

[24] Although such a discussion might seem tangential, understanding how the stalemate came about makes it easier to explain the doctrinal solutions that ultimately brought it to an end.

[25] Political scientists have referred to the relationship between offensive and defensive power as the offense/defense balance. For the paradigmatic statement on the offense/defense balance, see Robert Jervis, "Cooperation Under the Security Dilemma," *World Politics* 30, no. 2 (January 1, 1978): 167–214. See also, Charles L. Glaser and Chaim Kaufmann, "What Is the Offense-defense Balance and Can We Measure It?," *International Security* 22, no. 4 (1998): 44–82; Keir A. Lieber, "Grasping the Technological Peace: The Offense-defense Balance and International Security," *International Security* 25, no. 1 (2000): 71–104; Stephen Biddle, "Rebuilding the Foundations of Offense-Defense Theory," *The Journal of Politics* 63, no. 03 (2001): 741–774.

[26] These armies were certainly not professional in the modern Weberian sense. Most soldiers were, however, long serving in that they typically 'agreed' to serve for periods ranging from seven to twenty years.

trust their men to forage – the risk was too great that they might run away while looking for food (taking their expensive training and equipment with them).[27]

Revolutionary France's levee en masse inverted the entire system.[28] States now found it possible to mobilize large portions of their citizenry by drafting them. For their part, nationalism inspired citizens to rally to the flag without being coerced or compelled. While conscripts were less capable than professional, quantity offset quality.[29] At least in revolutionary France, conscripts also tended to fight more aggressively, *because they believed in what they were fighting for*.[30] Subsequent advances in bureaucracy, rail, and communications meant that by the early 20th century Europe's Great Powers could mobilize nearly of 10 percent of their total population in the event of war.[31] Of the First World War's primary combatants, only the British did not go to war with a mass national army in 1914.[32]

Too little space

The fact that armies were made up of millions of full-time professionals, part-time reservists, and short-service conscripts meant they could physically occupy enormous swaths of terrain. This reality created a problem when war broke out in an area already

[27] Robert Jervis, "Cooperation Under the Security Dilemma," *World Politics* 30, no. 2 (January 1, 1978): 167–214.
[28] Ibid., 19–21.
[29] Conscript armies were also cheaper than professional armies, because states only had to pay them in times of war. Martin Van Creveld, *Command in War* (Cambridge, Mass: Harvard University Press, 1985), 106.
[30] Ramsay, *Command and Cohesion*, 19.
[31] Van Creveld, *Technology and War*, 161.
[32] As of August 1914 the French Army had 4.9 million soldiers (700,000 active duty and 4.2 million reservists), the German Army had 5.8 million (840,000 active duty and 5 million reservists), and the British had 747,000 (247,000 were active duty and 500,000 were reservists; of the 247,000 active soldiers, 90,000 were assigned to BEF units as of mid-1914). These figures were assembled from Stephen Bull, "The Early Years of the War," 172; Drury, "German Stormtrooper," 29; Herwig, "You Are Here to Learn How to Die: German Subaltern Officer Education on the Eve of the Great War," 32.

short on maneuver space. Deadlock would not have occurred were it not for the fact that these mass national armies fought in Belgium and small corner of northeastern France. Were these armies smaller, or the space they were fighting in larger, it is entirely possible that the road to victory would not have required punching directly through the other side.

It is telling to compare force to space ratios on the Eastern and Western fronts. On the Eastern front a division of 12,000 soldiers could cover a 30-kilometer front. [33] If relocated to the Western Front, as many German divisions were in 1917, that same division would occupy approximately 2.5 kilometers.[34]

Too many bullets

The 'storm of steel' created by breech loading rifles, machine guns, and rapid-fire artillery also contributed to the stalemate. At the same time, it is important not to overstate firepower's effect. Absent the mass armies or tight geography, firepower alone would not have led to static warfare. With greater tactical mobility (i.e. trucks) or flexibility (facilitated by radios) it is also possible that maneuver would have prevailed in 1914.

In the century preceding the First World War, two major waves of technical innovation in firearms transformed the battlefield.[35] The first wave took place between the 1820 and 1870 and involved advances in mass production (which helped states to equip their ever-growing armies more cheaply), rifling (which made individual weapons lethal at up to a

[33] War Office, *German Army Handbook. 1918. Reprint* (London: Arms and Armour Press, 1977), 34.
[34] It is telling that the German Army never felt compelled to fundamentally alter its tactical assault doctrines in the Eastern theater.
[35] House, *Combined Arms Warfare in the Twentieth Century*, 16.

mile)[36], and breech loading mechanisms (which allowed soldiers to fire while laying down). The second wave occurred in the 1880s. It introduced smokeless powder (making it easier to fire without being spotted), quick firing artillery (mechanical recoil mechanisms that allowed cannons to fire without needing to readjust the gun), and the machine gun.

A simple thought experiment illustrates firepower's cumulative effect: In 1815, 1,000 men crossing 100 yards under fire would be exposed to 2,000 bullets and shell fragments. In 1915, a mere 100 years later, these same 1,000 men would absorb 200,000 bullets and shell fragments attempting to cross this same ground.[37]

Again, firepower did not cause the stalemate on its own. Nor did firepower make it less costly to defend than to attack. Rather, firepower contributed to stalemate *because of the state of technology at war's outbreak*. In 1914 machine guns were too big; artillery was too bulky; and radios were too crude to be of use to soldiers on the move. As a result, and for reasons unrelated to the amount of firepower these weapons unleashed, these advances were of more use to defenders than attackers.

Take heavy machine guns as an example.[38] Size and weight did not matter to defenders since they had time to prepare positions in advance. Nor did defenders have to move across terrain to do their job – they could stay put, waiting for the other side to come to them. Size

[36] Before, rifles were generally effective up to around 100 yards.
[37] Biddle, *Military Power*, 2006.
[38] The Maxim machine gun weighed approximately 60 lbs; the Vickers approximately 51 lbs; and the MG08 approximately 60 lbs. Note that this was just the weight of the gun itself and did not include the sleds, tripods, or other stabilizing equipment required to fire the weapon (which typically weighed another 80 lbs); the water needed for cooling (up to ten pounds); and, of course, the ammunition needed to feed it.

and weight were, however, a big problem for the attackers who had to lug them over torn up ground. It was not until both sides developed and fielded light machine guns like the Lewis gun, that attackers could redress the imbalance.

Artillery, with is finite range, was also of little use when successful attacks moved beyond its field of fire.[39] Attackers tried to solve this problem by relying on massive artillery strikes before mounting their assault. However, these pre-assault bombardments invariably failed to kill every defender, and a single surviving machine gun could inflict grievous damage on an attacking unit. Massive pre-assault bombardments also worked against attackers by warning defenders that an attack was imminent (giving them time to preposition reserves) and chopping up the ground (making it hard for attacking infantry to cross).

Not enough trucks and radios

Finally, despite major advances in strategic mobility, tactical mobility remained decidedly pre-modern. Getting soldiers to the front was easier than moving them around once they were there. Ships, trains, and lorries could transport hundreds of thousands of troops from their homes to the front in weeks.[40] For all their speed and lift capacity, ships needed deep water and ports to deliver troops.[41] Trains needed rails and were therefore of little use at the front where rails were vulnerable to destruction and where the situation changed

[39] Martin Samuels, *Command or Control?: Command, Training, and Tactics in the British and German Armies, 1888-1918* (London ; Portland, OR: Frank Cass, 1995), 86.
[40] Some historians even argue that mobilization plans drove strategic thinking and made conflict all but inevitable in August 1914. M. Trachtenberg, "The Meaning of Mobilization in 1914," *International Security* 15, no. 3 (1990): 120–150.
[41] This consideration played no small role in the British decision to attack Gallipoli.

faster than new railways could be built in any case.[42] And early 20th century trucks were too fragile for use in combat.

Thus, once soldiers arrived at the front they were forced to the oldest transportation systems known to man: feet and horses.[43] Even intra-war inventions like the tank did not redress this gap.[44] The imbalance between strategic and tactical mobility meant both sides could jam more soldiers into the front, while the lack of tactical mobility made it hard to shift troops around to exploit weak points and breakthroughs in the other side's lines.

The same was true for radios. Early in the war all three sides acquired large numbers of heavy, long-range artillery. These proved highly effective in smashing defenses, destroying enemy guns, harassing command posts, and protecting advancing troops in the attack. However, long-range artillery required long range communications to be effective.[45] Before radios were portable and reliable this again gave defenders a distinct advantage. Because

[42] Van Creveld, *Technology and War*, 168.

[43] In a book to help American officers prepare for service on the Western Front, French officers observed, "we have seen photographs of American machine-gun batteries carried on motorcycles… although it may have proven excellent in Mexico, it is entirely impracticable on the French Front. The ground for a long distance behind the lines of defense has been so torn up and rendered impassable by prolonged bombardment that motor vehicles cannot get through. Horse-drawn vehicles can approach much nearer but at the entrance of the communication trenches even pack transport has to be abandoned… all war material has to go forward to the advance lines on men's backs. In case of an advance beyond the front, difficulties would be doubled, since the devastated ground behind the enemy's lines would have to be traversed." René Louis Jules Radiguet, *The Making of a Modern Army and Its Operations in the Field: A Study Based On the Experience of Three Years On the French Front (1914-1917)* (New York and London: G.P. Putnam's Sons, 1918), 115–116.

[44] Tactical mobility would not catch up with strategic mobility until the 1920s and 1930s.

[45] Before the First World War almost all armies used artillery as a direct fire weapon. Artillerymen could see their targets and would fire shells along a relatively flat trajectory to support the infantry. This approach became highly impractical – if not outright deadly – early in the war. Artillery that dared to expose itself was quickly destroyed. Thus, all sides quickly started placing artillery in covered positions well behind friendly lines. (The German Army was able to do this faster than anyone else, because it had invested more in heavy artillery – which had a longer range - than the British and the French. This was less a case of strategic foresight than it was the practical matter that the Germans knew they would have to smash Belgian and French forts to launch on offensive). Gunners could no longer see their targets at these long distances. Therefore, forward observers (positioned with the infantry) had to relay both targets for the artillery to fire upon; and instructions for adjusting and refining their aim.

they were essentially static and knew exactly where they were going to fight they did not face the same coordination problems as attackers. Defending gunners had time to bury telephone wires, create elaborate signal plans, and pre-target the battlefield (including their own positions.)

The lack of portable and reliable radios had the opposite effect on attackers. By definition, attacking meant advancing into the unknown. In the absence of reliable, real-time communications, timetables became the standard solution. Yet timetables were a poor substitute. Attacks invariably met unexpected resistance or unexpected success. Timetables did not allow for either. If the attack bogged down, artillery support mechanically went on as though nothing was wrong. If attackers tried to seize more ground than they had anticipated they risked being hit by their own artillery. The only way to adjust a fire plan once the attack was in motion was to use a vulnerable system of runners, signals, and telephones. In the chaos of battle runners got lost, telephone lines were cut, and signals were missed. As was the case with trucks, no army developed a reliable, lightweight radio system until at least 1918.[46]

The trench as a cumulative effect

Collectively, these four factors created the stalemate. The initial decision to entrench was ad hoc – individual soldiers and units dug in to protect themselves when their attacks failed. These hastily prepared defenses first appeared in German lines as early as the Battle of the Marne. In the beginning most trenches were barely deep enough to protect a single

[46] Van Creveld, *Command in War*, 162.

soldier - no more than 12 inches deep in most places.[47] They were never designed to be part of a coherent and permanent defensive network.[48] Everyone was convinced maneuver would soon resume.[49] By late September 1914, commanders began telling their men to connect their individual holes, a process that continued until a single trench line ran the length of the Western Front.

That neither side made a major dent in this configuration until 1918 leads many to assume that the dominant tactical problem was one of surviving the storm of steel, and this is what gave defenders a decisive advantage. There are a number of reasons this view is incorrect and that firepower itself was neither the main problem nor the core solution. First, artillery, not machine guns, did most of the killing.[50] This meant it was at least as costly – if not more so – to defend as it was to attack.[51] It was far easier for artillery to pound static targets (like defensive trench lines) than it was to hit mobile forces (like attackers).

A more important critique of this 'firepower thesis' is that penetrating (or breaking into) enemy lines was far less of a problem than popular history depicts.[52] Costly though it was

[47] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 27. Stephen Bull, "The Early Years of the War," 187–188.
[48] Stephen Bull, "The Early Years of the War," 191.
[49] Gudmundsson, *Stormtroop Tactics*, 28.
[50] Estimates range between 60 and 70% of all casualties were caused by artillery fire. Griffith, *Battle Tactics of the Western Front*, 43; Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 84.
[51] The Germans lost more men in the first two months of defending at Somme than they did while spending six months in the attack at Verdun. Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 84. And over the course of the Somme offensive the British lost approximately 420,000 men in the attack, while the Germans lost 465,000 in the defense. G.C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber and Faber, 1940), 131.
[52] "Notes on Certain Lessons of the Great War" (The War Office, 1934), 9–10, WO 32/3116, The National Archive, Kew. "Report on the Committee on the Lessons of the Great War (Kirke Report)" (The War Office, 1932), 11, WO 32/3116, The National Archive, Kew.

to attack across No Man's Land, both sides were more than willing to pay the price.[53] And both sides seized opposing trenches with regularity. The fact is that even in the most disastrous and ill-fated offensives attackers gained ground.[54]

The tactical dilemma

Offense

The real offensive challenge was primarily one of coordination and logistics. The elusive goal for attackers was "to achieve and exploit a penetration more rapidly than the defender could re-deploy to prevent or seal it off."[55] A series of simple diagrams show why this was.

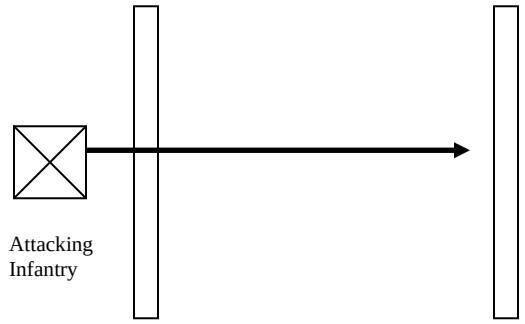
Early in the stalemate attackers would try to simply 'rush' enemy lines with waves of infantry.

[53] As Alexander Haig wrote in his diary on the 2nd of July, 1916 (the day after his men went over the top for the first time during the Somme offensive, which was to be the bloodiest single day in British military history): "The A.G. [adjutant-general] reported to-day that the total casualties are estimated at over 40,000 to date [note that the battle had only been raging for 24 hours at this point.] This cannot be considered severe in the views of the numbers engaged, and the length of front attacked. By nightfall, the situation is much more favourable than when we started today." Douglas Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde* (London: Eyre & Spottiswoode, 1952), 154.

[54] This was a problem that dated back to at least the American Civil War. During that conflict, General Hancock habitually ordered his men to dig three lines of trenches when in defense, because "the first was almost invariably captured by surprise, and sometimes the second also." "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909" (The War Office, 1909), 9, Joint Services Command and Staff College Archives, Shrivenham.TNA WO 279/25. See also House, *Combined Arms Warfare in the Twentieth Century*, 39; Samuels, *Command or Control?*, 1995, 86–87.

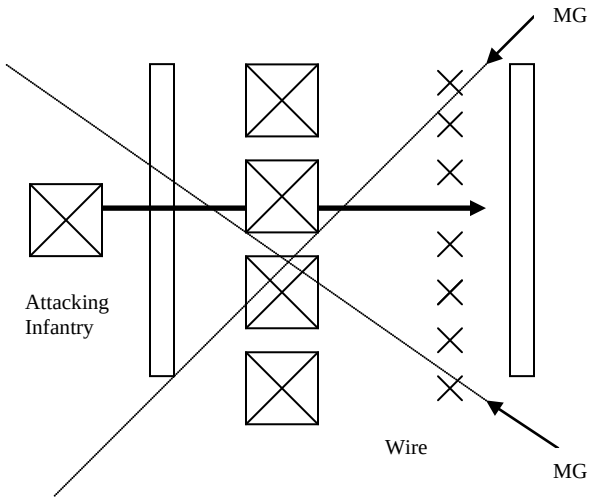
[55] House, *Combined Arms Warfare in the Twentieth Century*, 39.

An early war attack
Figure 4.1



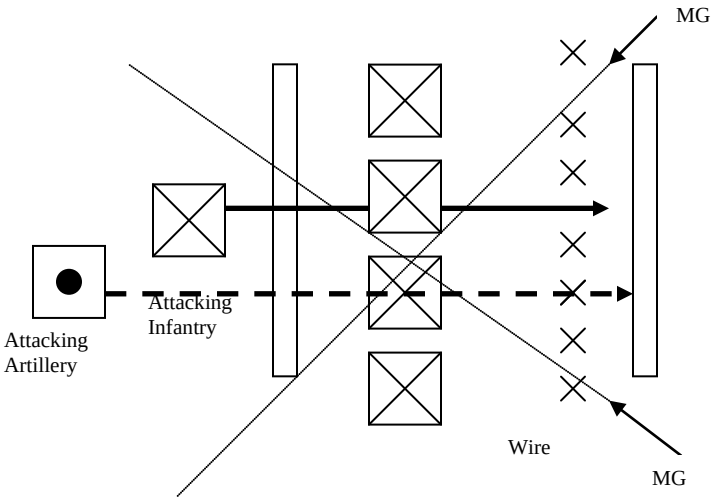
As mentioned, because the attackers were at a firepower disadvantage because they did not have light machine guns. Moreover, obstacles (like barbed wire) could slow their even further, giving defenders even more time to wear them down.

Defenses adjust
Figure 4.2



The initial response – and indeed the method that dominated much of the war – was for attackers to offset their firepower disadvantage by relying on massive, multi-day pre-assault bombardments to destroy the defender's wire, machine guns, and trench line. The goal was to win the firefight before the attacking infantry left its trenches.

The artillery 'solution'
Figure 4.3

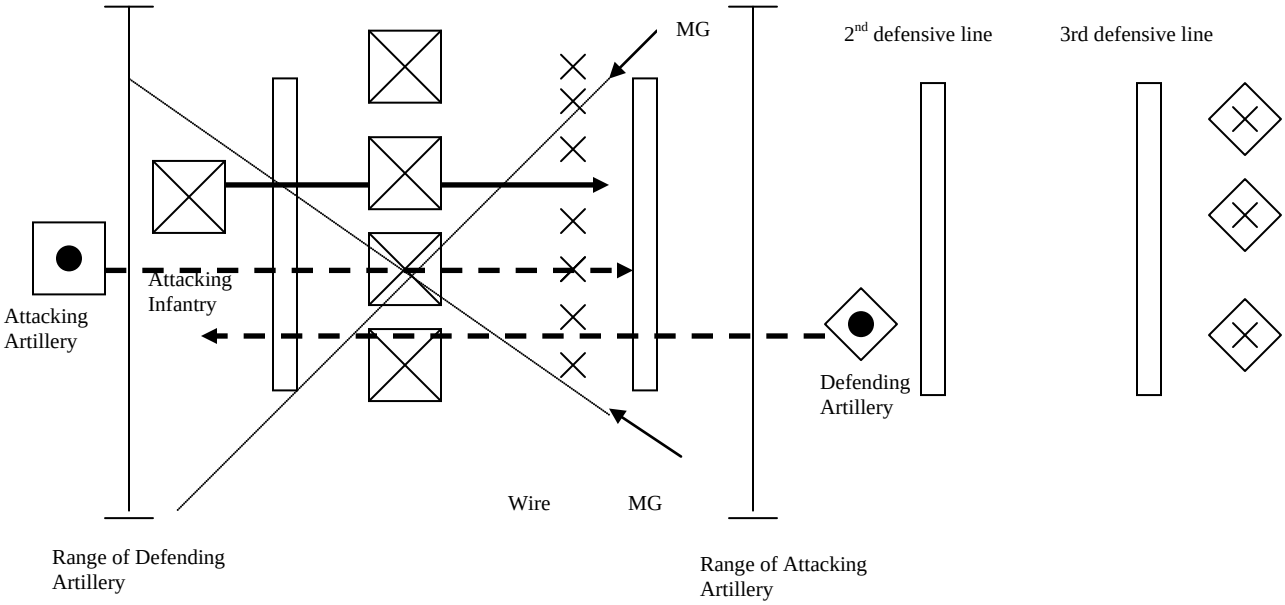


Although the massive bombardments helped attackers cross No Man's Land (especially after the introduction of the creeper barrage) there were still several important limitations.[56] First, artillery had a finite range, and because defenders had artillery too, attackers had to keep their artillery well behind friendly lines to keep it from being destroyed early in the battle.[57] Second, although pre-assault bombardments grew in length and power, defenders always managed to survive.[58] Defenders also resorted to a frighteningly intuitive solution – they made their defenses deeper (in distance, not depth) by digging additional trenches outside of the artillery's reach. Third, these extensive pre-assault bombardments came at a high price in terms of surprise. While bombardments pinned down those defenders already

[56] A wall of shells fired according to a timetable that advanced immediately in front of the foremost assault waves.
[57] By war's end some heavy artillery could hit targets 15 kilometers away. War Office, *German Army Handbook. 1918. Reprint*, 88.
[58] Later in the war defenders avoided a bombardment's worst effects by crawling into the very shell holes created by the bombardment and using those to fire on attacking infantry.

in the trenches, they also gave warning that an attack was imminent. As a result, reserve units had ample time to shift into place and to counter any penetrations.[59]

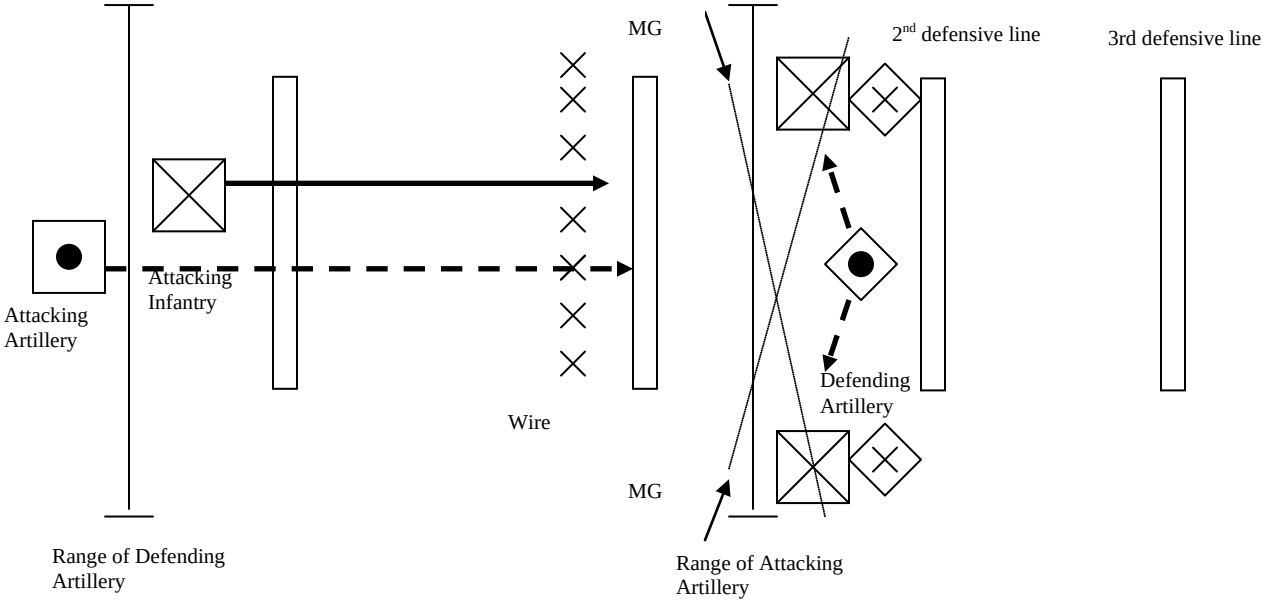
Defenses add depth
Figure 4.4



Once these defenses in depth were complete, an attack might penetrate the first trench line. Yet as long as the defenders could reposition reserve units faster than the attackers could move their artillery and reinforcements forward, the rest of the position was secure.

[59] There was also the problem that massive bombardments required massive preparation (to stockpile the millions upon millions of shells). Such preparations were almost always detected – usually by air, but sometimes even by defenders watching from their trenches.

Why defenses in depth were hard to penetrate
Figure 4.5



Again, the problem was not of firepower per se. There was no shortage of offensive firepower. Even if we ignore the powerful pre-assault bombardments, by 1916 the war attackers had access to an entire range of mobile firepower, including light machine guns, mortars, hand grenades, and rifle grenades.[60]

The real challenges were organizational, doctrinal, and logistical. Organizationally, attackers needed to generate firepower even after exceeding their artillery's range. To do this meant re-thinking the way they organized and equipped their infantry units. Before the war infantry units were exclusively made of riflemen, regiments controlled machine guns,

[60] Mortars were small artillery tubes that were relatively mobile and fired small explosive projectiles at high angles of fire. They were often referred to as trench mortars or minenwerfer, and were available on all sides by 1915. Light machine guns, although actually invented in 1911, were only in limited use by 1914. Of the combatants on the Western Front, the Germans were actually the last to adopt a light machine gun (and even then German soldiers preferred to use captured Lewis guns).

and divisions controlled artillery. As a result, small units had no way to generate the kind of firepower they needed to operate beyond their artillery's range.

Doctrinally, attackers needed new tactics and formations to traverse No Man's Land and beyond. For most of the war infantry assaulted in large waves, with soldiers standing two to three meters apart in a long line.[61] These linear formations were hard to control under fire and over broken terrain. Worse yet, they were too inflexible to adapt to unforeseen circumstances.

Logistically, all three armies faced two problems. The first was unsolvable given the available technology in the First World War. In an age before heavy trucks there was no way to quickly move that artillery forward across the devastated terrain. Were rapid displacement possible it might have decreased the infantry's need to generate its own firepower. However, even if artillery were more mobile, the infantry still had no way to communicate with it in real time. Military historian Paddy Griffith estimates that it took an six hours for a message to make it from a headquarters unit to the front line.[62] There was no way to alter the artillery plan once the assault had stepped off.

[61] The British, French and German armies *did not* rely on these antiquated formations because they were ignorant about modern firepower. They knew linear formations were costly. However, they were willing to pay the price to ensure their poorly trained soldiers would continue to press forward into the storm of steel.

[62] Typically the corps level to the company level. Griffith, *Battle Tactics of the Western Front*, 25. Similarly, Bradley Meyer points out that during the German invasion it took 24 hours for a message to make it from OHL to the army level (one step on the chain of command) Bradley John Meyer, "Operational Art and the German Command System in World War I" (Ph.D., The Ohio State University, 1988), 125. And this assumes a single message. To give some sense of the scope of the communication problem, during an average offensive a single British field army managed 10,000 telegrams, 20,000 phone calls, and 5,000 written messages dispatched by runners *per day*. Van Creveld, *Command in War*, 158.

Second, attacking units were exhausted and short on ammunition and supplies by the time they reached their initial objectives. Compounding matters, attacking meant moving away from supplies. Perversely, the more successful the attack, the bigger the gap between the railheads that delivered reinforcements and the assaulting units that needed them. Pre-assault bombardments made the problem worse, rendering the ground reinforcements had to cross impassable. Meanwhile, defenders had no such problem. They could build their rail networks as close to the front as they wanted. If forced to retreat they could fall back on their own supply lines.

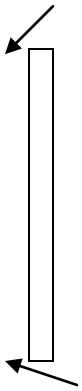
Defense

That attackers had a hard time capitalizing on their successes does not mean that defending was easy on the Western Front. In many respects, war on the Western Front was less a case of a defensive advantage than it was of offensive and defensive parity. Defenders absorbed appalling casualties. This fact was especially true during the epic battles of 1916 and 1917 when weeklong, million shell bombardments pummeled defenses – and the men garrisoning them – into oblivion.[63] If the defenders really had an advantage there would have been no reason for defenses to evolve throughout the war. Yet they did. The defenses in use by 1917 bore almost no resemblance to the crude trenches that stymied attacks in 1914. Thus, defenders had to optimize their doctrines to keep pace with the ever more complex and powerful assaults that sought to penetrate them.

[63] Moreover, casualty estimates for defenders are almost always underestimated. Entire units disappeared under the weight of the mass bombardments at the Somme and Ypres. To give some sense of the firepower defenders were subjected to, at Passchendaele one group of obviously bored German soldiers sitting in a pillbox counted 2,500 shells detonating within 100 yards of their position in four hours. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 266–273.

No one gave much thought to defensive operations before the war.[64] Although the improvised trenches of late 1914 were strong enough to create the stalemate, defenders spent the rest of the war wrestling with a core challenge: how to survive attacks – and especially the bombardments which preceded them – that grew exponentially in power. The very nature of the holding ground seemed to work against them. Attackers had the luxury of deciding where and when they wanted to assault. Airplanes and forward observers could easily study defensive positions, guiding artillery as it decimated communication trenches, supply points, and command nodes.

Defense circa 1914[65]
Figure 4.6

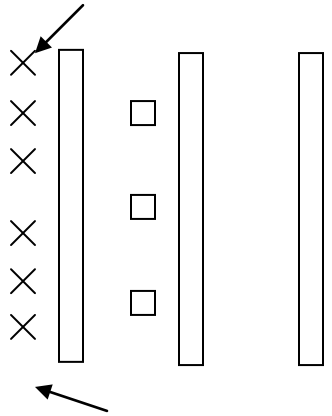


[64] The 1906 edition of the German exercise regulations for infantry dedicated five pages to the subject – twice the number of the 1888 edition. Samuels, *Command or Control?*, 1995, 161. The 1909 British Field Service Regulations (FSR) likewise commits five of its 229 pages (exclusive of the index) to defensive operations. "Field Service Regulations, Part I" (The War Office, July 29, 1912). The French seem to have given the most thought to defensive doctrine, although the key tenet in the 1913 update was that offensive action "alone leads to positive results." Defensive activity was far from completely ignored as the French had a separate handbook for engineers which outlined how to build a defensive position in the rare occasion that it was needed. Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 4–8.

65 Note that not only are the following diagrams not drawn to scale, but actual trenches almost never followed straight lines. Perfectly linear trenches were vulnerable to enfilading fire and offered no protection from shells and grenades that landed inside the trench. Trench lines were usually built with acute or 90 degree cut every few meters to defend against enfilading fire and to isolate against large blasts. In some particularly active sectors, defenders resorted to connecting shell holes instead of wasting time digging 'by the book' trenches that were both hard to conceal and easy to target.

The initial solution was to build obstacles and dig deeper. Attackers responded by using bigger shells. Eventually, bunkers grew so deep that defenders were either buried alive or took so long to climb out of their holes that the assault waves were upon them before they could escape.[66] Obstacles were added to buy time, but remained vulnerable to sappers and artillery.[67]

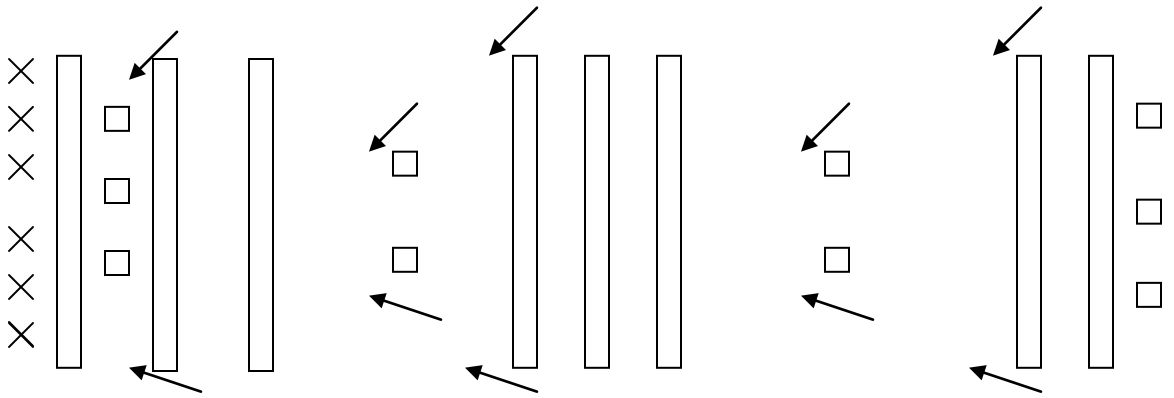
Defense circa 1915
Figure 4.7



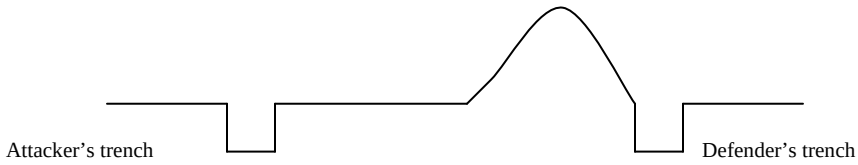
Next, defenders added depth to the entire position by positioning successive lines of trenches beyond effective artillery range. Although seemingly counter-intuitive, defenders also started relying on reverse slope defenses – digging trenches at the bottom of a hill (opposite the attacker) instead of on the top or forward slope. This simple measure kept artillery observers from shelling defensive trenches with impunity.

[66] Erich Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army* (New York: Harper, 1919), 289–290.
[67] Once the British and French managed to develop an effective point-detonation fuse.

Defense circa 1916
Figure 4.8



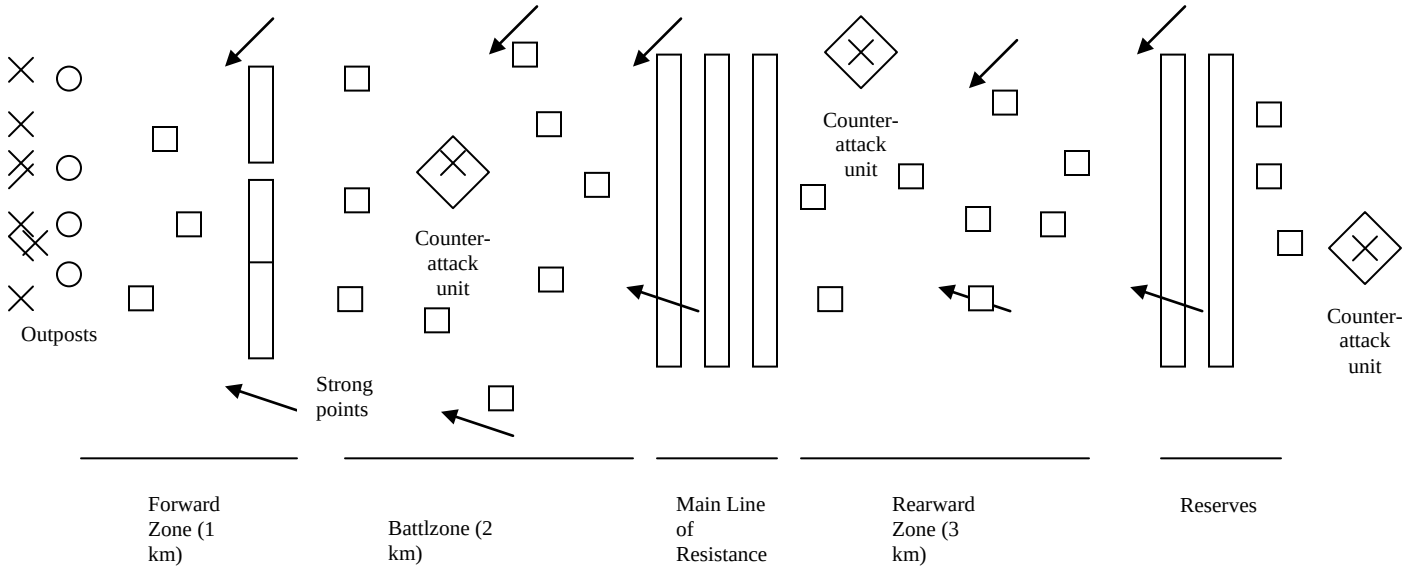
Reverse slope defense[68]
Figure 4.9



There were limits to what depth (in terms of distance) could do for defenders. First, if a defense grew too deep, reserve forces would be too far away to assist with stopping a penetration. This problem was especially severe when attackers switched from 'deep' penetrations to shallow 'bite and hold' attacks, where their only goal was to grab the front trench. In this way attackers could turn depth against the defender, slowly devouring a defensive position piece-by-piece and ensuring each attack ended before reinforcements could move into place. Second, depth was of little use as long as commanders insisted on putting most of their men in the front trench. Indeed, by fighting for the front line, defenders exposed themselves to the most powerful weapon in the attacker's arsenal: the pre-assault bombardment.

[68] In reality, soldiers would dig the reverse slope trench below the crest of the hill, not at its base. Graphic design limitations made this too difficult to recreate.

Defense circa 1918
Figure 4.10



Thus, defenders needed to find a way to trade space. To accomplish this goal, defenders needed to deliberately allow their forward positions to be taken. The risk was that in doing so attackers might create a foothold for future attacks. Such a system was challenging both politically and doctrinally. Doctrinally, it required a hyper-flexible command and control system as well as units that could decide when to fight and when to retreat.[69] Politically, it was unpalatable for both sides to willingly give up ground that had been so costly to take and hold in the first place.

Combined arms

Attackers and defenders alike shared a third problem: they needed to integrate the various weapons at their disposal. All three armies started the war with three main combat arms -

[69] The fear, of course, was that every unit would decide to retreat.

infantry, artillery, and cavalry. For the most part, the three arms fought independently on the battlefield.

This approach was untenable. No arm could operate on its own – each needed the other to offset its weaknesses and vulnerabilities. All three armies recognized the tactical advantages of integrating and coordinating the arms.[70] The rise of specialist engineering, tank, machine gun, grenade, and close air support units during the war made the task of combining arms more urgent and more complex.

III. The optimal doctrine

So what was this revolutionary doctrine that helped end the stalemate and in many respects formed the basis for 20th century conventional warfare? As I have suggested, it was based on three core elements: assault tactics, combined arms, and elastic defense-in-depth. Each represented the optimal way to attack and defend given the core challenges facing all sides on the Western Front.

Modern assault tactics[71]

Neither side had effective small unit tactics at the start of the war. Ideally, the best way to conserve manpower while attacking across No Man's Land was to disperse and maneuver in small groups. Formations of more than a few soldiers (perhaps 8-12) attracted unwanted attention from defenders. At the same time, commanders could not just unleash

[70] And at increasingly lower levels.
[71] See also Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton University Press, 2004), 35 – 38; Meyer, "Operational Art and the German Command System in World War I," 279–289.

thousands of small units and hope something useful would come of their uncoordinated actions. To fight in small units meant training small unit leaders and trusting them to fight independently. Small units also had to be able to generate their own firepower. Gaps and weak points in enemy defenses had to be exploited as soon as they presented themselves. Strong points had to be avoided lest the attack bog down. It was lethal to wait for reinforcements.[72]

To accomplish the aforementioned tasks, assault tactics needed to contain five interrelated components:

[72] The German, French, and British armies had all experimented with tactical systems that began to address these issues before the war, but all three had essentially abandoned such tactical systems by 1908. This dissertation contends that the dominant view in political science, that the French, German, and British armies were possessed by a "cult of the offensive" and caught off guard by the bloodbath that followed, is overstated and simplistic. It may have been true that the senior leadership in each army and the politicians who directed them embraced such a naïve view. But there is evidence that many, if not most, professional officers in all three armies realized that advances in firepower, mobility, and manpower demanded a new approach to offensive maneuver and that few bought into the idea that "élan" and bayonet charges across open terrain would carry the day. Of course such an argument is well beyond the scope of this dissertation – it is likely a dissertation project in its own right. See Eugenia Kiesling, who argues that "that military reform before World War I tended to be something done to the army rather than done by it, did nothing to endear the concept to members of the French high command, and the consequences of a prewar doctrinal reform movement within the army itself reinforced their suspicions. Although the infantry regulations promulgated in 1875, 1904, and 1914 encouraged attacking soldiers to disperse so as to lessen their exposure to enemy fire, a contrary school of thought, briefly triumphant in the 1894 regulations, argues that only closely packed formations could retain the cohesion necessary to triumph over an enemy's greater weight of lead. The regulations in force from 1904 on called for attacks to be carried out in skirmishing order [i.e. spread out] but official caution lost out to the intoxicating heresies spread in lectures…by Colonels Ferdinand Foch and Louis de Grandmaison. Their "cult of the offensive," the notion that élan and cold steel would defeat firepower, *never became official doctrine* but found enthusiastic adherents among French (and foreign) officers up to and including General Joseph Joffree himself." Eugenia Kiesling, "Resting Uncomfortable on Its Laurels: The Army of Interwar France," in *The Challenge of Change: Military Institutions and New Realities, 1918 -1941* (Lincoln, Nebraska, 2000), 3. See also Ramsay, *Command and Cohesion*.

Irregular and dispersed formations

To avoid withering fire and horrific casualties attackers needed to abandon large and inflexible linear formations in favor of ones that were irregular and dispersed.[73] 'Blob' formations allowed units to take advantage of the terrain and kept men far enough apart that a single bullet (or one shell fragment) would not injure or kill too many of them at once.

Independent small unit action

At the start of the war, companies (made up of about 200 soldiers and commanded by a captain) were the smallest unit capable of acting independently on a battlefield. However, one officer could never control 200 men spread out in an irregular formation. Thus, the next step was to train small units (and their leaders) to move and fight on their own. These units grew successively smaller as the war progressed. At first, armies experimented with platoons (40 or so men under a junior officer). When these formations proved equally unwieldy, they shifted to half-platoons of 20 or so men led by a senior enlisted soldier. By war's end it was common in all three armies for squads (8-12 men led by a relatively junior enlisted soldier) to fight on their own. These small units needed the authority to adapt to unforeseen set backs, exploit unexpected opportunities, and take advantage of terrain that could protect them from artillery, machine gun, and rifle fire.

[73] The British referred to these as 'blob formations.'

Fire and movement

Long before the First World War it had become suicidal to advance across open terrain without suppressing enemy gunners.[74] Before the war, all three armies taught attackers to use fire and movement to suppress the enemy. Fire and movement meant having part of an attacking unit stop to shoot while the rest continued to advance. It was akin to a game of armed leapfrog.[75] Once the war started, all three armies stopped using fire and movement at the small unit level. In 1914 and early 1915, commanders sent their men forward in a single, massive thrust.[76] Later, in 1915 and 1916, all three armies gave up on using the infantry to self-generate suppression. Instead of firing *and* moving, they shifted to firing *then* moving. Artillery would take care of suppression via its massive bombardments and creeping barrages. Then the infantry would advance across the battlefield. Of course, while this approach was better than advancing without any suppression, it still left attackers exposed once they moved beyond their artillery's range, or fell behind the timetable.

At the end of the day, infantry units still needed to generate their own suppressive fire. The optimal approach was to re-emphasize fire and movement, albeit at much lower levels of command. Although 'leapfrogging' sounds simple enough in theory, it is important not to underestimate the inherent challenges. The chance that some soldiers might get down only

[74] To suppress involves firing a weapon in the general direction of an adversary to keep that adversary from taking a well-aimed shot at you.
[75] As I will discuss, there was some variation among prewar doctrines as to how artillery would help the infantry advance by providing suppressive fire.
[76] General Joffre (as well as many historians) blamed this on lack of familiarity with pre-war doctrines. Joffre, *The Personal Memoirs of Joffre*, 1:185; Douglas Porch, "The French Army in the First World War," in *Military Effectiveness*, vol. I (Boston: Allen & Unwin, 1988), 215. Many historians point to the lack of realism in pre-war training, which resulted from a lack of training space, austere training budgets, and the desire to look good during large scale maneuvers. See Ian Sumner, "French Poilu," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K.: Osprey, 2007), 57.

to refuse to get back up again was not insignificant; especially given the firestorm these poorly trained conscripts were asked to attack through. Moreover, controlling thousands of individual units as they leapfrogged across the battlefield – and doing so in conjunction with an overarching artillery plan – required an unprecedented degree of preparation, training and small unit coordination.

Organic firepower

Fire and movement only worked if these small, independent, and self-contained infantry units had enough firepower to go up against heavily armed and fortified defenders. Riflemen armed with bolt-action rifles simply could not generate enough firepower to press an assault, especially without artillery support. As mentioned, it did not take long for all three armies to begin supplying their attackers with a stunning menagerie of weapons, including light machine guns, grenades, rifle grenades, mortars, and field guns.[77] Even then, for much of the war all three armies tended to put these weapons in the hands of specialists – specialists who joined infantry units immediately before an attack and left them immediately after. This practice precluded the familiarity and camaraderie that facilitates battlefield effectiveness. Moreover, even when specialists were attached, higher headquarters tended to retain control over their use, making them unavailable for front line service in most cases.[78]

[77] Essentially small artillery cannon

[78] To be fair, this was often because it took time to field enough new weapons – or soldiers trained how to use them – to place them with every small unit.

The optimal approach was to integrate the full range of weapons within the platoons and squads. Instead of giving these weapons to specialists, the infantrymen themselves needed to know how to use them, making these weapons were therefore a permanent part of each small unit.[79] Armed with their own light machine guns, rifle grenades, and hand grenades, small units would therefore possess had the kind of firepower needed to press forward without artillery support.

Deep objectives and bypassed resistance

Finally, assault tactics required attackers to aim for objectives deep within the defensive network. The goal was to strike as far deep as possible to disrupt the defender's command, support and artillery assets. To do this, attackers needed to strike on a relatively narrow front – preferably along the weakest points of the defensive line. Strong points and areas of stiff resistance needed to be bypassed and left for follow-on units to 'mop up.' Both requirements meant, once again, that attacking units needed to be relatively small; powerful enough to fight in isolation; and independent enough to exploit unforeseen gaps while avoiding unanticipated resistance.

In many ways this was a return to prewar doctrines, which called on attackers to avoid assaulting into the teeth of enemy defenses (hence the preference for flanking attacks) and to seek deep objectives that might disrupt the adversary's so-called center of gravity. Of course, the devil was in the details. Prewar doctrines might have advocated the same basic principles and goals, but prewar infantry units lacked the training, independence,

[79] Hence the term organic.

formations, and firepower carry out these kinds of attacks under the conditions present on the Western Front.

Thus, for much of the war all three armies tended to attack on a broad front (which they assumed would force defenders to divide reinforcements while preventing heavy artillery on the flanks to strike the entire breadth of the attack); seek close-in objectives (so-called 'bite and hold' tactics, which were designed to always keep attackers within range of friendly artillery); and reinforce units assigned to destroy strong points or that met unanticipated resistance.

Assault Tactics
Table 4.3

Component	**Description**	**Purpose** / **Replaced**	**Requirements**
Irregular and dispersed formations	Spread soldiers apart in width and depth when attacking; use non-linear formations to avoid enfilading fire	Take advantage of micro-terrain and avoid effects of artillery (shrapnel) and machine guns (enfilading fire) / Waves and large columns (linear formations)	Requires small unit leadership and extensive training to avoid the risk of soldiers getting lost, disoriented, or intentionally retreating
Independent, small unit action	Organize assault around squads (8-12 soldiers) and platoons. Give these small units the authority to deviate/improvise as the situation dictates and mission requires	Take advantage of micro-terrain; avoid presenting a large target on the battlefield; increase flexibility to set back to one part of the assault does not endanger the entire effort / Assaults in which companies and battalions are the smallest units of action	Requires small unit leadership and extensive training; creates a large coordination problem since independent units are now free to make bad decisions. Units also need enough firepower to fight on their own.

Fire and movement	At small unit level (i.e. platoon, squad or individual) one element halts to fire on defenders while the other part advances.	Allow infantry assault elements to generate their own suppressive fire – especially once the attack has penetrated beyond friendly artillery range	Requires small unit leadership and extensive training; risk that men will get down and never get back up in the face of a 'storm of steel.' Suppression requires sufficient firepower to work.
		No fire and movement (using artillery alone to suppress via creeping barrage) or large unit fire and movement (which is large and unwieldy)	
Organic firepower	Creation of 'all arms' combat teams: integrate full range of weapons (light machine guns, mortars, rifle grenades, grenades) to platoon and squad level	Allows independent small units can generate enough firepower to fight on their own, even in the absence of artillery support	Integration means that infantrymen are trained to use these weapons – not specialists who join the assaulting unit only for a single operation or attack
		Infantry units made up purely of riflemen; infantry units augmented by specialist machine gunners, mortarmen and bombers	
Deep objectives - bypass resistance	Attack on a narrow front to exploit weak spots; assign units deep objectives that allow them to wreak havoc on defending command posts, artillery, and supply points. Reinforce units that are making headway; call off attacks that have hit resistance. Avoid strong points and leave for follow on forces to reduce	Move rapidly to disrupt defender's key advantage: reinforcements and artillery (by hitting command and control nodes) instead of focusing on front line forces	Requires all of the other components to work: irregular formations, independent small units, fire and movement, and organic firepower
		Attacks on a broad front; bite and hold tactics; reinforcing units that meet resistance and focusing on strong points	

Combined arms

As important as these assault tactics were, better artillery tactics were also needed. After all, although infantrymen needed to take and hold the ground, artillery did most of the killing. Moreover, artillerymen needed new techniques to better facilitate the new assault

tactics. At least on the Western Front, where technological limits made true combined arms impossible, the optimal solution lay in four interrelated practices. [80]

Hurricane barrage

No matter how much mobile firepower armies could provide for their infantry, an attack into heavily prepared defenses was suicidal without artillery preparation. Given the degree to which defenses had advanced even by early 1915 this support had to include both a bombardment *before* the attackers stepped off (to destroy obstacle belts, knock out strong points, kill defenders, and prevent enemy artillery from firing) and suppressive fire to keep defenders pinned down *during* the assault. The dilemma was that the larger, deeper and more complex defenses became, the longer the preparatory bombardment needed to be; but the longer the preparatory bombardment lasted, the more time defenders had to shift reserves into place.[81] Attacking without a pre-assault bombardment was suicidal. So too was attacking without surprise.

[80] This statement means that the lack of tactical mobility for artillery (i.e. self-powered artillery, although tanks represented a crude first step) and the absence of reliable radio communications meant that it was impossible for the artillery to both keep up with the infantry and to coordinate with it as the situation evolved. It was not until the interwar period that technological advances would allow artillery to provide flexible and fully integrated fire support to the infantry throughout all phases of an offensive action.

[81] Because the multi-day bombardments gave defenders advance warning; and because actually moving enough cannon into place to fire the multi-day bombardment – let alone to stockpile the shells – could be easily detected. At the Somme the British fired 500 tons of explosives per day. And in a German attack in 1917 a single army-group used seven train loads of heavy shells (which in turn required 26,000 horses to move the shells from the trains to the front lines) every day. The artillery bombardment at Flanders in June 1917 required the attacking British units to stockpile 3 million shells. Drury, "German Stormtrooper," 49; Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 94; Wynne, *If Germany Attacks: The Battle in Depth in the West*, 277.

The solution to this catch-22 was simple but risky: gunners had to stop trying to destroy the enemy defenses. Indeed, destruction was an illusory goal.[82] Defenders could always dig deeper, add more concrete, or, as they shifted to defenses in depth, simply move outside of artillery range. Instead of seeking the impossible, gunners had to settle for neutralization. Where destruction implied physically smashing machine gun strong points, trenches, and opposing artillery, neutralization meant disorienting defenses.

Rapid, intense, and brief pre-assault bombardments, which came to be known as 'Hurricane barrages,' were the best way to neutralize a defense. Hurricane barrages focused on disrupting defenders by knocking out their command posts and communication junctures. Surprise was essential. Since the defenses themselves were left largely intact, the bombardment had to end before defenders could to re-establish communications and start moving reserves into place.

Predicted fire

Generals in all three armies recognized that surprise bombardments were better than long, drawn out ones. In 1915, the British experimented with proto-Hurricane barrages at Neuve Chapelle and Aubers Ridge. Their goal was to shock defenders into submission while retaining tactical surprise.[83] The problem was technological. For a Hurricane barrage to work, gunners had to actually hit their targets without warning. Yet for most of the war

[82] House, *Combined Arms Warfare in the Twentieth Century*, 32–33; Meyer, "Operational Art and the German Command System in World War I," 279–289.
[83] Bidwell and Graham, *Fire-power*, 73; Samuels, *Command or Control?*, 1995, 105–109; Wynne, *If Germany Attacks: The Battle in Depth in the West*, 25&42; Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 87.

technological limitations meant to have any hope of hitting their target gunners had to shoot registration rounds before firing a bombardment.

To explain this limitation: Rifles and machine guns fire bullets along a relatively flat trajectory, which means the gunner can see where his bullets strike. Artillery, on the other hand, fires at a high angle such that gunners cannot see where their shells land.[84] Complicating artillery gunnery even more, a lot of factors affect where a shell lands, including wind, humidity, temperature, and even the earth's rotation. Idiosyncratic differences between guns as well as wear and tear also affect accuracy.[85] As a result, before firing a bombardment, artillery gunners needed to fire several rounds to make sure they knew where their shells would land.[86] This was called registration fire. Since thousands of guns were used in a pre-assault bombardment, thousands of registration rounds needed to be fired, rendering surprise all but impossible. It could take days just to register all of the guns before a major offensive.

Predicted fire was the answer to this problem. Given accurate maps, precise meteorological reports, and highly technical gun tables, artillerymen could accurately fire their guns without registering them first.[87] Predicted fire was a major technical innovation that took

[84] Technically, the difference between cannon, howitzers and mortars is one of angle of fire. Cannon can fire shells at a relatively flat angle (which is why they are typically used on ships); mortars fire at an extremely high angle (making them especially useful in trench warfare, because they could be fired at very close ranges to their target, and because their shells could drop into narrow trenches). Howitzers fire shells at angles between these two extremes (which is why most ground artillery is of the howitzer variety – it combines a longer distance than mortars with the ability to drop shells behind hills, buildings, walls, etc).
[85] No two barrels are exactly alike. Moreover, as a barrel ages it becomes less accurate.
[86] Technically, the bombardment could be fired without registering first. However, it would be unlikely to hit anything at all – which is problematic given the logistical task of getting millions of shells into place.
[87] That were designed for each individual gun and that accounted for each gun's idiosyncrasies and wear such that two guns could hit the same point without firing practice rounds

years of experimentation and refinement before it worked.[88] All three armies had to start from scratch, since none invested time or energy into indirect fire techniques before the war, assuming artillery would fire directly over the heads of advancing infantry.[89]

Flexible command and control (C2)

The transition to assault tactics meant decentralizing authority well beyond anything prewar doctrines had imagined. Nevertheless, effective combined arms required armies to be able to rapidly switch between centralized and decentralized control over artillery assets. For much of the war all three armies gave divisions, corps, and army groups control over their own artillery assets. Division, corps, and army group commanders guarded their prerogative ferociously. Even when a division was assigned to a corps for a particular offensive, division commanders maintained control over their artillery assets. In other words, a corps commander could not tell a division commander working under him how to use his organic artillery.

Allowing every division to control its own artillery plan made sense during the assault, when gunners focused on suppressing defenders as the infantry made its way across No Man's Land. After all, units had different objectives, crossed different terrain, and faced different defensive networks. It was therefore impractical to have a single creeping barrage suppress for multiple assault divisions.

[88] Predicted fire was perhaps the most important technical achievement in a conflict known for its scientific and technical advances. Meyer, "Operational Art and the German Command System in World War I," 318–333; Bidwell and Graham, *Fire-power*, 102–113.

[89] In fact, the entire concept of using a map to aid with targeting was eschewed by most artillerymen in the prewar period.

At the same time, pre-assault bombardments worked best when they were coordinated and unified across the entire zone of attack. This was especially true for Hurricane barrages, where surprise was of the essence. It was impossible to coordinate multiple Hurricane barrages, meaning a decentralized barrage was unlikely to surprise defenders. The solution was to develop flexible C2 techniques that allowed the highest-ranking commander in an offensive to control all artillery in his sector during the pre-assault barrage; then returned control to subordinate units for the infantry assault.

All arms integration

The final component to effective combined arms mirrored the need for organic firepower at the small unit level. Larger units – brigades, divisions, and corps – similarly needed to integrate all available weapons, including tanks, aircraft (in a close air support role)[90] and both heavy and field artillery.

[90] Close air support means aircraft that are specifically tasked with firing on ground troops (as opposed to those tasked with gaining air superiority by shooting down enemy air craft; reconnaissance; or observing artillery fire). Although any aircraft can technically fill a close air support role, it usually requires special training for pilots; techniques for coordinating and communicating with ground troops; and aircraft capable of withstanding ground fire from rifles, machine guns, and anti-aircraft guns.

Combined Arms
Table 4.4

Element	Description	Purpose	Requirements
		Replaced	
Hurricane barrage	A no-warning, short, accurate and intense pre-assault barrage that aims to *neutralize* (not destroy) defensive positions.	Allows attackers to knock out key command and control (C2) nodes and to stun defenders prior to assault; ensures tactical surprise	Requires predicted fire capability to work
		A prolonged bombardment, which seeks to destroy defenses, but which gives defenders ample time and warning to bring up reserves.	
Predicted fire	The ability to accurately hit a target with artillery without first registering rounds (i.e. shooting practice rounds to verify whether the target will be hit)	Allows artillery barrage to achieve surprise	Technically difficult – requires advanced meteorology, mapping, and gun tables
		Registered fire, which takes a lot of time and gives defenders warning	
Flexible C2	The ability to centralize some aspects of the artillery plan (especially the pre-assault barrage and counter-battery fire	Allows the parts of the artillery plan that require massed fire (e.g. pre-assault barrage and counter-battery fire) to be controlled centrally, and the parts of the plan that require decentralized fire (e.g. fire support in the attack itself) to be decentralized as the battle progresses	Well developed staff procedures and commanders willing to forego control over some of their artillery assets
		Fire plans that are completely centralized or completely decentralized, but with no ability to switch during the course of the battle (e.g. the infamous 'time table' artillery plans	
All arms integration	Assault units at the division level and below have access and control to heavy firepower (i.e. artillery-type fire). Fire and movement at the large unit level.	Gives larger assault units rapid access to heavy firepower to deal with points of resistance, strong points, and bunkers	Requires heavy all-arms training (i.e. infantry, artillery, armor, and air staffs as well as leaders have to coordinate and train together extensively). Can be achieved by attaching field guns to infantry units; attaching tanks to infantry units; or making use of close air support
		Individual arms (infantry, tanks, cavalry, air, artillery) fighting independently	

Elastic Defense-in-Depth

Defensive dominance was neither absolute nor inevitable in the First World War. The ad hoc defenses that evolved in late 1914 would not have survived the assaults mounted by attackers in 1915. Nor would the defenses that existed by 1916 survive the attacks launched in 1917. Despite their supposed dominance, defenders absorbed horrific casualties throughout the war. Commanders on all sides concluded that even a war of attrition could not be won on the defensive.

In the end, defensive doctrines evolved on the Western Front alongside the attacks that sought to penetrate them. They reached their optimal form when the German Army introduced the elastic defense in depth in late 1916/early 1917 (although minor modifications were made through 1917, and again when the British adopted the system in late 1917/early 1918). The elastic defense in depth itself comprised three components: depth, elasticity, and the counterattack.[91]

Depth

On all sides, Western Front trenches started as a hastily dug holes tied together to form continuous trench line. Given the increasingly powerful pre-assault bombardments, defenders then started to add depth and redundancy. First, the armies dug second and third trenches behind the original line.[92] Later, they dug subsequent sets of trenches were

[91] See also Meyer, "Operational Art and the German Command System in World War I," 349–350; Biddle, *Military Power*, 2006, 46–48; House, *Combined Arms Warfare in the Twentieth Century*, 40–43.

[92] These were connected by lateral, or communication trenches, which served two purposes: 1) They allowed reinforcements and replacements to move between trenches without exposing themselves to enemy observation and fire; 2) they allowed defenders to "close off" or isolate portions of the trench line that were lost in an attack without giving up the entire position.

built behind initial network.[93] At Passchendaele (1917) the British faced a German defensive network that was 10,000 meters in depth at some points.

There were two reasons to build a deep defense. First, it gave defenders redundancy. If an attack managed to take first trench line, the attackers had turn around and launch another attack against the next position. Each successive effort sapped time, ammunition, energy, men and momentum from attackers, giving defenders time to shift reserve forces into place. Second, the deeper defenses extended, the harder it was for the attacker's artillery to range the entire network. When combined with a willingness to shift defenders away out the front trenches (see below) it also helped conserve manpower.

Elasticity

Elasticity also meant giving front line commanders the authority to fall back if the situation called for it. In this way, defenders could fight hard for the front line when confronted with a probe, raid, or other type of small assault. At the same time, if faced with on overwhelming onslaught, forward units could fire on attackers long enough to slow them down and then displace to prepared positions farther back in the defense.

If adding depth to the defensive network was intuitive, shifting defenders out of the front lines was not. As late as 1918 some officers persisted in positioning the bulk of their soldiers in the front trenches. Not only did this make it hard for them to adapt when

[93] Although prisoners of war and colonial labor did a lot of the trench construction, recruits were also regularly used to build new trenches. As I will demonstrate, this suggests the degree to which training was viewed as a relatively unimportant task by many officers during the war. This is especially interesting given how much officers in all three armies worried that conscripts were not trained enough to carry out complex tasks.

attackers inevitably got a foothold, but it also meant that most of the defenders were within range of attacking artillery.

Officers resisted distributing their soldiers farther back in their defenses for at least three reasons. First, they were worried about the political ramifications of not fighting to hold on to every inch of ground (an especially acute concern for the French, but also an issue for the Germans). Second, they were concerned about making it too easy for attackers to gain a foothold that would be hard to repulse. Third, it gave relatively low-level commanders the authority to order a retreat. Senior leaders in every army worried that their subordinates might abuse this authority, withdrawing prematurely or mutating an orderly pull-back into a general route.

Counterattack

The freedom to fall back constituted only part of elasticity. The other, equally critical part was that units at every level vigorously and aggressively counterattacked to retake lost ground. When faced with an overwhelming attack, squads, platoons, companies, and battalions were free to pull back. But as soon as the attackers halted to regroup, reorient, or rearm, the same units that had fallen back were expected to immediately retake their position with a counterassault.

In this way, elastic defenses in depth were highly offensive in nature. Attackers were allowed to take ground until, thereby expending combat power and pushing beyond the limits of supporting artillery. At that point, when they were attempting to consolidate their

gains or organize a new push, defenders would isolate and attack them in turn. The idea was to organize the fight on favorable terrain (usually in the battle-zone – see the diagram above) using pre-built concrete pillboxes and strong points (camouflaged from view or beyond artillery range) as rally points. Larger penetrations would wait for reserve forces to counterattack. Everything else depended on local defenders to mount the attacks themselves.

Elastic Defense-in-Depth
Table 4.5

Element	Description	Purpose Replaced	Requirements
Depth	Defensive lines were almost always penetrated during a major offensive. Adding depth to the defensive network via subsequent trench lines and strong points forces attackers to either strike deeper in a single push (beyond range of friendly artillery); or lose momentum as they re-stage for a subsequent push (i.e. bite and hold tactics); gives time for reserves to move up.	Give defenders more opportunities to stop a penetration; shelter reserve forces; forces attackers to move beyond range of supporting artillery Shallow defenses	Can be politically inflammatory – Neither French nor German politicians like the idea of ceding territory purchased at a high price; officers on all sides fear that redundant positions might encourage soldiers to not fight as hard
Elasticity	Do not fight for the front line. Shift bulk of troops out of forward-most positions; hold forward positions with a minimum of troops to serve as outposts, give warning in event of large scale attack, and slow the attackers by firing on them and forcing them to deploy into combat formations. Allow front line commanders to decide when to hold and fight, when to fall back, and when to counterattack.	Move as many defenders as possible out of attacking artillery range; trade space for time (to shift reserves into place) to avoid unnecessary losses for untenable terrain Rigid emphasis on holding the front line at all costs	Even more politically inflammatory than defense in depth. Requires extensive small unit leadership and training as well as trust on the part of senior leaders that soldiers will not abandon their posts prematurely
Counterattack	Hold defensive terrain by counterattack. Units at every level (from the squad to the division) mount immediate and aggressive counterattacks to retake all lost terrain	Conserves manpower by letting attackers waste combat power before putting up a fight; Hits attackers at their most vulnerable – while consolidating Fighting for the first line	Requires extensive small unit leadership. Creates a difficult coordination problem as hundreds of squads, platoons, companies and battalions may be counterattacking in different areas at the same time.

IV. Methodological issues

The foregoing discussion is intended to rebuff the popular myths surrounding the First World War in general, and fighting on the Western Front in particular. The goal is to both give readers a glimpse of the degree to which warfare evolved between 1914 and 1918 and to make the case that these changes converged on an optimal set of offensive, defensive, and combined arms doctrines. Two additional tasks remain. The first of these is to show why the First World War is a good test case for command culture, assessment and training (CAT) theory.

Strengths

Controls

The First World War is the closest thing to a natural experiment in warfare. The British, French and German armies were virtually identical across many parameters that scholars typically associate with organizational change. These include size (at least after 1916),[94] structure,[95] and wartime budgets.[96] The three primary combatants also fought with virtually identical weapons and, at least in 1914, doctrines. This uniformity along many of the parameters usually associated with organizational change allow us to dismiss these

[94] For the seminal version of the argument that organizational size drives innovativeness, see Joseph A. Schumpeter, "The Creative Response in Economic History," *The Journal of Economic History* 7, no. 02 (1947): 149–159. For a review of the subsequent industrial literature on Schumpeter's size thesis, see Wesley M. Cohen and Richard C. Levin, "Chapter 18 Empirical Studies of Innovation and Market Structure," vol. Volume 2 (Elsevier, 1989), 1069.
[95] Fariborz Damanpour, "Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators," *The Academy of Management Journal* 34, no. 3 (1991): 555–590.
[96] Budgets are often cited in the organizational change literature in terms of their impact on research and development spending (see Mark S. Freel, "Sectoral Patterns of Small Firm Innovation, Networking and Proximity," *Research Policy* 32, no. 5 (May 2003): 751–770.) or slack resources (see Martin M. Rosner, "Administrative Controls and Innovation," *Behavioral Science* 13, no. 1 (1968): 615; Damanpour, "Organizational Innovation."

factors as optimization's causes and drivers among the British, French and German armies in the First World War

More important, especially in security studies, all three armies shared similar strategic goals (in a military sense). They also fought under the same basic conditions, allowing us to control for strategic objectives and other potential confounding factors.[97] In terms of strategy, the British, French and Germans shared a basic military goal: to penetrate the other side's defensive network in order to restore maneuver to the battlefield. (The British and French likewise shared a larger set of political goals. Most immediately, the French wanted to end the stalemate to push Germany out of French territory; the British to push Germany out of Belgian territory. Both wanted to neuter Germany's future warmaking potential. The Germans are the puzzle in this regard. From 1914 onward it is hard to see how their tactics and operations fed into a coherent strategic-political framework. Indeed, it is curious to imagine what exactly the Germans planned to do had they reached Paris in 1914… or in 1918 for that matter.)[98] In terms of environment, all three armies fought under identical conditions on the Western Front. They faced the same weather, the same terrain, and the same endemic uncertainty. In a larger sense, all three armies also faced the same basic political pressure to end the war quickly from their elites and domestic audiences at home.

[97] Organizational scholars suggest that different causal variables (e.g. structure, spending, etc) operate in different ways under different environmental conditions (e.g. uncertainty, stability, etc). See Fariborz Damanpour and Shanthi Gopalakrishnan, "Theories of Organizational Structure and Innovation Adoption: The Role of Environmental Change," *Journal of Engineering and Technology Management* 15, no. 1 (March 1998): 1–24.
[98] Herwig, "The Dynamics of Necessity: German Military Policy During the First World War."

The First World War offers another important source of control. Often, states can 'tolerate' armies that fight in an inefficient or sub-optimal way as long as battlefield incompetence does not threaten broader strategic goals. For example, the U.S. emerged victorious from the Second World War even though its military was often out-fought by its rivals. However, the First World War was a conflict in which success and failure at the strategic and political levels turned on how quickly the armies adjusted at the tactical level.[99]

Variation

As a test case, the British, French and German armies also vary in the dependent variable (doctrinal optimization) and CAT's independent variables of interest (command culture, assessment mechanism, and training structure). As chapters 5, 6 and 7 demonstrate, these armies optimized more effectively and more quickly as they shifted towards moderately decentralized command cultures; developed coherent and independent assessment mechanisms; and exerted centralized control over their training. The Germans were the first to reach this ideal set-up, and were also the first to adopt (most of) the elements of the optimal doctrine. The British Army was close behind, although because it struggled with centralizing training until the summer of 1918, its units never demonstrated a significant degree of uniformity in how they fought.[100] The French Army was the slowest of the three to optimize. For these reasons, chapter 7 parses out the effects of French command culture, assessment mechanisms and training structures against the equally strong force generated by an army collapsing in on itself.

[99] Murray, *Military Adaptation in War*, 76.
[100] Hew Strachan, "The First World War," *The Historical Journal* 43, no. 3 (2000): 889–903.

The First World War: Variation on the dependent and independent variables
Table 4.6

Germany

	1914	1915	1916	1917	1918
Assault tactics	No	Exp	Dev	Dem	Yes
Combined arms	No	Exp	Dev	Dem/Yes	Yes
Elastic defense in depth	No	Exp	Dev	Dem/Yes	Yes

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Mod Centralized	Mod Decentralized	Mod Decentralized	Mod Decentralized
Assessment mechanism	Yes	Yes	Yes	Yes	Yes
Training structure	Mod Centralized	Mod Centralized	Centralized	Centralized	Centralized

Britain

	1914	1915	1916	1917	1918
Assault tactics	No	Exp. / No	No	Exp/Dev	Exp/Dev
Combined arms	No	No	Exp.	Dev / Dem	Yes
Elastic defense in depth	No	No	No	Dev**	Dem***

*Experimentation ended after Battle of Aubers Ridge in May 1915
**Skipped experimentation – copied directly from German army
***There is a historical debate as to how well the British army actually knew and applied the elastic defense in depth

.
**** After July 1918 (with General Maxse's appointment as IG Training)

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Centralized	Centralized	Mod Centralized	Mod Decentralized
Assessment mechanism	No	No	Dev	Dev	Yes
Training structure	Decentralized	Mod Decentralized	Mod Decentralized	Mod Centralized	Mod Centralized/ Centralized****

France

	1914	1915	1916	1917	1918
Assault tactics	No	No	No	Exp	Exp
Combined arms	No	No	No	Exp/Dev	Dev
Elastic defense in depth	No	No	No	Exp/Dev	Dev/No

	1914	1915	1916	1917	1918
Command culture	Mod Centralized	Centralized	Centralized	Mod Centralized	Mod Centralized
Assessment mechanism	No	No	No	No	No
Training structure	Decentralized	Decentralized	Decentralized	Mod Decentralized	Mod Decentralized

Abbreviations:
Exp – Experimenting (ad hoc)
Dev – Developing (wide spread effort to refine)
Mod cent/decent – Moderately centralized/ decentralized

Limitations

The First World War is not without its limits as a case study. Two are particularly important to address. First, there are several potential confounding factors, which cannot be controlled. Britain and France were democracies (albeit not very robust ones for much of the conflict), while Germany was not. It is entirely possible that autocracies enjoy certain advantages when it comes to doctrinal change. Second, Britain, France and German (as well

as the British, French and German armies) possess unique cultures. It is therefore also possible that Germany optimized better than its adversaries because it had a national, strategic, or military culture that placed a higher premium on flexibility.[101]

This dissertation deals with these limitations in chapter 8 by addressing the counterarguments and alternative explanations they generate. To fill in potential gaps, Part III develops shadow cases that control for regime type and culture.

How do we know assault tactics, combined arms, and elastic defense in depth were the optimal doctrine*?*

The second major issue deals with whether there really was an optimal doctrine on the Western Front, and whether my description is accurate. There are three compelling reasons to believe both are true.

First, as chapters 5, 6 and 7 demonstrate all three armies either converged on assault tactics, combined arms, and elastic defense in depth, or were trying to doing so as the war ended. While the German Army was the first to (almost fully) adopt these measures, the British Army was never far behind (and in the case of the tank and some aspects of combined arms, it was actually ahead). Moreover, the French Army made significant strides towards implementing these concepts army wide. Additionally, at least in the case of defense in depth and assault tactics, the French were actually the first to sketch these ideas out on paper. Again, the French case is complicated by the mutinies and unrest that

[101] A culture that, in turn, could be explained with reference to differences between the three nations' geo-strategic position.

followed Nivelle's offensive in Chemin des Dames, forcing Petain to focus his efforts inward, on rebuilding the French Army, rather than outward, on taking the fight to the Germans. It is noteworthy that even during this introspective period the French Army nonetheless adopted the defense in depth as a way to conserve manpower until the Americans arrived in force.

Second, military historians concur that this was the optimal doctrine on the Western Front (even if this is not the terminology they use). There is certainly considerable debate about *why* assault tactics, combined arms, and the elastic defense in depth worked to end the stalemate, and which elements were most important to its success.[102] However, the basic consensus that these doctrinal precepts represented a superior way of fighting on the West remains unchallenged.

Finally, assault tactics, combined arms, and elastic defense in depth remain centerpieces in modern military doctrines. In his seminal work on conventional warfare, *Military Power*, Stephen Biddle argues that

> By 1918, a process of convergent evolution under harsh wartime selection pressures had produced a stable and essentially transnational body of ideas on the methods needed to operate effectively in the face of radically lethal modern weapons…. Taken together, they broke the trench stalemate in 1918 and defined the standard for successful military operations throughout the post-1918 era.[103]

Although not all historians and military analysts agree with Biddle's contention, it is at least clear that assault tactics, combined arms, and elastic defense in depth as they were

[102] This debate has been especially fierce in the British historiography. See Timothy Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917-1918* (London ; New York: Routledge, 1992); Boff, *Winning and Losing on the Western Front*, 8–18; Griffith, *Battle Tactics of the Western Front*, chap. 1.
[103] Biddle, *Military Power*, 2006, 28.

developed in the First World War went on to form the core of the German Army's blitzkrieg 'doctrine' in the Second World War, and the maneuver warfare doctrine that guided the American Army to victory in the Persian Gulf and the initial phases of Operation Iraqi Freedom.[104]

Why did Germany lose if this was the optimal doctrine?

There is a final issue worth addressing at the outset: if assault tactics, combined arms, and the elastic defense in depth represented the best possible way to fight; and if the Germans were the first to adopt all three; then why did it lose the war? The simplest answer has to do with what an optimal doctrine means in the first place: optimal doctrines maximize the probability that an army will fight as efficiently as possible, given the goals it has set for itself (or which have been set for it). War outcomes are the result of a far more complex set of factors than just efficiency (and probabilistic efficiency at that). To use a stylized example: The Jamaican army can adopt an optimal doctrine, but it is still likely to be little more than a speed bump were it to square off with Russia, China, or the United States in a conventional conflict.

[104] For an in-depth discussion on this subject, see Robert Michael Citino, *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920-1939* (Lynne Rienner Publishers, 1999); Robert Michael Citino, *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare*, Modern War Studies (Lawrence, Kan: University Press of Kansas, 2004).

Ultimately, throughout the First World War the German high command proved pathologically incapable of developing a coherent political-military strategy.[105] The fact that Germany's prewar planning called for invading Belgium without giving serious thought to what that would mean in terms of British intervention is perhaps the most striking example of this. However, the calculus behind the ill-fated Zimmerman telegram and the unrestricted U-boat campaign;[106] the decision to engage the Allied powers in a battle of attrition at Verdun; and the absence of a strategic objective in Ludendorff's Spring Offensives collectively demonstrate that strategic incoherency was a consistent theme throughout the conflict.[107]

V. Roadmap

Part II is organized as follows: chapters 5, 6, and 7 detail the development and evolution of German, British, and French doctrine from 1895 to 1918, respectively. Each chapter is organized by period (prewar, 1914, 1915, 1916, 1917, and 1918) and discusses how the major dependent variables (assault, combined arms, and defensive doctrines) and core independent variables (command culture, assessment mechanisms, and training structures) vary over time. Attempts are made to discuss major political and strategic developments insofar as they might plausibly influence tactical doctrine. Evidence is drawn

[105] This argument is made elsewhere. For a succinct version that does a good job of acknowledging the obvious tensions created by the German Army's tactical brilliance and strategic incompetence, see Herwig, "The Dynamics of Necessity: German Military Policy During the First World War."
[106] Where the Schlieffen Plan's 'right hook' through Belgium guaranteed British intervention, the Zimmerman Plan and unrestricted U-boat campaign virtually guaranteed America's. To be fair, Ludendorff and others most likely thought that American intervention on the Entente's side was inevitable (although whether they were right or not is up for debate). Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, 369–378.
[107] In some respects we must wonder if possessing the solution to stalemate encouraged Ludendorff to overreach in the first place.

from the secondary literature, after action reports, intelligence documents, and training manuals. Chapter 8 concludes by addressing confounding variables and alternate explanations.

Chapter 4 Appendix

Appendix A: Key battles in development of tactical doctrine

	Date	Description	Significance
Frontiers	14 – 24 August 1914	German-French-British-Belgian	Entente forces slow German advance long enough for Joffre to pull his forces back from Alsace-Lorraine
Marne	5 – 12 September 1914	British-French counteroffensive	Ends German offensive into France
Aisne	13 – 15 September 1914	British-French offensive	First attempts to use aircraft to direct artillery fire
Yser	16 – 31 October 1914	Final attempt by Gemans to break through Belgian lines	Beginning of the stalemate
Soissons	8 – 14 January 1915	Minor French attack followed by German counterattack	German experiment with neutralization fire; Chief of Staff for German Army III Corps (Seekt) calls for flexible formations and more firepower for assault units. French learn opposite lesson, concluding that artillery was dominant arm and infantry should support (beginning of 'the artillery conquers, the infantry occupies')
Neuve Chapelle	10 – 13 March 1915	British offensive (48 battalions on a 2,000 yard front)	British First Army successfully penetrates German trench line (composed of a single trench) but stalls for 7 hours waiting for follow on orders – reinforcements repulse. Prompts German army to build a second trench line in British sector
Aubers Ridge	9 May 1915	British attack in support of French Artois offensive (Second Battle of Artois)	British forces experiment with a hurricane barrage and attach field guns,

			machine guns and engineers to infantry, but lose 10,000 in the attack. Therefore, marks high water mark for experimentation with assault tactics until after Somme. Marks shift to 'artillery conquers, infantry occupies'
Festubert	15 – 25 May 1915	British attack in support of French Artois offensive (Second battle of Artois)	First use of a prolonged pre-assault bombardment (three days) by British
Loos	25 September 14 October 1915	British attack in support of French Artois (Third Battle of Artois) and Champagne offensives	British forces use a four day bombardment but fail to recognize increased depth of German defenses – lose 43,000 soldiers; first large scale use of Kitchener's 'New Army' units
Second Battle of Champagne	25 September – 6 October 1915	French offensive (20 divisions on an 18 mile front)	French GQG concludes that break in operations and break out operations have different requirements, and Joffre concludes that "success is only possible where attacks are thoroughly and methodically organized"[108]; German Third Army build the first true defense in depth; Germans experiment extensively with counterattacks
Gorlice-Tarnow	1 May – 18 September 1915	Minor German offensive against Russia that leads to collapse of Russian lines. Germans advance 300 miles and inflict 2 million casualties	Assault forces experiment with Hurricane barrages (as suggested by Seekt), bypassing points of resistance, and deep objectives
Verdun Offensive	21 February – 18 December 1916	Major German offensive against French army to 'bleed' the French white	Germans bleed themselves white; prompts British to launch Somme offensive without significant French support and earlier than Haig preferred; Longest battle of the war
Battle of Narotsch	18 Mar – 30 April 1916	German offensive on Eastern Front	First use of an Army level unified artillery plan by German army (prior to this no artillery plan had ever

[108] Joffre, *The Personal Memoirs of Joffre*, 1:346.

			been coordinated at above the division level); Bruchmuller first identified
Somme Offensive	1 July – 18 November 1916	Combined British-French offensive (but mainly British) to rupture German lines… or at least relieve French forces at Verdun.. or whatever	Beginning of army-wide transition to defense in depth by German army; beginning of experimentation with assault tactics by British Army
Vimy-Arras	9 – 12 April 1917	British offensive designed to draw off German forces before Nivelle's larger attack at Chemin des Dames	Germans recently transitioned to elastic defense in depth but apply it poorly; British shift to bite and hold tactics
Chemine des Dames (Nivelle offensive)	16 April – 9 May 1917	French army offensive based around Nivelle's innovative doctrine	Epic fail: Nivelle disregards recent German shift to elastic defense in depth; ignores the fact the Germans have a copy of his plan; promises total victory to everyone. Leads to widespread mutinies throughout the French army – Nivelle replaced with Petain. France forced to shift to strategic defensive until summer 1918
Passchendaele	31 July – 6 November 1917	To relieve pressure on beleaguered French army	Major blow to Haig's reputation
Caporetto	24 October - 12 November 1917	Combined German-Austro-Hungarian offensive on Italian front	Second large scale use of assault tactics; but Ludendorff still not convinced they will work because he considers Italian forces not to be as good as British and French
Cambrai	20 November – 7 December 1917	British attack and German counterattack	First British use of combined arms (Hurricane barrage, close air support and tanks). German combined arms counterattack takes all the ground back
Ludendorff offensives	21 March – July 1918	German army's attempt to end the war	Validates assault tactics and combined arms doctrines, but Ludendorff overreaches
Hundred Days offensive	8 August – 11 November 1918	British-French-American counterattack	British begin to implement assault tactics / perfect combined arms

Chapter 5

The German Army on the Western Front

"It was just as necessary to have a clear idea of our fighting capacity as to know whether our tactical views were still sound. The first was an easy matter, the second of extreme difficulty. Opinions vary as much in the strategical and tactical as in the political and economic questions. It is just as difficult to carry conviction. The symptoms are recognized, but the underlying causes are the subject of controversy. In such circumstances a cure is a difficult matter."[1]

I. Overview

The German army optimized its tactical doctrine faster and more completely than either of its adversaries on the Western Front. By January 1917, it implemented an elastic defense in depth across most of the Western Front. By November 1917, it demonstrated army-wide proficiency with combined arms. And during Ludendorff's March 1918 offensive it proved capable of executing assault tactics on a large scale.

No other army in the First World War managed a comparable feat. While the British army kept pace with their German competitors in terms of combined arms, and actually stayed ahead of them in terms tank warfare, the British were at least a year behind in adopting the elastic defense-in-depth. Moreover, their application of the elastic defense-in-depth during Ludendorff's offensives gives reason to doubt that they truly understood a concept copied wholesale from German manuals. Finally, while the British experimented widely with assault tactics in 1917 and 1918, they never managed to enforce their adoption over a large portion of the army.

[1] Erich Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army* (New York: Harper, 1919), 315–316.

For its part, the French army was ahead of the Germans in terms of thinking about assault tactics, combined arms, and elastic defense-in-depth. However, they proved far less adept at translating good ideas into practical doctrine. Indeed, there is a great deal of evidence suggesting that the Germans were eager conceptual scavengers and were both willing and able to attack the French with their own ideas.

This last point is important and suggests why optimization offers a better framework than innovation, adaptation, and emulation for thinking about doctrinal change. Despite the standard narrative, the German army was not necessarily more creative, original, or innovative than its adversaries. It was, however, better at transforming a good idea into doctrine. Some ideas came from the top echelons of the German army's officer corps (most notably, Hurricane barrages and flexible command and control over artillery planning). Others came from below, including much of the thinking around assault tactics. And, as mentioned, some came from the French. The French army's Commander-in-Chief, General Joseph Joffre, seems to have been the first to openly call for adding depth to defenses. And French Captain Andre Laffargue's 1915 treatise on assault tactics, although most certainly not the source of the idea in the German army, helped with its refinement and application.

Crucially, the German army did not import concepts wholesale. Rather, the Germans took the time to refine and adapt concepts such that they were relevant and applicable to its needs and requirements at the time. This was something the British army failed to do when copying the German elastic defense in depth in early 1918 – a failure that nearly cost them the war.

Thus, in the final analysis, German optimization on the Western Front was the product of their systematic ability to generate or emulate new ideas, refine them in a systematic and coherent way, and implement them with ruthless efficiency. It was not the product of individual genius. Ludendorff, Bruchmuller, Lossberg, Seekt and others are often given singular credit for the German army's doctrinal prowess. While they are undoubtedly an important part of the causal story, it is absurd to think any individual could singularly conceive, refine, and enforce a novel set of doctrinal practices across a multi-million-man army.[2] Common sense dictates that something systemic must also be going on behind the scenes.

Nor was optimization simply the product of the decentralized culture for which the German army was renowned.[3] For the reasons discussed in chapter 3, decentralization may help us understand why some organizations are better at coming up with ideas than others, but it then needs a *dues ex machina* to explain how a single idea subsequently spreads across the rest of the decentralized organization.[4] As this chapter shows, the German army optimized

[2] As Timothy Lupfer aptly summarizes it, "the process of developing principles to obtain this objective was a collective or corporate effort. Individual talents and personalities were essential, but the doctrine emerged in an atmosphere where ideas were discovered and shared, not invented and arbitrarily imposed." Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Diane Publishing, 1981), 57.

[3] As Jorg Muth argues, "The stories and events that kept alive the virtue requiring an officer – even in war – to disobey an order 'when justified by honor and circumstance' were corporate cultural knowledge within the Prussian and German officer corps." Jörg Muth, *Command Culture: Officer Education in the U.S. Army and the German Armed Forces, 1901-1940, and the Consequences for World War II*, 1st ed (Denton, TX: University of North Texas Press, 2011), 168. For examples stretching back to Fredrick the Great, see Ibid., 168 – 174.

[4] There is a more specific problem with the decentralization argument as it applies to the German army in the First World War: it simultaneously overstates the degree to which the German army was decentralized, and understates the degree to which it evolved over the war's course. There is little doubt that the German army was the most decentralized in the years leading up to 1914 (although there are reasons to suspect that the French army was not far behind). Nevertheless, this is a highly relative claim – even if it was more decentralized than other armies, the German army was still far more rigid, hierarchical, and centralized than any non-military organization of the period

more quickly and more completely than its competitors because it was the first to possess a moderately decentralized command culture, an assessment mechanism, and a highly centralized training structure.

II. Prewar

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Mod. Centralized
Assessment mechanism	Yes
Training structure	Mod Centralized

Political, strategic, and operational situation

Potential enemies had always surrounded Germany. In the decades leading up to the First World War, Germany's bellicose foreign policies transformed potential adversaries into real ones.[5] Germany's Triple Alliance with Austria-Hungary and Italy pushed France and

(and perhaps many military organizations that exist today). The nature of trench warfare forced the German army to become more decentralized as the war wore on, just as it did with the British and the French (although the French initially responded to trench warfare by centralizing control). Thus, the German army actually became better at optimizing as the war progressed.

[5] Much blame lay at the feet of Kaiser Wilhelm II and his *Weltpolitik* ('Place in the sun') foreign policy. Hew Strachan, *The First World War: Volume I: To Arms (First World War*, New Ed (Oxford University Press, USA, 2003), 4 – 35.

Russia into a balancing alliance.[6] German belligerence also improved relations between Britain and France – leading to the *Entente cordiale*[7] – and between Russia and Britain.

Germany's self-imposed geo-political situation necessarily shaped its military strategy.[8] The now infamous Schlieffen Plan was a plan to avoid encirclement by defeating France and Russia in sequence.[9] It called on the army to sweep through Belgium and Northern France as soon as hostilities broke out. The goal was to knock France out of the war, securing Germany's western flank before the Russian juggernaut had time to mobilize to its east.[10] With France out of the war, the German army could then pivot east to concentrate against the Russians.

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[6] Russia and France signed a political agreement in 1891. The military components of this alliance were agreed upon in later years. Robert A. Doughty, "French Strategy in 1914: Joffre's Own," *The Journal of Military History* 67, no. 2 (2003): 433.

[7] These agreements included, among other things, Britain's commitment to deploy an expeditionary force to the Continent in the event of German aggression. This was a remarkable development, given that Britain had previously seen France and Russia as its two primary European adversaries. See Michael Carver, *Britain's Army in the Twentieth Century* (London: Macmillan in association with the Imperial War Museum, 1998), chap. 1; G. C. Peden, *Arms, Economics and British Strategy: From Dreadnoughts to Hyrdrogen Bombs*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2007), 27–30; 40–48.

[8] Martin Samuels, *Command or Control?: Command, Training, and Tactics in the British and German Armies, 1888-1918* (London ; Portland, OR: Frank Cass, 1995), 7.

[9] Named after its author, Alfred Graf von Schlieffen, Chief of the Imperial German General Staff from 1891 to 1906.

[10] Technically, it is incorrect to call the German strategic plan the Schlieffen Plan. Schlieffen did put the basic ideas for the invasion into a paper written in 1905, one year before his retirement. However, this paper was not a war plan or an operation order. Moreover, given that war plans were highly classified documents, and the archive, which contained German war plans from 1914 was destroyed in World War II, there is no proof Schlieffen actually codified his thinking into a formal war plan. See Strachan, *The First World War*, 163–166. In either case, Helmuth von Moltke modified Schlieffen's original concept (although to reiterate, we have no way of knowning what the actual war plan looked like) Moltke's diverted units from the so-called 'right hook' to secure Alsace-Lorraine (which French war planners sought to invade at the beginning of a war) and to augment defenses in the east (in case the Russians mobilized faster than anticipated…which they did). While historians debate the degree to which Motke's modifications 'diluted the original concept, the fact of the matter is that the Schlieffen Plan was fatally flawed from the outset. It wildly overestimated the German army's logistical capabilities; negligently ignored the political ramifications of invading Belgium (which was not only neutral, but was also seen as the most likely launching point for an invasion of the British isles by Britain); and was never fully coordinated with the German Navy or the civilian government (in fact, Schlieffen failed to inform the government that his plan called for more troops than were currently under arms). See Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge, UK: Cambridge University Press, 2004); Holger H. Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," in *Military Effectiveness*, vol. I (Boston: Allen and Unwin,

Germany's strategic situation – and the war plan created to ameliorate it – also influenced how its army thought about tactics. First, it led planners to emphasize offensive tactics. As I will show, this does not mean German planners ignored recent advances in firepower. Rather, the strategic need to strike swiftly meant they had little choice but to press the attack, storm of steel or not. Second, it caused the army to discount the price of pressing an attack under modern firepower conditions.[11] Remember, the Schlieffen Plan was about grand maneuver. Under these conditions "the loss of a battle, the destruction of a regiment, or even the destruction of a division was seen by the general staff virtuosos who directed the movement of million-man armies as inconsequential when compared to considerations that affected the campaign as a whole."[12]

Dependent Variables

Even though political and strategic imperatives meant the German army had to seek 'victory at any cost,' German tactical doctrine still fluctuated a great deal in the decades preceding World War I. [13] In large part this owes to an officer corps that recognized the

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1988), 86–92; Gunther Rothenberg, "Moltke, Schlieffen, and the Doctrine of Strategic Envelopment," in *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, N.J.: Princeton University Press, 1986), 296 – 325.

[11] Again, this is not the same thing as ignoring the cost. To use an example: if you and I are shopping for a suit, and we both find that a suit we like costs $10,000.00, the fact that you purchase the suit but I do not does not suggest that you ignored its price tag. Rather, it suggests that for any number of reasons (relative wealth, the desire to impress, a willingness to engage in consumption smoothing) you discount $10,000.00 more (far more) than me.

[12] B. I Gudmundsson, *Stormtroop Tactics: Innovation in the German Army 1914-18* (Westport, CT: Praeger, 1989), 1.

[13] As I will demonstrate, this was also the case in the British and French armies. To reiterate a theme introduced in chapter 4 – and that will be repeated throughout chapters 5, 6 and 7 – European armies were not 'blinded' to tactical reality by a 'cult of the offensive.' Certainly, all three wildly underestimated the degree to which force to space rations, technological limitations (in logistics and communications) and firepower would undercut offensive operations. Yet all three were keenly aware that attacking under modern conditions would entail far heavier casualties than it had in previous wars. Indeed, political and strategic imperatives – including the fear that modern nation states were too fragile to endure a drawn out conflict; that trade would suffer too grievously; and (unique to

tactical dilemmas presaged by the American Civil, Boer, and Russo-Japanese wars without agreeing on what could be done about them.[14] In fact, as is also true for the British and French armies, the German army went through multiple prewar doctrines as it struggled with the modern battlefield.

Three sets of doctrinal documents capture how German tactics evolved in the prewar era: the 1888 *Exerzier-Reglement fur die Infanterie* (1888 ExRfdI), the 1906 *Exerzier-Reglement fur die Infanterie* (1906 ExRfdI), and the 1908 *Felddienst Ordnung* (1908 FSR).[15]

Offensive tactics

Breaking with the past The 1888 ExRfdI were an attempt to figure out what lessons the army should have learned from the Franco-Prussian War (1870 – 1871). Although a clear-cut victory, the war nonetheless triggered intense debates within the German officer corps.[16] These debates were about close-order formations and whether they were still appropriate given advances in modern firepower.[17]

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the Germans) the need to resolve strategic encirclement – led most to *tentatively* embrace offensive doctrines emphasizing speed and weight over dispersion, coordination, suppression, etc. To argue otherwise is to ignore the debates and doctrinal vacillation that gripped all three armies from the end of the Franco-Prussian war to 1914.

[14] Especially given the imperative to win quickly.

[15] Details on the 1906 and 1908 documents are taken directly from English translations made by the British army: "Field Service Regulations of the German Army, 1908" (The War Office, 1908), Joint Services Command and Staff College Archives, Shrivenham; "Handbook of the German Army, 1912" (The War Office, 1912), Joint Services Command and Staff College Archives, Shrivenham. As I could not locate English language versions of the 1888 and 1906 ExRfdIs, details on these documents are taken from; Pascal Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, trans. P. Kieffer (Paris: Berger - Leorault, 1923), 18; Samuels, *Command or Control?*, chap. 3; Theodore Schwan, *The Organization of the German Army* (Washington: Government Printing Office, 1902); Gudmundsson, *Stormtroop Tactics*, chap. 1.

[16] The fact that it took the German Army 18 years to publish this new doctrine represented a deliberate attempt to avoid writing doctrine based on hasty inference and first impressions. The regulation's authors intentionally waited for the Great General Staff to publish its official history of the conflict before proceeding with their task. Samuels, *Command or Control?*, 71.

[17] That is to say, modern firepower as it existed in 1870. Ibid., 70–71; Gudmundsson, *Stormtroop Tactics*, 7–9.

The 1888 ExRfdI represented a number of firsts in German doctrine. It was the first manual to privlige firepower over mass (i.e. the shock force derived from an infantry charge) in an attack. [18] Before the 1888 manual, German doctrine instructed attacker to use on firepower to 'soften' and 'prepare' enemy defenses. However, the final charge was seen as decisive. Shock power demanded speed and control. As a result, previous doctrines told infantry to move across the battlefield in close order (i.e. shoulder to shoulder) formations.

The 1888 ExRfdI also called for a new combat formation: the *schutzenswarm* (a swarm of riflemen). When attacking prepared defenses,[19] infantry were to halt just beyond the maximum range of enemy guns while German artillery 'softened' the defenses. Next, the leading infantry units were to shift from close order formations to *schutzenswarm.* The *schutzenswarm* would lead the attack, working their way forward in a loose formation with several meters between soldiers.[20] The *schutzenswarm* were to move as fast as possible, waiting until the last possible moment to start a decisive firefight with enemy defenders. Once the firefight was won, reserve troops could finish off remaining defenders with a final (and highly traditional) charge.

Despite its novel characteristics, the 1888 ExRfdI still had a lot in common with earlier German doctrine. For example, most of the attacking force (i.e. the troops advancing behind the *schutzenswarm*) still moved in a close order formation. Moreover, despite officially

[18] Most historians refer to this as assault power. In other words, they describe the prewar debate between those who advocated for relying on the weight of the infantry charge to displace the enemy and those who advocated for relying on firepower as one between assault and firepower. However, to keep 'assault power' distinct from 'assault tactics' I use the term 'mass' or 'shock power' instead of assault power. This and what follows are from Samuels (71-73) and Gudmundsson (7-9).
[19] i.e. one where defenders have time to entrench or fortify.
[20] In a formation that looked a lot like a skirmisher line.

admitting that firepower might be more important than shock power, the 1888 ExRfdI still thought of the infantry charge as decisive. That the doctrine clearly warned against launching the final charge until *after* the firefight was won was lost on most German officers.[21]

Reversion The 1888 ExRfdI were hardly the last word on the matter, and the Boer and Russo-Japanese wars re-ignited debate. The German Army dispatched liaison officers to observe both wars, but their reports did not resolve the dispute.[22] With the benefit of hindsight we now know both wars presaged firepower's dominance. However, for those who watched the battles firsthand, the lessons were not clear-cut.[23]

The important point is that both sides agreed that modern weapons rendered the battlefield a far more lethal and unforgiving place. They disagreed about whether anything could be done to ameliorate the situation; and whether the suggested solutions would prove more costly than the problem.

On one side of the debate were firepower advocates, who thought it was too costly – if not outright impossible – to cross fire-swept terrain in tight formations. They believed that

[21] This was especially true in the early years of the First World War when retired officers who knew only the 1888 regulations were called back to active service to train new soldiers. Gudmundsson, *Stormtroop Tactics*, 9.
[22] For examples of (translated) German after action reports on the Boer War, see Colmar Von Der Goltz, "What Can We Learn from the Boer War?," *The Journal of the Royal United Service Institution* XLVI, no. 298 (December 1902): 1533–1539; Lindenau, "What Has the Boer War to Teach Us, As Regards to Infantry Attack?," *The Journal of the Royal United Service Institution* XLVII, no. 299 (January 1903): 49–56. Both argued that the war validated the need for fire superiority and dispersion on the modern battlefield.
[23] For present purposes it is sufficient to note that the wars generated more questions than answers. However, the fact that all three armies mis-learned lessons from the Boer and Russo-Japanese wars presents an important historical puzzle.

attacking units should break down into small teams, with each moving independently. Flexible tactics and dispersed formations would minimize exposure to enemy firepower and allow infantrymen to use terrain for cover.[24]

Conservatives countered that it was too hard to control a disparate units spread across the battlefield.[25] Furthermore, they felt that conscripts (who made up most of the German army) could not be trusted to press an attack. Dispersion led to isolation; and poorly trained soldiers might refuse to get up under fire. Thus, while tight formations might absorb heavier casualties, they facilitated faster movement and gave conscripts the moral support they needed. From their perspective, the Russo-Japanese war was vindication. After all, the Japanese used tight columns to penetrate heavily fortified Russian defenses.[26]

Ultimately, the German army's next doctrinal manual, the 1906 ExRfdI, was an unhappy and incoherent compromise between the two sides. It still warned that attacking infantry needed to win the firefight before mounting a final charge. However, the regulations also advised against waiting too long to charge, since delay might sap the offensive spirit needed for inspiration. Confusing matters further, the 1906 ExRfdI suggested, "modern fire was not as annihilating as it had been claimed." Thus, "if fire was less overwhelming, there was less need for open-order tactics."[27]

[24] Gudmundsson, *Stormtroop Tactics*, 20–21.
[25] They argued that a 1,000 man battalion would cover three kilometers in the assault if it used dispersed formations. Ibid.
[26] Ibid.
[27] Samuels, *Command or Control?*, 77.

This uncomfortable compromise was apparent in the instructions for mounting an infantry attack. As before, German units were instructed to wait just beyond the effective range of a defender's rifles while German artillery pounded the defenses. However, under the 1906 guidelines, if the artillery fire proved effective then the infantry was to race into action in a tight column, maximizing speed, shock, and control. Only when the artillery failed to knock out enemy guns were commanders to deploy skirmishers. If skirmishers proved necessary, they were to advance to within 500 meters of the objective; initiate a firefight with the defenders; and mount a decisive bayonet charge.[28]

Doctrinal uncertainty German doctrine continued to vacillate between firepower and shock power in the years preceding the First World War. While the German army does seem to have been more explicit about recognizing firepower's importance on the battlefield than French or British doctrine in the prewar period,[29] its tactics were not markedly different than those found in French and British manuals.[30]

Contrary to the standard narrative, firepower advocates had the upper hand in the army's final prewar doctrine, the 1908 FSR. Attacks were now to be divided into three phases: the forming up phase (*Aufmarsch*), the deployment phase (*Entfaltung*) and the extension phase

[28] Stephen Bull, "The Early Years of the War," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 176–177.
[29] The 1908 FSR warns that even skirmisher formations that try to cross open terrain "will suffer severely from the fire of unshaken [i.e. unsuppressed] infantry at medium and even at long ranges. Their losses will increase with the density of the skirmishing lines. Long and uninterrupted advances of dense skirmishing lines are therefore impossible under effective hostile fire." "Field Service Regulations of the German Army, 1908," 177–178.Regarding relatively appreciation of firepower, see Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 20.
[30] "Handbook of the German Army, 1912," 235.

(*Entwickelung*).[31] To protect troops from artillery fire, attacking infantry were to shift from tight formations to dispersed lines 2,500 yards from the enemy. During the deployment phase the unit was to move within 1,500 yards of the enemy using three successive skirmisher lines, with about 300 yards in depth between each line.[32] Finally, during the extension phase the front line was to spread out into a thin skirmisher line with soldiers standing two to four meters apart.

Following the obligatory artillery barrage, the commander was to initiate a firefight while continuing to push his troops towards the objective while feeding reserve troops into the firing line.[33] At approximately 160 yards from the objective the firing line was to begin its final assault, with parts of the line moving in 50-100 yard bounds. Such bounding was a crude version of fire and movement, with parts of the firing while other parts advanced.[34] Regulations warned that covering fire, from both artillery and the line itself, was critical. The assault was to end with the inevitable bayonet charge.

Offensive Doctrine as of July 1914
Table 5.1

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	Yes (crude)
Organic firepower	No
Bypass resistance	Yes

[31] What follows is taken from the Ibid., 234–235.
[32] Note, this differs significantly from the 1888 and 1906 doctrines, in which all attackers except those in the front line advanced in close order formations.
[33] The goal was to mass firepower by massing men.
[34] Regulations instruct leaders not to bound at regular intervals or distances.

Combined arms

It is a little anachronistic to talk about combined arms before the First World War. None of the three armies gave much thought to integrating their infantry, cavalry and artillery units on the battlefield. Nor were they systematic in thinking about the technical challenges associated with supporting infantry maneuver with indirect artillery fire.

Like their British and French counterparts, German prewar regulations saw the infantry as the dominant combat arm.[35] The artillery's main role in an attack was to destroy enemy cannon and damaging defensive fieldworks. Prewar doctrines also called on gunners to rely on *direct fire.*[36] In other words, artillerymen were to position themselves so close to the enemy that the gunners who loaded and fired the cannon could also see where their shells landed. In the interest of maintaining speed in the attack, indirect fire – using distance, terrain, and high trajectories of fire to protect gunners and their guns from enemy fire such that one person could not both fire the gun and observe its effects – was not prescribed.

Artillery officerswere expected to coordinate with the infantry units, even when it meant advancing alongside them in an assault. The problem was that the prewar doctrines said remarkably little about the precise mechanisms by which this coordination should occur. More important, many infantry officers ignored the doctrinal admonition to coordinate with the artillery *before* launching the decisive assault. This proved a disastrous oversight

[35] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 19.
[36] "Handbook of the German Army, 1912," 235.

in World War I's opening months as countless units went into the assault without any artillery preparation whatsoever.[37]

German prewar combined arms doctrine did differ from the French and British armies' in one important, if inadvertent, respect. The Germans invested relatively more in heavy artillery.[38] This move did not represent tactical foresight per se. Rather, the Germans developed this capability because the Schlieffen Plan required the massive forts along the French and Belgian borders be quickly destroyed.[39] This need for heavy artillery gave the Germans a modest advantage in coordinating long-range fire and in large caliber guns, at least for the first few months of the war.

Combined Arms Doctrine as of July1914
Table 5.2

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

Given the Schlieffen Plan's strategic imperatives[40] it is unsurprising that the army's prewar doctrine spent very little time addressing defensive operations.[41] All defenses tried to

[37] Lupfer, *The Dynamics of Doctrine*, 2.
[38] By comparison, the British and French focused almost exclusively on light, direct fire artillery – an emphasis that made sense at the time given that both possessed the qualitatively superior French 75 mm quick firing cannon.
[39] Shelford Bidwell and Dominick Graham, *Fire-power: British Army Weapons and Theories of War, 1904-1945* (London: Allen & Unwin, 1982), 17; Bradley John Meyer, "Operational Art and the German Command System in World War I" (Ph.D., The Ohio State University, 1988), 90.
[40] Lupfer, *The Dynamics of Doctrine*, 1.
[41] The 1888 ExRfdI devoted only two pages to the defense. Its 1906 replacement allotted only five. Samuels, *Command or Control?*, 160–161. See also Wilhelm Balck's post-war analysis of German tactics, in which he argues that "under the conviction that infantry that can attack well, can also defend itself well, we had not paid as much

protect soldiers and artillery from enemy fire.[42] Although entrenching and fortification were necessary adjuncts to this goal, defenses ultimately won or lost based on firepower. In turn, firepower depended on troop density. Commanders were therefore told to put as many men as possible in the firing line.[43] While the 1906 regulations suggested adding outpost positions to help break up the infantry assault before it reached the main line, most prewar defenses were still linear and shallow (i.e. only one line of troops).[44]

As with combined arms, German prewar doctrine had much in common with its future adversaries. In fact, if there was a difference in defensive doctrine, it was that the German General Staff paid more attention to the need to build hasty fortifications, trenches, and field works.[45]

Defensive Doctrine as of July 1914
Table 5.3

Depth	No
Elasticity	No
Counterattack	No

attention to the technique of the defensive battle as should have been done." Wilhelm Balck, *Development of Tactics: World War I* (Fort Leavenworth, Kan: The General Service Schools Press, 1922), 10.
[42] "Handbook of the German Army, 1912," 235–236.
[43] Although commanders were also told to retain some portion of their force in reserve, to plug any holes in the line or penetrations that might occur. Samuels, *Command or Control?*, 160.
[44] Ibid., 161.
[45] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 20.

Independent Variables

Command culture

The prewar German army had a moderately centralized command culture.[46] This claim is sure to be controversial. On the one hand, there is a popular misconception that the German army, and especially its dominant Prussian element, "was a rigidly hierarchical organization, with the relationship of inferiors to superiors being one of strictest obedience."[47] This stereotype derives from the fact that German society was, in a relative sense, far more authoritarian and hierarchical than those of its British or French adversaries.[48]

Nevertheless, the German army's command culture *did not* reflect that of the larger society it was created to protect. Divergence was especially pronounced in the officer corps. The German officer corps had a long tradition of empowering commanders and allowing them to exhibit initiative (*weisungsfuerhrung*). This was true even when permitting independent action a brought with it a greater risk for error.[49]

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[46] It is important to note that it is technically inaccurate to talk about the German army as a unified construct. In reality, the German army was comprised of four national armies: Prussian (which included soldiers from all of the smaller states), Bavarian, Saxon and Wurttembergian. Each national army had its own War Ministry and General Staff. The Bavarian Army – by far the most independent of the three - even had its own War Academy, while the Saxon and Wurttembergian armies sent their staff officers to the Prussian War Academy. Nevertheless, the Prussian army was roughly seven times larger than the Bavarian Army; ten times larger than the Saxon; and twenty times larger than the Wuttermburgian contingent. "Handbook of the German Army, 1912," 43 & 97. Even in wartime these distinct armies did not always comply with the either the Prussian Great General Staff or with the high command (OHL). Erich Ludendorff, *The General Staff and Its Problems; the History of the Relations Between the High Command and the German Imperial Government as Revealed by Official Documents*, vol. 1 (New York: E.P. Dutton and company, 1920), 308.

[47] Meyer, "Operational Art and the German Command System in World War I," 46.

[48] Muth, *Command Culture*, 182. Nevertheless, we should still be careful not to overstate the degree of authoritarianism and homogeneity in either Prussian or German culture writ large. "The country had been torn by cleavages in religious convictions, regional and civil particularisms, and by class and political divisions." Michael Brian Petersen, "All the Kaiser's Men: German Volunteers and the Great War, 1914-1918" (M.A., Florida Atlantic University, 1997), 29.

[49] Meyer, "Operational Art and the German Command System in World War I," 102.

Historians trace this practice traced back to at least the 1860s,[50] although some, including Martin Samuels, argue that its antecedents lay in the Napoleonic-era Prussian army.[51] Whatever its origins, we know that the practice was enshrined in the concept *Auftragstaktik*, or mission oriented command system.[52] First formally articulated in the1888 ExRfdI, the mission oriented command system,

> Meant that the higher headquarters would do two things. The first was to let subordinates in on the thinking of the high command by describing the overall intentions of the high command. The second was to issue directives and (usually general) orders to subordinate units. Then, in theory, the local commander could combine his knowledge of the overall intentions of the high command with his detailed and up-to-date knowledge of the local situation…. Hopefully, the resulting operational decision would be quicker and better adapted to local realities in a fluid situation.[53]

German doctrine described how commanders were to apply *Auftragstaktik* in practice.[54] According to the 1908 FSR,

> *An order* should contain, and *only* contain, everything which the recipient requires to know to enable him to carry out independently the task assigned to him…" and "In issuing orders, detailed instructions should be especially avoided in cases where circumstances may have changed before the order can be carried out. This point is especially important in field operations… when orders may have to be issued extending over a period of several days. In such a case a commander's general intention should be emphasized… The general views of the commander for the conduct of the

[50] Martin Van Creveld argues that this command system was the logical response to the German officer corps' philosophy that war was inherently chaotic. Martin Van Creveld, *Command in War* (Cambridge, Mass: Harvard University Press, 1985), 169. See also Dennis Showalter, "Goltz and Bernhardi: The Institutionalization of Originality in the Imperial German Army," *Defense Analysis* 3, no. 4 (December 1987): 313–314.
[51] Samuels, *Command or Control?*, 11.
[52] In his study of German command culture, Muth argues that the standard American translation for the term 'mission type order,' as well as the British translation 'directive control' (a term favored by Samuels) are inaccurate and misleading. As Muth frames it "Often Aufgtragstaktitk is misunderstood as a technique to issue orders, while in fact it is a command philosophy. The basic concept…means that there is direction by the superior, but no tight control." He goes on to argue that the English language lacks an appropriate term, and that although the term 'mission oriented command system' comes closest, the concept is best described through example. For the entire discussion, see Muth, *Command Culture*, 168–174. I accept Muth's critique (because he wrote an entire book about it, and because I do not speak German) and so I use the term 'mission oriented command system' despite its clunky nature. American readers familiar with the U.S. military term 'mission type orders' can assume I am talking about the same thing.
[53] Samuels, *Command or Control?*, 15; Meyer, "Operational Art and the German Command System in World War I," 110.
[54] The 1908 FSR dedicated an entire chapter to the issue. See "Field Service Regulations of the German Army, 1908," 12–31.

> intended operations should be given, but the method of execution must be left open (Italics in the original).[55]

On the other hand, we should not overstate the mission oriented command system. The prewar German army was not decentralized in any modern sense of the term. The idea that leaders should exhibit initiative did not extend beyond the officer corps.[56] As Helmuth von Moltke (the Elder) originally thought of the concept, authority was rarely delegated below the army level.[57] In his view, corps, divisions, and all lower formations should still receive rigid, detailed orders.[58] Decentralization continued throughout the latter half of the 19th century, often extending down to the battalion level. Nevertheless, neither company grade officers nor non-commissioned officers enjoyed such latitude before the First World War.[59]

Thus, the 'moderately centralized' label for the prewar German army's command culture is predicated on the fact that while higher level commanders had the authority to deviate when needed, their subordinates did not. Allowing that such authority was delegated to at least the battalion level, and that the prewar German army had approximately 996 battalions as of July 1914 (12 battalions per division x 83 divisions), this yields around 1,000 units capable of generating variation in their tactical methods. While this may seem

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[55] Ibid., 12–13. para 49 and 50.
[56] A corporate body that was every bit as homogenous and elitist as its British (but not French) counterparts. For much of the 19th century it the near exclusive purview of the aristocracy. Middle class men were prohibited from becoming officers under Frederick the Great and only made up 10% of the corps by the end of the Napoleonic Wars. Class restrictions were ostensibly eliminated in 1808, but it was not until the needs of fielding a mass conscript army that middle class officers began to approach a majority. Even then, by 1913 nobles still had a disproportionate influence over the higher ranks, holding 52% of the top positions, despite comprising only 30% of the officer corps. Steven Errol Clemente, "'Mit Gott! Fuer Koenig Und Kaiser!': A Critical Analysis of the Making of the Prussian Army Officer, 1860--1914" (Ph.D., The University of Oklahoma, 1989), 3; 14; 16;23; 364.
[57] It is important to remember the difference between the German army and field armies units. The former describes the entire military organization. The latter describes a particular type of operational unit which was itself comprised of corps, divisions, brigades, battalions, and so forth. Thus, it is not nonsensical to say that the German army delegated command, but not below the army level.
[58] Meyer, "Operational Art and the German Command System in World War I," 131–132.
[59] Ibid.

like a lot, it pales in comparison to the nearly 46,272 units capable of doing the same by the time the German army reached its peak size in late 1917 (241 divisions) *and* regularly delegated autonomy down to the platoon level, at least in the storm troop divisions (representing approximately half – or 120 – of the army's field forces).[60]

A final point: As practiced by the German Army, *Auftragstaktik* had a built-in restraint against excessive decentralization: subordinates were to deviate from established practice only *as the situation required*. In other words, an officer could not violate doctrine just because he disagreed with it. It follows that officers were expected to know regulations and doctrine.[61] Moreover, delegation did not entail complete freedom – subordinates were still expected to operate within a general framework and towards a specific objective. This built-in restraint was a crucial and often overlooked part of *Auftragstaktik*.

Command culture as of July 1914
Table 5.4

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

The German army had the most advanced and sophisticated doctrinal assessment mechanism in the prewar period - an advantage it would maintain throughout the war.

[60] If we account for the fact that platoons were themselves made up of four squads, each of which had significant autonomy by this period, the number jumps to roughly 185,088.
[61] Samuels, *Command or Control?*, 10–15; 22.

This assessment mechanism was built into the army's General Staff system.[62] Although better known for its work with operational and logistical planning, the General Staff had a major role in doctrinal development.[63]

Organized in 1807, the General Staff traces its origins to Prussia's early defeats in the Napoleonic Wars. While it is beyond the scope of this dissertation to describe how it evolved and matured over the course of the 19th century[64], it is worth briefly describing its core characteristics. The General Staff was made up of three main elements: the Chief of the General Staff, the Great General Staff (*Großer Generalstab)* and the General Staff serving with the troops (*Truppen Generalstaf*).

To briefly discuss each in turn: The Chief of the General Staff had different roles in peace and in war. In peace he personally supervised the Great General Staff and served as the Kaiser's top military adviser.[65] He did not, however, control the army's divisions and corps. Under the *Wehrkreis* military district system, units remained strictly under the purview of

[62] Again, it is actually a bit of a misnomer to talk in terms of a 'German' General Staff. In reality there were four separate General Staffs: Prussian, Saxon, Bavarian, and Wurttembergian. Nevertheless, for all practical purposes the Prussian army was so much larger than its counterparts, and the other staffs (except perhaps for the Bavarians) followed its lead that I will use the term German General Staff to describe the Prussian General Staff. Meyer, "Operational Art and the German Command System in World War I," 16.
[63] Samuels, *Command or Control?*, 15.
[64] For a detailed overview of the General Staff system and its origins, see Trevor Nevitt Dupuy, *A Genius for War: The German Army and General Staff, 1807-1945* (Prentice-Hall Englewood Cliffs, NJ, 1977).
[65] But, critically, not the Kaiser's only military advisor. In fact, by the time of Kaiser Wilhelm II's over 40 officers had the so-called 'right of direct access' to the Kaiser. This was to have important consequences for how the Kaiser navigated Europe's volatile diplomatic scene in the years and months leading up to July 1914. Strachan, *The First World War*, 7–8.

24 regional commanders.[66] It was only in war that the Chief of the General Staff became the Commander in Chief (C-in-C), and assumed command over the entire army.[67]

If the Chief was the General Staff's leader,[68] the Great General Staff was its brain trust. Centrally located in Berlin, the Great General Staff represented the cream of an already elite cadre of officers. Since at least Helmuth von Motlke (the Elder's) term as Chief of the General Staff, one of the Great General Staff's most important responsibilities was to analyze and publish historical accounts of recent conflicts.

Finally, the General Staff officers serving with troops were, as the term implies, General Staff officers attached to all divisions, corps, and armies.[69] As such, they represented the Great General Staff's eyes and ears, providing a critical conduit for transmitting information between Berlin and the front lines.

The General Staff served as the army's doctrinal assessment mechanism even before the war's outbreak. It met all of the criteria identified by CAT theory. It had systematic conduits between front line units (the General Staff officers serving with troops) and the highest levels of command (the Chief of the General Staff).

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[66] The German army was administratively divided into 24 districts (plus one additional corps for the Prussian Guard). Each district recruited, trained, and equipped approximately one corps. In times of war, or for large scale maneuvers, these corps fell under the operational control of one of 7 field armies. "Handbook of the German Army, 1912," 41, 47, 71. For practical purposes, it may be said that the Army is managed as a number of separate business establishments, which are administered and directed on general lines only from a central office, and are visited and reported on by traveling inspectors of each department which they contain. Ibid., 73.

[67] To include those fielded by Bavaria, Saxon, and Wurrtemberg.

[68] Even if he was not always the army's

[69] Each division had one LtCol or Maj (GS) who served as the Division Chief of Staff and one or two additional General Staff officers. Each Corps had one Col (GS) to serve as the Corps Chief of Staff and up to seven other GS officers (majors and captains). Each army had one general (GS) who served as the Army Chief of Staff s well as five or more GS officers (Colonels, LtCols, and majors). "Handbook of the German Army, 1912," 45–51.

It also had the capacity to do rigorous analysis. First, by the late 19th Century the General Staff was the most prestigious and most meritocratic institution in the German army. [70] Each year over 1,000 officers applied for one of 160 slots in the German War Academy (*Kriegsakademie*). More importantly, the War Academy – a hyper-competitive, three year program[71] – represented the most rigorous program to prepare future staff officers for the technical and analytical aspects of staff work to have existed in military history.

Finally, the General Staff had the institutional autonomy to make recommendations and give advice, even when it ran counter to what senior commanders preferred. General staff officers' careers were protected (despite the fact that they often earned the disdain of their 'regimental' peers). They were seven times more likely to be promoted to general officer. At every rank they enjoyed accelerated promotion, advancing four years before their peers on average.[72] Both trends suggest the General Staff was insulated from parochial interests and 'payback' from senior officers who disagreed with their work.

Assessment mechanism as of July 1914
Table 5.5

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

[70] "The General Staff, while unquestionably a corps d'elite, is in no sense a close corporation; that it is made up of officers at once scientific and thoroughly practical, and that its members, having come from and kept up their intimate connection with the troops, enjoy the respect and confidence of the latter in a high degree. This respect and confidence they possess all the more since they owe their distinction not to the advantage of birth, wealth, or influence, but solely to their own efforts and merit." Schwan, *The Organization of the German Army*, 99.
[71] Excluding the mandatory probationary period for those officers who managed to complete the arduous school.
[72] And this was in a prewar army that was notoriously slow to promote company grade officers to field grade (i.e. captain to major). Samuels, *Command or Control?*, 27.

Training structure

The prewar German army had a moderately centralized training structure.[73] This assessment reflects the interaction between three factors: First, units trained their own conscripts, not central schools. While this is a decentralizing factor, it was offset to a significant degree by the army's rigorous inspection system. Units were subject to over a dozen training inspections each year. Furthermore, an Inspector General of Military Training and Education (IGMTE) had the authority to conduct inspections and access to the highest echelons of command. Finally, although conscript training was geographically diffuse, the same was not as true for officer and non-commissioned officer training, which was both more centralized and exposed to more control. Since officers and non-commissioned officers represented the German army's leadership, the degree to which their training was centralized was probably of greater importance than the conscripts' (especially because officers and non-commissioned officer led conscript training). To discuss each factor in turn: [74]

Unit level conscript training: In terms of training conscripts, the German army was similar to its British and French counterparts. [75] As mentioned, the German army was physically distributed across 24 Army-Corps recruiting districts. Each district held two

[73] It would grow more centralized as the war progressed.

[74] The discussion that follows focuses specifically on conscript training for infantry soldiers (as will be the case for similar analyses of the British and French armies). In part this is because infantry soldiers comprised the bulk of all three armies. In part it is because an in depth analysis of artillery, engineering, and specialist training would consume an entire dissertation in its own right.

[75] The German army had approximately 6 million soldiers available for mobilization in 1914. Of these, approximately 840,000 were active duty. Conscripts made up the bulk of the active duty force (although the exact number is unclear). Except for those who went on to become non-commissioned officers or officers (i.e. career soldiers) all other conscripts served for two years. Thus, roughly one half of the active force had to undergo introductory training each year, which equates to 400,000 (accounting for career soldiers). See also "Education and Training of the German Infantry" (The War Office, July 1909), 9, Z160, Joint Services Command and Staff College Archives, Shrivenham.

infantry divisions.[76] Conscripts were assigned to a regiment in their district. Regiments delegated training to their battalions, and the battalions delegated the task to its companies. Therefore, company grade officers usually led training.

Inspection system: Of course, at first glance this system might resemble decentralization's zenith. Essentially it meant that each year approximately 4,000 different units trained the army's 400,000 new soldiers.[77] To maintain control over training the army used a universal training schedule; based all training was on a common doctrine;[78] and employed an aggressive inspection regime.

Every company in the army followed the same schedule.[79] Each year, recruits and conscripts mustered at their regiments during the first week of October.[80] From the 10th of October to the 20th of January training focused on physical fitness training, close order drill, and individual skills (i.e. marksmanship, wearing uniforms, and political indoctrination). From the 20th of January to the 1st of March training shifted to section and platoon level skills, including unit drill and small unit leadership. March was spent on company maneuvers, which included tactical training for the first time (recall that according to prewar doctrine units smaller than companies were not expected to operate independently). This was also the point at which the recruits were integrated into sections

[76] The districts also house the artillery, engineer, pioneer and machine gun units associated with their respective corps, divisions, regiments, etc. Pioneers were essentially precursors to modern combat engineers. Jager battalions were independent infantry units.
[77] Again, roughly 83 divisions x 2 brigades per division x 2 regiments per brigade x 3 battalions per regiment x 4 companies per battalion = 3,986 companies
[78] Samuels, *Command or Control?*, 78–79.
[79] What follows is taken from "Education and Training of the German Infantry," 10–13.
[80] In the weeks preceding their arrival regiments hand picked officers and non-commissioned officers to lead training.

and platoons with 'seasoned' (second year) conscripts. Battalion training and maneuvers took up April. The summer months, May to August, were spent preparing for large-unit exercises (regimental and above), which were held from August 1st to September 1st.[81]

Perhaps more important than the rigid, top-down training schedule was the fact that since 1855 the German army had an IGMTE.[82] The IGMTE sat on the Defense Commission as a peer to the Chief of the General Staff, the Commanding General of the Guard Corps, and the Commanding Generals of the Army Corps.[83] In other words, the IGTME was powerful. He supervised an extensive system of inspectors and inspections, including the Superior Military Committee of Studies, comprised of 13 senior generals with control over the training and education at every military school except for the War Academy; the Superior Military Examination Committee; the Corps of Cadets; the Combined Artillery and Engineer Schools; and the Inspector of the Infantry Schools, itself commanded by a major-general.[84]

The IGMTE's inspectors had the authority to discipline instructors.[85] Inspections were a routine part of the annual training cycle. The Kaiser thought them important enough to issue guidance on them in his Royal Order of March 31st, 1889.[86] Every infantry battalion in the army was inspected at least 13 times a year. Inspectors reviewed everything from the

[81] September was spent ushering the cadre of 2nd year conscripts out of the army and preparing for the introduction of the new conscripts. If there are doubts about how prescriptive this curriculum was, see the detailed week by week itinerary for individual training (October to January), in "Education and Training of the German Infantry," 13.
[82] Clemente, "Mit Gott! Fuer Koenig Und Kaiser!," 112.
[83] Schwan, *The Organization of the German Army*, 87. In 1907 the position was incorporated as part of the Military Cabinet. Clemente, "Mit Gott! Fuer Koenig Und Kaiser!," 117.
[84] Schwan, *The Organization of the German Army*, 42–51.
[85] "Handbook of the German Army, 1912," 94.
[86] "Education and Training of the German Infantry," 18–19.

battalion's physical training program to conscript training.[87] The IGMTE's centralizing effects were augmented by the fact that the General Staff assigned with the troops maintained a presence in every division and also had purview over training.[88]

Officer and non-commissioned officer training In every modern army, officers and non-commissioned officers lead on the battlefield. Their role is doubly important in a mass conscript army because they represent both leadership and experience. This was true in the German army, where even junior officers and non-commissioned officers usually had more experience than their two-year conscripts.

Training for officers and non-commissioned officers was subject to the same inspection system as was that of conscripts (and perhaps more so, since many of the IGMTE's subordinates were specifically tasked with inspecting officer and non-commissioned officer schools). The IGMTE maintained exclusive control over the "screening, admission, and training of potential officers."[89]

Moreover, unlike conscript training, most initial officer training was done at a relatively small number of geographically consolidated schools.[90] Many, if not most, Germans who wanted to become officers first attended a cadet school, which they enrolled in at 10-12 years old.[91] There were only four such schools in 1860 (at Potsdam, Wahlstatt, Bensberg, and Culm), plus a 'senior' cadet school in Berlin for older students. By 1900 this number

[87] Ibid., 19.
[88] At the Army and Corps level these officers were found in the First Section, which handled training, maneuvers and operations for the Chief of Staff. General Staff officers at the division level handled the same task, but their specific tasks were not as clearly delineated. "Handbook of the German Army, 1912," 89.

had increased to eight (plus the senior cadet school), all of which fell under the IGMTE's control.

Furthermore, all aspiring officers had to attend a War School (not to be confused with the War Academy).[92] At the War School officers studied weapons, ordnance, tactics, fortification, topography, survey, drawing, regulations, correspondence, riding, fencing, gym, and swimming. French and Russian language training was added in 1887. Although the number of War Schools varied during the mid-19th century, by 1893 there were a total of ten. The War Schools also fell under the IGMTE. To ensure quality control, in 1875 the army created a specific department under the IGMTE called the *Inspektion der Kriegsschulen*. Its sole purpose was to "monitor and supervise the operation, instruction, discipline and the administration of the instruction."[93]

While training for non-commissioned officers was not as centralized, it was still heavily regulated. Prospective non-commissioned officers attended training at specifically designated non-commissioned officer schools operated by each division. These schools

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[89] Clemente, "Mit Gott! Fuer Koenig Und Kaiser!," 112. See Ibid. Pp 117 – 139 for the step by step process that most officer aspirants had to pass through to become an officer.

[90] It is true that those who qualified to become officers first spent several months as an enlisted recruit in their future regiment. However, all actual officer training was handled at central schools. Moreover, those aspirants who had first attended a cadet school (which also fell under the IGMTE's authority) were exempted from much of this experience. Ibid., 137.

[91] What follows is taken from Ibid., 149 – 183. The War School varied in length during the 19th Century from 10 to 6 months.

[92] A very small percentage of officer aspirants were exempted from attending the War School, generally those who already held an Abitur degree and had completed one year of university. Before 1865 technical officers (engineers and artillerymen) were also exempted from the War School. This exemption was eliminated after 1865 because senior officers "hoped to promote a general familiarity with the problems inherent to each and thereby enhance the course's overall worth." Ibid., 258–259.

[93] There were three in 1810; 17 in 1844; and 9 in the late 1840s. In 1859 the IGMTE decided that the disparity in instruction was too great and consolidated the system into 3 schools. Another 7 were added between 1860 and 1893 in response to the need to increase the army's size. Ibid., 255–261.

were of course subject to inspection by the IGMTE, as was the non-commissioned officer's sustainment training at the unit level.

Training structure as of July 1914
Table 5.6

	General in charge of training	No general in charge of training
Many schools/ training sites	X	
Few schools/training sites		

III. 1914

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Mod Centralized
Assessment mechanism	Yes
Training structure	Mod Centralized

The First World War began for Germany when it sent five armies into Belgium on August 4th, 1914. The plan was to overwhelm Belgian defenses en route to Paris. Unfortunately (for the German army) the Belgian army and its fortresses had other ideas. By holding out until August 16th, the Belgians bought time for the British Expeditionary Force (BEF) to land.[94] The BEF caused the Germans even more trouble, starting with a clash at Mons on August

[94] Not just by holding their forts against the German onslaught. The Belgians also wreaked havoc on the rail network German war planners needed to supply their invading forces. It ultimately took 26,000 rail repairmen to undo the damage. Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 93–94.

23rd. Nevertheless, the Germans pressed on until the combined British and French offensive at the River Marne in early September sent them into retreat.

These opening battles, collectively known as the Battle of the Frontiers, were bloody and chaotic.[95] But they did not defy the German army's prewar expectations. Commanders and planners alike knew that modern weapons would inflict horrendous casualties. It was not until the Race to the Sea ended at the Battle of the Yser in October that leaders recognized the need for a new tactical doctrine.

Thus, 1914 was not a pivotal year for doctrinal optimization in the German army.[96] After all, the deadlock did not even begin until October. The most important development occurred in late October, when the *Oberste Heeresleitung* (OHL), or High Command,[97] recognized that it needed new tactics to penetrate the fixed defenses.[98]

[95] The German army lost 800,000 soldiers in 1914 (116,000 of whom were killed). Losses were especially heavy among the officer corps (with 18,000 lost). To put this in perspective, it represented three times the total number of casualties in the entire Franco-Prussian war. Holger Herwig, "You Are Here to Learn How to Die: German Subaltern Officer Education on the Eve of the Great War," in *Forging the Sword: Selecting, Educating, and Training Cadets and Junior Officers in the Modern World*, ed. E. V. Converse (Imprint, 1998), 40.
[96] Or for any other army for that matter.
[97] Recall that the German army was actually a composite force made up of four subnational armies. OHL represented the joint command over all four. The Chief of the Prussian General Staff, (Helmuth von Moltke the Junior) presided over OHL until he was replaced by Erich von Falkenhayn in September 1914.
[98] Army Bulletin of October 21, 1914 declared that the assumptions on which the ExRfdI of 1906 were based had proven false and costly. Gudmundsson, *Stormtroop Tactics*, 27. See also Samuels, *Command or Control?*, 87. As chapters 6 and 7 detail there is no evidence suggesting that the German army recognized this doctrinal gap any faster (or slower) than its adversaries.

Political, strategic, and operational situation[99]

The German army shifted to the strategic defensive almost as soon as the Schlieffen Plan failed. The speed with which the Russian army mobilized necessitated this rapid reorientation. OHL had to quickly shift units to the Eastern Front. Indeed, the much larger Russian army and the much larger Eastern frontier represented a greater threat. Therefore, OHL's new goal was to focus its efforts on the Russian army in the East, while fending the combined British and French force with as few men as possible in the West. With few exceptions, the German army remained on the strategic defensive until early 1918.[100]

Dependent Variable

Offensive tactics

To reiterate: although the dominant image of warfare in 1914 was one of dense masses of soldiers throwing themselves headlong into machine gun fire, few German units actually used such tactics.[101] The 1906 ExRfdI and 1908 FSR clearly instructed officers to rely on open formations in the attack.[102] German units were also quick to start experimenting, leading to a significant degree of diversity in tactics within the last months of 1914.[103]

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[99] For a detailed discussion of German war aims during the First World War, see H. E. Goemans, *War and Punishment: The Causes of War Termination and the First World War*, Princeton Studies in International History and Politics (Princeton, N.J. ; Oxford: Princeton University Press, 2000), chap. 4.

[100] There were of course numerous local actions and attacks to seize better defensive terrain. Note that local is a relative term, since many of these 'minor' battles would constitute major combat in contemporary terms. The Second Battle of Ypres and the Verdun Offensive are exceptions to this statement.

[101] Gudmundsson, *Stormtroop Tactics*, 17–18. There were of course noteworthy exceptions. At the Battle of the Yser, Kaiser Wilhelm II himself ordered units from his Imperial Guard – soldiers who were elite more by virtue of their noble heritage than because of their warfighting prowess – into action using wildly outdated mass formations. "The 1st Foot Guard Regiment, with an officer roster that read like a 'Who's Who' of the Prussian aristocracy, lost eight officers… and 800 men." Ibid., 10-13.

[102] Of course, these were not nearly as dispersed as the assault formations that would eventual take their place

[103] Ian Drury, "German Stormtrooper," in *War on the Western Front*, ed. G.D. Sheffield (Oxford, U.K.: Osprey, 2007), 46.

By the end of 1914 the standard tactic for attacking was for a unit to send patrols to get as close to enemy lines as possible.[104] When contact was made, companies advanced in skirmisher waves, with 200 yards between each wave. As they came under fire the first wave would 'go to ground,' forming a firing line to suppress defenders. They would also start digging in. Subsequent waves would reinforce the first line with machine guns and riflemen. After the firing line reached a density of about two paces per man, individual squads would try to work their way forward towards enemy lines. The process was laborious; each squad had to start digging in again as soon as its forward progress was halted by enemy fire. If enough attacking units could close with the enemy defenders in this way, they would launch a charge Units also learned that their first priority after seizing part of the enemy line was to prepare for the inevitable counterattack.[105]

Offensive Doctrine as of December 1914
Table 5.7

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	Yes (crude)
Organic firepower	No
Bypass resistance	No

Combined arms

Although the German army had a slight advantage in heavy artillery and long-range gunnery, the edge was not decisive. It still lacked the guns and gunners needed on the front lines. It procured 'big guns' before the war to hammer Belgian forts, not to support waves

[104] What follows is from Balck, *Development of Tactics: World War I*, 19 – 21.
[105] This was actually much harder than it might seem. Not only were the attackers exhausted and low on food, water and ammunition… but the trenches they had just occupied faced the wrong way. Early in the war all sides would build firing steps on the forward side of the trench (the one facing the enemy) but would throw excess dirt on the reverse side. This made it exceedingly difficult for attackers to quickly mount a defense using the side of the trench which had both a higher ledge and no firing step.

of attacking infantry.[106] Like its adversaries, German arms did not train together, and the lack of familiarity – especially between the infantry and artillery – proved costly. Prewar doctrine clearly emphasized that infantry should not attack without artillery preparation.[107] Yet many commanders, eager to get into action, charged forward unsupported.[108]

There was another flaw in how the German army combined arms in 1914.[109] It used artillery as a direct fire weapon. In other words, even when the infantry waited for artillery, the artillery did its work in range of defending gunners. This practice left them dangerously exposed to enemy fire.

Combined Arms Doctrine as of December 1914
Table 5.8

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

Given the relative lack of attention to defensive tactics, German units were forced to develop ad hoc expedients in the war's early months.[110] The results were predictably sub-optimal. Early trenches were a long, single line.[111] This hardly protected soldiers from rifle fire, and offered no shelter from shell bursts. They were also terribly vulnerable to

[106] Gudmundsson, *Stormtroop Tactics*, 29.
[107] Balck, *Development of Tactics: World War I*, 16–17.
[108] Lupfer, *The Dynamics of Doctrine*, 2.
[109] Samuels, *Command or Control?*, 85.
[110] OHL did not publish its first guidance about defensive operations until early 1915. G.C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber and Faber, 1940), 15–16.
[111] Balck, *Development of Tactics: World War I*, 29.

enfilading fire, and gave defenders nothing to fall back on when British or French infantry invariably managed to take part of the line. Worse yet, the prewar practice of positioning trenches on the forward slope of a hill invariably made them easy targets for British and French artillery.[112]

Defensive Doctrine as of December 1914
Table 5.9

Depth	No
Elasticity	No
Counterattack	No

Independent Variables

Command culture

The German army's moderately centralized command culture encouraged moderate experimentation early in the war. Early on, OHL delegated autonomy to division, corps, and army commanders.[113] This practice was not without risk. Indeed, Moltke's decision to issue *vollmacht* – or the delegation of control in emergency situations – played an important role in the army's defeat at the river Marne. Moltke gave *vollmacht* to one of his General Staff officers, who "used [it] to make the most important operational decision of the German army in World War I: the decision to retreat from the Marne."[114]

[112] Samuels, *Command or Control?*, 161.
[113] Stephen Bull, "The Early Years of the War," 203.
[114] As described by Meyer, *vollmacht* entails higher headquarters giving an officer instructions to visit a lower level unit in cases where all contact has been lost with that unit. The officer is given the authority to assess the situation and to make an independent decision without referring back to the higher headquarters. In this case, OHL, located in Luxembourg, lost contact with his maneuver units in France and gave Hentsch the authority to assess the situation and decide upon a course of action. Meyer, "Operational Art and the German Command System in World War I," 116–117.

Delegation had positive effects as well. Infantry units wasted little time trying out new formations and methods. Units experimented with night attacks as early as the fall, while others tried mounting company-level assaults in December.[115]

Command culture as of December 1914
Table 5.10

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

From the war's earliest moments, the General Staff operated as it was designed. The Chief of the Prussian General Staff became the Commander in Chief of the entire German army. The General Staff maintained a presence in front line units at the division level and above. It also stationed officers with OHL (since the latter was no longer co-located with the Great General Staff in Berlin).

Several factors did limit its ability to immediately engage in doctrinal analysis. First, the General Staff was almost exclusively consumed by mobilizing the army's six million soldiers, and then by transporting them from one theater to the other. Second, the unexpected stalemate in October 1914 did not give the General Staff much time to engage in meaningful analysis. Finally, the General Staff was far too small to handle all of its tasks.

[115] Stephen Bull, "The Early Years of the War," 203. Up to this point the German army had not mounted an attack by a force any smaller than a battalion. The prewar doctrines were also written in terms of battalion sized elements. The Garde Schutzen Division was the first to try a company level attack.

As of 1914 there were only 625 officers on the General Staff, only 352 of who were permanent members.[116]

Assessment mechanism as of December 1914
Table 5.11

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

Training structure

Training took a back seat to operations in 1914. Like its adversaries, Germany went to war with the army it had, not the army it wished it had. The demands of rapid mobilization and the chaos of the first months of fighting meant that there was little time for training new soldiers.[117]

Training structure as of December 1914
Table 5.12

	General in charge of training	No general in charge of training
Many schools/ training sites	X	
Few schools/training sites		

[116] 113 were with the Great General Staff in Berlin and 239 were attached to field formations. Samuels, *Command or Control?*, 15.

[117] This pressure was exacerbated by the fact that the Schlieffen Plan did not even allow for reservists to receive refresher training. The Third Reserve Corps was assigned with laying siege to Antwerp. And four corps held the center of the German assault at Ypres. Gudmundsson, *Stormtroop Tactics*, 3–6. In fact, the German army's willingness to throw reserve formations into front line action took the French high command completely by surprise. Much of Joffre's Plan XVII was based on the assumption that the Germans would not use reservists as part of the invasion force. This led him to underestimate the offensive's size and to therefore overestimate his ability to hold those forces with a minimum number of defenders while the bulk of the French army tried to preemptively seize Alsace-Lorraine. See Ronald Harvey Cole, "'Forward with the Bayonet!': The French Army Prepares for Offensive Warfare, 1911-1914" (Ph.D., University of Maryland College Park, 1975). This would not be the last time the French underestimated German willingness to use reservists as front line troops. See Elizabeth Kier, "Culture and Military Doctrine: France Between the Wars," *International Security* 19, no. 4 (April 1, 1995): 65–93.

IV. 1915

Assault tactics	Exp.
Combined arms	Exp.
Elastic defense in depth	Exp.

Command culture	Mod Centralized
Assessment mechanism	Yes
Training structure	Mod Centralized

Sandwiched between 1914's chaos and 1916's epic battles at Verdun and Somme, 1915 has become the First World War's 'forgotten year.' This is unfortunate, because from a doctrinal optimization perspective it was also the war's most dynamic. By early 1915 all three armies clearly realized that their prewar doctrines were incapable of dislodging stasis on the Western Front, and all three began experimenting with alternatives. While the Battles of Soissons, Neuve Chapelle, Aubers Ridge and the Champagne Offensives might seem like minor skirmishes in comparison to the monstrous clashes that would follow, they generated new thinking and new approaches. In this way, 1915 represents a degree of doctrinal fluidity that would not be seen again until the war's final year.

However, by the end of 1915 the German army – and the German army alone – was systematically experimenting and refining the tactics, techniques and procedures that would lead to assault tactics, combined arms, and the elastic defense in depth. As chapters 6 and 7 argue, the French and British ended the year with the 'artillery conquers, infantry occupies' doctrine that would guide them through the next two years. This divergence is

especially puzzling since the French army had at least one officer actively call for assault and combined arms tactics.[118]

Political, strategic, and operational situation

With the exception of the Second Battle of Ypres (which was designed to adjust defensive lines, not breakthrough) the German army spent 1915 on the strategic defensive. Offensive operations on the Eastern Front consumed most of the army's time, manpower and attention.

This leads to an important observation, one to which chapter 8 will return. In looking at the First World War one conclude that strategic needs drove doctrinal development. After all, the Germans perfected the elastic defense in depth in 1917 – a year in which manpower constraints and the Eastern Front prevented any large scale offensive action. They then perfected assault tactics in 1918, when they had a strategic window that allowed them to shift forces from the Eastern Theater.

Such a view is only correct in the most superficial sense. Yes, the German army *perfected* their defensive doctrine in 1917 and their offensive doctrine in 1918. But this ignores the fact that optimization only occurred in 1917 and 1918 because of the years preceding work developing and refining these doctrines so that they would be ready for use the first place. To reiterate, this work traces back to 1915, a year in which there was no strategic imperative to attack in the west because there was no practical way to do so. Similarly, if

[118] Captain Andre Laffargue. See chapter 7.

this logic were true then we are forced to wonder why the Entente, which spent 1915, 1916 and 1917 on the strategic offensive, failed to optimize its assault tactics during these years. [119]

Dependent Variable

The German army's official doctrines remained largely unchanged in 1915. This was a year for experimentation and learning, not implementation and indoctrination. Like its counterparts in the British and French armies - General Headquarters (GHQ) and Grand Quartier General (GQG), respectively - OHL began distributing memoranda summarizing lessons learned. The goal was to circulate best practices across the Western Front. However, these memos were not intended to be doctrinal statements, nor were their recommendations universally adopted.[120]

[119] One could of course argue that strategic imperatives nevertheless drove the development of assault tactics in the German army even in 1915 because its leaders knew they would have to resume large scale offensive operations at some point to achieve their objectives. This view, however, robs the concept of any meaning. All armies must always be prepared to attack and defend – victory depends on both, since every attack invariably transitions into defense (so that attackers can regroup and refit), and defensive operations on their own rarely achieve decisive outcomes. So in this sense, all armies always need to attack and defend, suggesting that strategic imperatives can never explain variation in doctrinal outcomes.

[120] For example, see Army Group Fleck, "The Employment of Minenwerfer (Translation of a German Document)," July 1915, Joint Services Command and Staff College Archives, Shrivenham; 3rd Army Headquarters, "Experiences Gained in the Winter Battle in Champagne From the Point of View of the Organization of the Enemy's Lines of Defence and the Means of Combating an Attempt to Pierce Our Line (Translation of a German Document)," April 14, 1915, Joint Services Command and Staff College Archives, Shrivenham; Eberhardt, "The Lessons of the Recent Fighting in the Ban de Sapt (Translation of a German Document)," July 17, 1915, Joint Services Command and Staff College Archives, Shrivenham; A Casualty, "Extract from Notes on the Minor Tactics of Trench Warfare (Translation of a German Document)," June 1915, Joint Services Command and Staff College Archives, Shrivenham; General Staff (Intelligence), "German Instructions for the Employment of Flame Projectors (Translation of a German Document)," December 12, 1915, Joint Services Command and Staff College Archives, Shrivenham; Graf von Lamsdorff, "Experiences of the 5th Army in the Attacks in the Argonne (Translation of a German Document)," September 14, 1915, Joint Services Command and Staff College Archives, Shrivenham.

Offensive tactics

Even if its official doctrine remained unaltered, 1915 is noteworthy for the German army's willingness to experiment. Front line units tried out new technologies as they were fielded en masse, including hand grenades and body armor.[121] More important, units also worked on new ways to attack. Many of these experiments revolved around attacking with small, heavily armed teams instead of large waves of riflemen.[122] After the Battle of Soissons (January 1915) Colonel Hans von Seeckt (a General Staff officer with the troops, assigned as III Corps Chief of Staff),[123] argued that attacking units needed more firepower, especially when they moved beyond the German artillery's maximum range or deviated from the pre-established support plan.[124]

These front line experiments did not go unnoticed. Nor did the ideas meander aimlessly through OHL. Prodded by General Staff officers, OHL moved quickly to create a test unit. Organized in March 1915 it was placed under the command of Major Kalsow, an engineering officer.[125] Kalsow's *sturmabteilung* had nearly 700 men and was given new 3.7 cm field guns. It was instructed to develop techniques for using small, independent, and heavily armed units to penetrate enemy defenses.[126]

[121] Samuels, *Command or Control?*, 87–88.
[122] Stephen Bull, "The Early Years of the War," 205; Gudmundsson, *Stormtroop Tactics*, 32–35. By mid-1915 many front line regiments had created some kind of 'shock troop' detachment to lead larger assaults. By 1916 30 Western Front divisions had a self-made storm troop unit of some kind. Drury, "German Stormtrooper," 16.
[123] Seekt later served as the head of the *Reichswehr* during the Weimar Republic.
[124] Samuels, *Command or Control?*, 232.
[125] Before the war engineering officers had more experience using heavy weapons and demolitions than their infantry counterparts.
[126] Drury, "German Stormtrooper," 12.

Kalsow's detachment spent April and May 1915 on developing new tactics. To test its progress, OHL put it into action to support a small-scale attack in June 1915. The experiment was failure and the unit suffered horrendous casualties, losing 184 men and six cannon in two weeks.[127] OHL had to decide whether the concept was flawed and should be abandoned; or whether the detachment misapplied its concepts.

In hindsight application seems to have been the problem. The infantry general Kalsow was assigned to support ignored his advice and piecemealed the detachment throughout the division. Moreover, the 3.7 cm gun was too small to destroy strong points, but too big to hide. As a result, it attracted enemy fire before it could do any real damage.[128]

OHL, however, decided that Kalsow was the real problem. He was fired (under protest) and replaced by an infantry officer, Captain Willy Rohr, on September 8, 1915. Rohr quickly made several important changes to Kalsow's tactics.[129] He did away with body armor because it was too cumbersome. He also got rid of the 3.7 cm guns, arguing that firepower needed to be more mobile,[130] and armed his men with a mix of trench mortars, rifle grenades, and captured Lewis light machineguns instead.[131] Captain Rohr also abandoned waves in favor of small groups. [132] This change allowed his men to take advantage of terrain and gave them additional flexibility. Conceptually, these changes meant that not

[127] And one that suggests the challenge of making causal inferences from combat outcomes.
[128] Samuels, *Command or Control?*, 89; Gudmundsson, *Stormtroop Tactics*, 46–47.
[129] Drury, "German Stormtrooper," 14.
[130] In their place he adopted captured Russian field guns, which were lighter.
[131] The German army did not yet have a light machine gun. Even after one was fielded, German soldiers still preferred to use the American designed, British employed Lewis gun. See Ernst Jünger, *Storm of Steel*, Penguin Classics (New York: Penguin Books, 2004).
[132] Samuels, *Command or Control?*, 90–93; Gudmundsson, *Stormtroop Tactics*, 49.

every infantryman carried a rifle. Now each 8-man squad was a self-contained unit where some infantrymen carried rifles while others carried grenades or light machine guns.[133]

By October Captain Rohr's had settled on a basic scheme of maneuver for attacking.[134] Column and wave formations were gone. In their place, squads crossed No Man's Land in flexible formations, taking advantage of terrain to move towards enemy defenses. Each squad had a different objective and maneuvered without trying to stay in contact with one another. Rather than dash headfirst into enemy defenses, the squads were trained to identify and *bypass* strong points. Looking for weak points in the lines instead, the squads then used their organic firepower to penetrate enemy lines. Subsequent units would follow, enveloping the bypassed strong points and 'mopping' up the trenches.

OHL validated Rohr's concepts by sending his *sturmabteilung* into action on the Eastern Front in October 1915. Satisfied with the results, OHL had Rohr's detachment run a training course for the 8th Bavarian Reserve Division in December 1915.[135]

Rohr's pioneering concepts formed the core around which the German army's offensive doctrine in 1918 was built. Most of the ideas had been tested and validated by the late fall of 1915. Yet it still took time and effort to refine them, acquire the necessary equipment to execute them on a large scale, and retrain an army in the midst of a two-front war.

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[133] Although German, British and French units had all more or less started employing rifle grenades, hand grenades, mortars, and light machine guns by 1915, Rohr's approach was unique in that these weapons were not assigned to specialists who attached to a infantry unit (made up only of riflemen) only for the duration of an attack. The difference was subtle but critical as organic firepower was impossible to achieve without it.
[134] Samuels, *Command or Control?*, 90–93; Gudmundsson, *Stormtroop Tactics*, 49.
[135] Samuels, *Command or Control?*, 239; Drury, "German Stormtrooper," 14.

Offensive Doctrine as of December 1915
Table 5.13

Irregular & dispersed formations	Exp
Independent small unit action	Exp
Fire and movement (small unit level)	Exp
Organic firepower	Exp
Bypass resistance	Exp

Combined arms

Three important combined arms concepts emerged in 1915. First, German units on the Eastern Front used a creeping barrage to protect assault waves for the first time.[136] Eventually, this became a standard technique army-wide. Second, during the summer artillery units began incorporating flexibility into their defensive fire plans. Most notably, during the enemy's pre-assault bombardments Germans gunners started targeting assembly areas where the infantry units massed before stepping off. Then, as soon as the pre-assault bombardment lifted, German guns would shift to create a protective will directly in front of the defensive trenches. Gunners would also randomly shell No Man's Land throughout the attack, to hit the initial assault waves and to stop the units that tried to reinforce them.[137] Finally, on June 30th, 1915 the Germans used a surprise Hurricane barrage for the first time to support a small-scale attack in the Argonne.[138] Although the attack failed for a variety of reasons, the idea to trade destructive power for tactical surprise had survived its first test.

[136] Herwig, "You Are Here to Learn How to Die: German Subaltern Officer Education on the Eve of the Great War," 41.
[137] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 64–77; Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 95–96.
[138] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 50.

Combined Arms Doctrine as of December 1915
Table 5.14

Hurricane barrage	Exp
Predicted fire	No
Flexible C2	Exp
All arms integration (fire and movement)	No

Defensive tactics[139]

Official doctrine The German army did modify its official defensive doctrine in 1915. This is not surprising given the number of large-scale Entente offensives, several of which almost succeeded. Luck and poor coordination, not the defenses' inherent power, prevented both the French and the British from exploiting major breaches during the Champagne offensives and at Neuve Chapelle.[140]

In early January, months before these near disasters, OHL updated its prewar defensive doctrine for the first time.[141] Published in two memoranda, dated 7 January and 25 January respectively, these updates firmly committed defenders to the principle of *'Halten, Was Zu Halten Ist'* (hold whatever can be held). This was to be the principle around which all defenses were organized until late 1916.[142] Defenders were to build and hold the front trench line (called the Main Line of Resistance, or MLR) at all costs. To do this inevitably

[139] 3rd Army Headquarters, "C.D.S. 303."
[140] At Neuve Chapelle British units penetrated German lines at a point where the nearest reserves were 24 hours away, but then sat for seven hours waiting for further instructions. On Neuve Chapelle, see Wynne, *If Germany Attacks: The Battle in Depth in the West*, 30–31; John Strawson, *Gentlemen in Khaki and Camouflage: The British Army 1890-2008* (Barnsley, [England]: Pen & Sword Military, 2009), 113; Douglas Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde* (London: Eyre & Spottiswoode, 1952), 87; Bidwell and Graham, *Fire-power*, 73. On the Champagne offensives, see Wynne, *If Germany Attacks: The Battle in Depth in the West*, 90–96.
[141] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 15–17; Balck, *Development of Tactics: World War I*, 30–32.
[142] Drury, "German Stormtrooper," 49.

meant positioning as many troops as possible in the forward-most trench, and refusing to fall back unless completely overrun.[143]

These memos also suggested units build secondary trenches in case of a breakthrough. Redundant positions would slow attackers long enough for reserve units to move into place. Unfortunately, given the emphasis on holding the front line, and the German army's predilection for allowing commanders to adjust doctrine to meet local conditions, many units ignored this guidance. Furthermore, some commanders thought that their soldiers would be less willing to hold the MLR at all costs if they knew they could fall back on a second set of trenches.

While German defenses still consisted of a single trench, they nevertheless increased in depth between Ypres (November 1914) and Neuve Chapelle (March 1915).[144] The single trench line of 1914 was by March 1915 reinforced by a series of strong points 1-2 kilometers back. These strong points held machine guns sited to cover the ground behind the MLR with fire. Reserve units for bottling up breaches were pre-positioned in houses or barns another few kilometers behind these strong points.

The near disasters in spring 1915, combined with the British and French tendency to use powerful pre-assault bombardments, led OHL to take a more directive stance. It told units along the entire Western Front to build not just a second trench, but an entire three-trench,

[143] For practical purposes, units usually put about half their soldiers in the forward most trench at a density of one man per three meters. Samuels, *Command or Control?*, 163.
[144] Ibid., 162–163.

secondary position.[145] These secondary positions were to be built beyond the Entente's artillery range. The logic was that attackers would have to reposition artillery before making a subsequent attack, even when they succeeded in breaching the first trench line.[146] By the late spring German defenses on the Western Front typically extended at least 2.5 kilometers in depth.[147] Defenders were still expected to hold the front most position – the MLR – at all costs.

OHL used a lull in the fighting during the summer to further refine the army's defensive doctrine. Many of these changes were based on lessons learned about reverse slope defenses at Loos (May 1915). OHL called on defenders to organize their positions in three layers. The first layer consisted of small trenches dug on a forward slope. These trenches were to hold artillery observers and machine guns, *not* the main body of defenders. With this change the forward most line was no longer the MLR. Instead, machine guns and artillery provided early warning of a major attack and stemmed its first waves. The second layer consisted of two continuous trench lines built on the reserve slope, usually 200 meters behind the crest of a hill.[148] This secondary position became the new MLR. The third layer was called the 'second zone,' and consisted of smaller trenches and strong points a

[145] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 48.
[146] Balck, *Development of Tactics: World War I*, 30.
[147] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 44.
[148] To reiterate a point first mentioned in chapter 4: although counterintuitive, the idea behind reverse slope defenses is remarkably simple and powerful. Most defenders are killed by artillery. By moving a defensive position to the reverse side of a hill it can no longer be shelled with impunity (since attackers can no longer see it). At the very least, attackers have to move forward observers to the crest of the hill, at which point they are exposed to fire from the reverse side (plus they have to first fight their way through the observation posts on the forward slope.) A final benefit is that attacking forces can find themselves trapped after they crest the hill. Hidden machine gun positions can hit them, leaving them the option of charging into the teeth of the defenses or climbing back up the hill under fire.

kilometer or more behind the MLR. Reserves were positioned 2-4 kilometers behind the second zone.

The 'summer updates' also refined how units counterattacked.[149] Prewar doctrine called for vigorous counterattacks as soon as part of the line was lost. OHL now recommended that units wait until after attackers tried to consolidate their gains to counterattack. By waiting, commanders avoided wasting men by throwing them into the middle of the fight when the attacker's artillery was still effective.

Experimentation Defending units also engaged in ad hoc experimentation. The most important experiments involved Colonel Fritz von Lossberg's work on defending in depth. During 20-division attack in Champagne (September 1915) the French army managed to break into German lines along eight miles of front. Lossberg, also a General Staff officer, was assigned to take over as the Chief of Staff for one of the beleaguered armies (the Third).[150] Despite the ongoing offensive, he reorganized the Third Army such that its defensive position was now 8 kilometers deep.[151] The forward and main line of resistance remained unchanged. However, Lossberg added a new defensive zone spanning from the MLR's second trench to a third trench line 2.5 kilometers back. Here he placed another set of forward observers, additional heavy artillery, and machine guns. He called the third trench line (located at the rear of the aforementioned zone) the 1st rearward position, and placed reserve units in it for protection. Finally, Lossberg had Third Army build a 2nd

[149] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 64–77.
[150] Ibid., 90–96.
[151] Samuels, *Command or Control?*, 169.

rearward position 2.5 kilometers behind the 1st rearward position. This position held larger reserve forces, although trenches and strong points were not built to house them.

Lossberg's innovation represented the Western Front's first true defense in depth. Although it was not 'elastic,' because units were still ordered to hold their positions at all costs, Lossberg's defensive system clearly demonstrated the value depth. When defensive systems were deep enough, attackers could no longer sweep through the entire position in a single thrust – at least not with the organic firepower available in 1915. Nor was it easy to mount a series a smaller attacks (i.e. to 'chew' through the defensive system), because it took time to reposition artillery for each successive push. Depth gave defenders time to pound them with the artillery now positioned throughout the defense and well-prepared counter-attacks.

Defensive Doctrine as of December 1915
Table 5.15

Depth	Exp
Elasticity	No
Counterattack	Yes

Independent Variables

Command culture

There is little evidence to suggest a major change in the German army's command culture during 1915. As should be evident by this point, units were free to experiment with new techniques, technologies and tactics. OHL eagerly studied their reports and acted on the

most promising ones.[152] At the same time, this autonomy still did not extend all the way down the chain of command. Battalions, divisions, and corps were still doing the experimenting – not squads, platoons and companies.[153] Thus, it is safe to categorize the army's command culture as moderately centralized.

Command culture as of December 1915
Table 5.16

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

The German army's assessment mechanism operated as it was designed to during 1915. General staff officers rotated between the Great General Staff, OHL, and the front lines. They either advocated for, or personally developed, the assault tactics and defense in depth concepts around which German doctrine was subsequently modeled. Lieutenant Colonel Max Bauer appears to be the first General Staff officer to call for creating small, independent infantry units with organic firepower to act as 'trailblazers' for major assault forces.[154] Colonel Lossberg's work on the defense in depth has already been described. The key point is that the General Staff and OHL both solicited ideas from front line units and actively pursued those that seemed to have value. Captain Rohr's work on assault unit tactics exemplified this approach.

[152] Ibid., 93.
[153] To be fair, it would not have been possible for a company, platoon, or smaller unit to 'combine arms' or build a defense in depth. Assault tactics are another matter, since these are predicated around small unit action.
[154] Gudmundsson, *Stormtroop Tactics*, 46–47.

The General Staff and OHL were also remarkably willing to copy British and French ideas. In April 1915 they obtained a captured French memo – issued by GQG –outlining a new elastic defense in depth concept. It is unclear whether Colonel Lossberg read this document, but its ideas were remarkably similar to, if not more advanced than, those he eventually employed in Champagne.[155]

Finally, if only to reiterate the claim that the General Staff tolerated dissent, it is worth noting the heated debate swirling around the mandate to hold the front line at all costs.[156] The dominant view among senior General Staff officers was that defensive positions needed to be both continuous and rigidly held. Even Colonel Lossberg, creator of the defense in depth, ascribed to this view.[157] However, a growing faction, led primarily by junior staff officers like the aforementioned Lieutenant Colonel Bauer, called for more flexibility. They argued that putting too many troops in the front line unnecessarily exposed them to enemy artillery. It would have been better to garrison front lines with only a few troops, and to let commanders decide when it was best to fight, and when it was best to fall back and let the attackers wear themselves out.

Assessment mechanism as of December 1915
Table 5.17

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

[155] German military historian Holger Herwig suggests that many of the basic ideas in this memo made their way into Ludendorff's 1916 Principles of Defense in Positional Warfare. Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 95–96.
[156] Samuels, *Command or Control?*, 167.
[157] In his mind depth was necessary to stop the inevitable penetrations. It was not, however, an invitation for units to preemptively pull out. He and Ludendorff would openly debate this issue throughout much of 1917.

Training structure

Its feverish expansion notwithstanding,[158] the German army's training structure remained largely unchanged in 1915. When regiments mobilized in 1914 they left behind a small cadre to train replacements.[159] During 1915 recruits and conscripts reported to these cadres for initial training, after which they were formed into replacement drafts and sent to join their units on the Eastern or Western Front.[160]

OHL modified this training system in only two ways in 1915. First, because units complained that recruits were not prepared for life in the trenches, the army established recruit depots behind the Western Front for recruits to receive additional training.[161] Second, OHL started organizing schools and instructional units for units already at the front. The aforementioned *Sturmabteilung* Rohr was one of these instructional units, and in May 1915 OHL directed that every army send two officers and four non-commissioned officers to train with the unit.[162]

[158] The German army added approximately 30 infantry divisions between January and December 1915. War Office, *German Army Handbook. 1918. Reprint* (London: Arms and Armour Press, 1977), 28.
[159] And to house casualties. Often the two tasks were 'synergized' as recovering casualties became training officers for new recruits. At other times the two tasks were at odds, since casualties took up space and billeting that could not then be given to recruits.
[160] Conscripts were still called up according to the year in which they turned 20. However, as manpower shortages became acute the German army started calling up year groups early. The class of 1915 was called up in April 1915. The class of 1916 was called up in August of 1915. The first half of the class of 1917 (those born before September 1897) were called up in February 1916; the second half in July 1916. The entire class of 1918 was called up in September 1916 and the class of 1919 was ordered to duty in April 1919. War Office, *German Army Handbook. 1918. Reprint*, 15.
[161] However, this training was also often insufficient. How much a recruit received often depended on how active or peaceful the front was at the time he arrived. Lupfer, *The Dynamics of Doctrine*, 23.
[162] This is further evidence that storm troops were never intended to be 'elite.' Rather, the plan from the beginning was to retrain the entire army once the concept had been proven. Drury, "German Stormtrooper," 14.

Training structure as of December 1915
Table 5.18

	General in charge of training	No general in charge of training
Many schools/ training sites	X	
Few schools/training sites		

V. 1916

Assault tactics	Dev.
Combined arms	Dev.
Elastic defense in depth	Dev.

Command culture	Mod Decentralized
Assessment mechanism	Yes
Training structure	Centralized

1916 transformed the German army. It started the year with an overconfident attempt to bleed the French army white at Verdun; Falkenhayn in command; and tactical doctrines that, at least on paper, still reflected a number of prewar assumptions. It ended the year with a manpower crisis; Ludendorff in charge;[163] and the pieces in place to implement its radically new warfighting doctrine.

[163] Technically, Ludendorff was the Quartermaster General of the German army – second in command. However, for all practical purposes he quickly emerged as its true leader. In many respects this reflected the unique dual-command system used in the Prussian and German armies. Unlike the British, French, or even American militaries, German Commanding Generals always had a chief of staff (in the case of the Commander in Chief of the German army the Chief of Staff was called the Quartermaster General). This was a deliberate hedge against the fact that most Commanding Generals were picked on the basis of pedigree or royal lineage, not competence. The chief of staff was typically an accomplished General Staff officer. Thus, while the Commanding General was ostensibly in charge, the Chief of Staff wielded enormous influence. He could issue orders in the Commanding General's absence. And while he lacked the authority to countermand a command, if the Commanding General issued an order his Chief of Staff disagreed with, the Chief of Staff was required to submit a written statement expressing his opposition. If the Chief of Staff did not, and the order resulted in failure, then the Chief of Staff was fired. For a more detailed discussion of this fascinating leadership system, see Lupfer, *The Dynamics of Doctrine*, 8–9; Muth, *Command Culture*.

On the surface, these facts might lead to a spurious conclusion about how and why doctrinal optimization occurred. First, there was a leadership transition, so it might seem that Ludendorff was the chief agent of change. Indeed, many historians identify him as the mastermind behind Germany's revolutionary tactics on the Western Front.[164] Second, Germany was almost in crisis by the end of 1916. It had already exhausted the classes of 1916, 1917, and 1918 (and was forced to call the class of 1919 to arms by April 1917).[165] Its leaders even made the war's first serious offer to negotiate an armistice.[166] Thus, it is not hard to imagine that crisis engendered innovation.

These are common alternative explanations. Chapter 8 fully addresses each in turn. At this point it suffices to point out why neither was important in a causal sense. While Ludendorff's leadership was undoubtedly important, the key elements behind assault tactics, combined arms and the elastic defense in depth were well-established before his tenure began. Moreover, there is ample evidence that Falkenhayn was equally receptive to the ideas being generated in the front lines and filtered through the General Staff. After all, he did authorize the creation of Kaslow's experimental unit; dispatch Lossberg to Champagne; and direct front line units to begin training under Rohr. Finally, by 1917 Ludendorff had become Germany's de facto dictator, overseeing everything from tactical doctrine to industrial policy. It is inconceivable that he could have led a nation at (global) war while simultaneously directing the detailed development of a radical new tactical

[164] Lupfer, *The Dynamics of Doctrine*, 9.
[165] War Office, *German Army Handbook. 1918. Reprint*, 15. See also J Charteris, "Fluctuations in German Strength During 1916" (General Staff, October 23, 1916), Joint Services Command and Staff College Archives, Shrivenham.
[166] The offer was rejected out of hand.

doctrine. This gives too much credit to genius, while ignoring the General Staff and OHLs' far more consistent influence.

The claim that crisis fostered change is even weaker. The Entente powers were in a worse strategic situation than Germany, at least in some respects.[167] Yet crisis did not lead to doctrinal optimization in the British or French armies. More important is the fact that the German army laid the groundwork for assault tactics, combined arms, and elastic defense in depth in 1915. OHL put serious resources behind developing and refining these ideas long before the twin disasters of Verdun and the Somme unfolded. There is also no way to link crisis to change causally. A crisis can make leaders more receptive to change, but it does not make them come up with new ideas in the first place. At the end of the day, crisis is neither necessary nor sufficient to understand change on the Western Front.

Political, strategic, and operational situation

With one major exception, Germany remained on the strategic defense in the West throughout 1916. Verdun was the exception.[168] Unlike most major offensives up to that point in the war, when Falkenhayn attacked at Verdun he had no intention of penetrating allied lines.[169] His goal was to get the French to pour men and material into a battle of attrition. This explains why he laid siege to Verdun. Its fortresses were historically,

[167] Both the British and French governments fell in December 1916; both faced severe manpower shortages of their own.
[168] For an in depth analysis of the battle, see Sir Alistair Horne, *The Price of Glory: Verdun 1916*, Reissue (Penguin Books, 1994).
[169] In fact, by this point in the war he believed that a decisive breakthrough was impossible. See Erich von Falkenhayn, *The German General Staff and Its Decisions, 1914-1916* (New York: Dodd, Mead, 1920).

culturally, and politically important, and Falkenhayn believed (correctly) the French would not give them up without a fight.[170]

The British-led Somme offensive was Germany's second major battle in 1916. Launched on 1 July to relieve German pressure on Verdun,[171] the battle pushed the German army close to its breaking point. The Germans lost more men in the first two months defending at the Somme than they did in the first six months attacking at Verdun.[172]

Doctrinally, both battles were important sources of learning and information. Storm troop detachments were used widely at Verdun, while the Somme definitively showed that rigidly held, linear defenses simply disappeared under the weight of Entente bombardments.

Dependent Variable

Offensive tactics

Official German doctrine remained largely unchanged in early 1916.[173] The initial assault at Verdun offers a telling example. Although a few attack divisions used assault groups to infiltrate French lines or tried out new formations, most units attacked in standard waves, with soldiers advancing across No Man's Land three meters apart.[174] Only a few minor

[170] Falkenhayn failed at Verdun in large part because his subordinates failed to adhere to the overarching concept of operations: to launch an attack and then revert to the defense while French units wasted men and material trying to retake the forts. Instead, they continually attacked to take more ground, or to retake ground lost to the French. In the end, Verdun cost the both sides equally.

[171] Although the offensive was initially conceived as part of an ambitious combined British-French offensive along a 60 mile front. P. Hart, *The Somme* (Cassell Military Paperbacks [Orion Publ. Co], 2006), 34–35.

[172] In total, the Germans suffered 465,000 casualties at the Somme. 130 German divisions ended up rotating through the fight there. For comparison, the entire active duty U.S. Army has ten divisions. Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 84.

modifications were evident: the soldiers followed creeping barrages instead of crossing open terrain without artillery support; machine guns accompanied the assault force instead of being left behind with reinforcements; and pioneers (combat engineers with demolitions experience) were integrated into the assault units.

However, major changes were forthcoming. Captain Rohr's unit participated in the initial assault at Verdun, where it against suffered heavy casualties and had to be reconstituted.[175] At this point OHL faced a decision: Rohr's detachment was clearly incapable of developing new tactics, training other units, and participating in major offensives at the same time. Therefore, in April 1916 Falkenhayn directed that Rohr and his men focus exclusively on training and experimening.[176] The detachment was re-established as a full battalion. Its first task was to turn four Jager battalions into assault battalions. In turn, these Jager battalions were then used to train even more assault battalions across the Western Front.[177]

In late May OHL published a tactical manual written by Captain Rohr.[178] Titled "Instructions for the Employment of an Assault Battalion" it was the first high-level update to infantry tactics since the 1906 ExRfdI. The manual called for assault battalions to support offensives

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[173] OHL continued to generate and distribute tactical notes, lessons learned, and after action reports. For example, see Vietinghoff and Wagener, "German Raid on the British Trenches Near La Boisselle, 11th April, 1916 (Translation of a German Document)," August 1916, Joint Services Command and Staff College Archives, Shrivenham.
[174] Balck, *Development of Tactics: World War I*, 40–42.
[175] Samuels, *Command or Control?*, 239.
[176] Gudmundsson, *Stormtroop Tactics*, 77.
[177] Jager battalions made ideal candidates for early transition since they were independent light infantry units and so pulling them out of the rotation for retraining and reassignment could be done with a minimum impact.
[178] Gudmundsson, *Stormtroop Tactics*, 86.

by attaching 8-man assault squads to each attacking battalion. The assault squads would lead the attack, scouting defenses for gaps and weak spots. Follow-on elements from the supported battalion would follow in platoon-sized units using irregular formations. Heavy weapons were to be integrated at all levels of the assault. Machine guns were used for protecting flanks (since each platoon would move independently). Field guns focused on destroying strong points. Meanwhile, trench mortars and grenades would suppress any infantry that survived the artillery bombardment.

General Ludendorff became a major advocate for assault tactics. [179] He directed that more assault battalions be created immediately after assuming de facto command over the army in August 1916. However, the core concepts were already established, refined, and written down (thanks in large part to Falkenhayn's support) well before Ludendorff's decree.

Offensive Doctrine as of December 1916
Table 5.19

Irregular & dispersed formations	Dev
Independent small unit action	Dev
Fire and movement (small unit level)	Dev
Organic firepower	Yes
Bypass resistance	Dev

Combined arms

The German army made major strides toward coherent combined arms doctrine in 1916. The story behind these advances, which included developing the techniques needed to fire an effective Hurricane barrage and to exercise flexible command and control over artillery, is quite extraordinary. Unlike assault tactics and the elastic defense in depth, these

[179] He first observed them while inspecting an honor guard from Rohr's battalion on October 23, 1916. Drury, "German Stormtrooper," 15.

techniques were first perfected on the Eastern Front. And they were promoted by an officer who was neither a member of the General Staff nor a traditional officer.[180]

Both techniques – predicted fire and flexible command and control – trace back to Colonel Georg Bruchmüller. Bruchmüller had been a heavy artillery officer, but retired before the war started. Called back to active duty he was put in charge of artillery for the 86th Division and was sent to the Eastern Front. In the spring of 1916 Bruchmüller's division was assigned to take part in the Tenth Army's offensive at Lake Narotsch. Before the battle, Bruchmuller approached Colonel Hell - a General Staff officer serving as the Chief of Staff for the Tenth Army - with an idea: he wanted to develop a single army-wide artillery plan. Up to this point, Tenth Army let every division fire its own preparatory bombardment, a standard practice throughout the German army.

Bruchmüller's idea proved a revolutionary development in artillery doctrine and played a major role in Tenth Army's success at the Battle of Lake Narotsch (18 March – 30 April, 1916). Bruchmüller wrote out a coherent artillery doctrine after the battle. The 'Bruchmüller Process,' as it came to be known, consisted of four phases. In the first phase, aerial units conducted extensive reconnaissance to identify command posts and telephone exchanges. The next phase replaced the traditional drawn out preparatory bombardment with a sudden Hurricane barrage. Relying on predicted firing, German gunners would target infantry units in the front line, command posts, communication networks, and

[180] What follows is taken from Balck, *Development of Tactics: World War I*, 42; Meyer, "Operational Art and the German Command System in World War I," 301 – 304; 308 – 315.

reserve forces. [181] The goal was no longer to destroy enemy defenses for assault waves to occupy. Instead, the Hurricane barrage sought to neutralize the defense by knocking out defenders' ability to communicate and coordinate.[182] This was more effective than trying to destroy every possible strong point. It also allowed attackers to achieve surprise again.[183] In the third phase gunners would shift from defenders to their artillery.[184] In the fourth phase gunners would shoot creeping barrages to keep defenders suppressed during the actual infantry assault.

Aside from the technical innovations needed to fire an effective Hurricane barrage, Bruchmüller's major contribution was his emphasis on flexible command and control. The highest artillery commander on scene was responsible for coordinating and directing the first three phases. Division artillery commanders only took control when the infantry was about to step off. This made sense given the shift in goals. Higher-level commanders had control over the reconnaissance assets needed to identify and target deep command posts and communication exchanges. Moreover, these targets were often located throughout the defensive sector. It was easier for a central commander to track their destruction than it was for multiple division commanders.[185] Conversely, lower level commanders were in better positioned to control the creeping barrages. They knew the terrain and were able to adjust the artillery plan to track their unit's progress.

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[181] See chapter 4.
[182] The first successful use of a Hurricane barrage by the German army occurred at the Battle of Tarnopol in July 1916. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 294.
[183] Bruchmuller's bombardments were incredibly short, lasting around three hours on average. Compare this to the 21 day bombardment at Passchendaele.
[184] I.e. counter-battery fire.
[185] After all, defenders didn't share the same unit boundaries as their attackers. To knock out a command post that controlled the units directly opposing them a German division commander might have to fire into another division's sector.

Eventually, Colonel Hell was promoted to serve as the Chief of Staff for an entire Army Group, and Hell brought Bruchmüller with him. As a result, the 'Bruchmüller Process' became standard practice across the Eastern Front by 1917.

Combined Arms Doctrine as of December 1916
Table 5.20

Hurricane barrage	Dev
Predicted fire	Dev
Flexible C2	Dev
All arms integration (fire and movement)	Dev

Defensive tactics

Even in a year defined by doctrinal change the German army's progress on defensive doctrine nonetheless stands out. Lossberg's work in Champagne notwithstanding, German defenses were for the most part shallow and rigidly held in January 1916.[186] By December of that same year army was poised to implement a coherent elastic defense in depth across the Western Front.

The 'typical' German defense in the first half of 1916 consisted of three sets of trench lines.[187] The first set of trenches was arrayed with 200 meters between each trench. Two massive obstacle belts protected the forward-most trench, each up to 30 yards deep. The second trench served as the MLR. The third was for local support troops. Concrete strong

[186] This is of course a relative claim. German defenses in early 1916 were far deeper than their predecessors in 1914 and 1915. In some sectors they extended five kilometers in depth. Yet this was only half as deep as the elastic defenses that would replace them by year's end.
[187] Balck, *Development of Tactics: World War I*, 42; Wynne, *If Germany Attacks: The Battle in Depth in the West*, 100–101.

points were built 1000 meters behind this first set of trenches. A second set of trenches was located behind the strong points – or approximately 3,000 yards behind the forward most trench.[188] Called the 'second line' these trenches were now connected to the 'first line' by covered communication trenches. Finally, in most sectors defenders had started building a third set of trenches. Where these had been finished defensive zones now extended 5,000 to 6,000 meters from front to rear.

Yet depth was not accompanied by elasticity. By July 1916 German doctrine remained unchanged in the most important respect: units were still required to fight for the first position. Depth was a way to stem penetrations. It was not deliberately designed to let the attacker wear himself out. In practice, the requirement to hold at all costs forced commanders to put most of their men in the first three trenches, well within artillery range.[189]

This practice was ill advised in 1915. It was disastrous in 1916. By this point in the war British and French forces could bring the full might of their material power to bear in an offensive. They did this in the form of multi-day artillery bombardments. Entire units disappeared rigidly clinking to their trenches during the seven-day pre-assault bombardment in the Somme.[190]

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[188] Far enough to be out of range for most artillery
[189] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 103.
[190] See Wynne, 122. In its after action report the 55th Reserve Division reported that all three lines (recall that each line consisted of three trenches) was completely destroyed and no longer defensible in its northern sector; and that only segments of its southern sector remain intact ("only defensible on emergency.") Freiherr von Susskind, "Report on the Defence of Gommecourt on the 1st July, 1916 (Translation of a German Document)," July 1916, 8, Joint Services Command and Staff College Archives, Shrivenham.

Costly though it was, the Somme also marked the beginning of German progress towards an elastic defense in depth. The first lessons were once again ad hoc. During the pre-assault bombardment many surviving defenders decided that No Man's Land was safer than in their trenches. So they used lulls in the bombardment to slip out of their lines and into shell holes. British attackers found the resulting non-linear defense extremely hard to fight through, as the irregular positions could take British lines under fire from all sides.[191]

The second lesson was that counterattacks were critical to holding ground in the "tangle of shell holes, mined dug-outs, quarry excavations and cellars that [now] formed the German front zone."[192] Defenders were spread too thin to repel assaults of any size. Nor could units wait the eight or more hours it took for a typical counterattack order to make its way from headquarters to the front line. Attackers were most vulnerable right after they stopped to consolidate.[193] The solution was to give front line commanders the authority to launch counter-attacks.[194] In Second Army's zone, Lossberg achieved this by dividing his area of responsibility into sub-sectors. He then put a single officer in charge of each. This officer had the power to launch counterattacks without waiting for authorization and to request reinforcements directly from division headquarters. This sector commander was also

[191] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 113 & 122. Some commanders wanted to abandon trenches altogether, but found that they were still necessary to coordinate re-supply and shelter reinforcements. Balck, *Development of Tactics: World War I*, 45.
[192] Bidwell and Graham, *Fire-power*, 113–114.
[193] The vulnerability stemmed from the fact they did not yet have time to entrench, send for reinforcements and position machine guns. One might wonder why an attacker would need to dig in after taking a trench. There are two reasons. First, the pre-assault bombardment often meant there was no longer a trench to hold. Second, even when the trenches survived the bombardment, they faced the wrong way. Attackers had to dig steps to fire over the other side and erect mounds of earth to give themselves protection while firing.
[194] Samuels, *Command or Control?*, 175–177.

empowered to control all reinforcements that can into his sector, regardless of whether or not he was the senior officer.[195]

Throughout the Somme campaign, units were still prohibited from surrendering ground preemptively.[196] It would take Ludendorff to begin the transition to deliberate elasticity. Ludendorff arrived on the Western Front after taking over as Quartermaster General on August 27, 1916. On the 8th of September he organized a conference at Cambrai to review the army's tactics.[197] The conference convinced Ludendorff that German units "fought too doggedly" for ground, forcing them to endure needless casualties to hold useless ground.[198]

Buttressed by General Staff officers in OHL, Ludendorff immediately set out to revise the army's defensive doctrine. In his words:

> In sharp contrast to the form of defense hitherto employed, which had concentrated in regular and easily recognizable lines, a broad defense was now organized in deep formations, mobile and handled in loose groups. At the end of the fighting the position should, of course, still be held by us, but the infantryman need no longer say to himself, 'Here I must stand or fall,' but had, on the contrary, the right, within a limited range, to give way in any direction before strong enemy fire. Any part of the line that was lost was to be recovered by counter-attack. The group (of a non-commissioned officer and eight men), the importance of which had been strongly emphasized by many intelligent commanders before the war, now became officially the unit of the infantry in fighting disposition.[199]

Ludendorff wasted no time directing OHL to start working on a new. Lossberg, Bauer, and others contributed to the final product, released as the "Principles of Command in the

[195] Bidwell and Graham, *Fire-power*, 113–114.
[196] Samuels, *Command or Control?*, 178.
[197] Except for a brief stint near Liege in 1914 Ludendorff had spent the rest of the war up to that point on the Eastern Front.
[198] Ludendorff also disliked the practice of building deep shelters in the front lines. They were death traps when hit by direct artillery fire. And defenders tended to stay in them as long as possible, making it easy for assault waves to beat them into the trench. Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, 321.
[199] Ibid., 459.

Defensive Battle in Position Warfare" on December 1st, 1916.[200] Less than four months later (and a mere seven months after the Cambrai conference) the army had reorganized its defenses across the Western Front to reflect the new doctrine.

Defensive Doctrine as of December 1916
Table 5.21

Depth	Dev
Elasticity	Dev
Counterattack	Yes

Independent Variables

Command culture

The German army's command culture underwent its most significant transition in 1916. For the first time, unit leaders at the company, platoon, and squad level regularly exercised the kind of autonomy once reserved for battalion commanders and above. This was not a free-for-all. Autonomy was moderated by the fact that subordinates were only allowed to exercise it under specific conditions. Moreover, superiors allowed the subordinates to exhibit initiative with the clear expectation that they operate in accordance with an overarching framework and towards a common goal.[201]

At least three factors drove this shift towards moderate decentralization. First, decentralization was the logical result of the army's doctrinal shifts. Neither assault tactics nor the elastic defense in depth could work unless small unit leaders had the authority to

[200]Chief of the General Staff of the Field Army, "Manual of Position Warfare for All Arms, Part 8, The Principles of Command in the Defensive Battle in Position Warfare (Translation of a German Document)," March 1, 1917, Joint Services Command and Staff College Archives, Shrivenham.

[201] Nor did German commanders hesitate to fire subordinates who failed to make sound decisions. This started at the top of the organization. Weeks after the new defensive doctrine was published, Ludendorff fired two generals who kept too many men in the front lines while defending against a French counterattack at Verdun. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 165–168.

make independent decisions. Second, the nature of the fighting made decentralization necessary. Large units rarely survived the trek across No Man's Land intact, necessitating small unit leaders take command. As the Somme demonstrated, trench warfare also meant defenders would have to fight as individuals or in small, isolated pockets. Third, and most important, the German army's longstanding philosophy of delegating autonomy made it easier and more palatable to expand that autonomy under wartime exigency. It is worth pointing out that the British and French armies were subject to the same battlefield conditions. They experimented with many of the same ideas. Yet neither was able to delegate autonomy as fully and as efficiently as their German adversary.

Command culture as of December 1916
Table 5.22

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

Assessment mechanism

OHL and the General Staff continued to perform doctrinal assessment for the German army. General Staff officers still played a central role developing assault tactics and the elastic defense in depth. Even when tactical ideas came from the 'bottom up' OHL still played a critical role analyzing lessons learned, allocating resources for further experimental work, and writing doctrinal manuals.[202]

[202] Lupfer, *The Dynamics of Doctrine*, 12–13.

Assessment mechanism as of December 1916
Table 5.23

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

Training structure

1916 saw the German army exert more control over training. The elastic defense in depth was sufficiently different that OHL thought schools were needed to train leaders.[203] Ludendorff also knew senior commanders were the most likely to cling to old methods, especially when it came to fighting rigidly for the front line. He therefore created two schools specifically for general officers and their staffs. He also put a general in charge of the schools, General Otto von Moser. Located at Sedan and Solesmes, these schools ran their first two-week course for 100 officers in February 1917.[204]

Nor were these centralizing efforts limited to defensive doctrine.[205] In October 1916 Ludendorff authorized the formation of assault battalions in every Western Front army. These battalions were not intended for use in battle. Rather, Ludendorff's intent was similar to Falkenhayn's – these units would serve as training centers to facilitate the army-wide transition to assault tactics. To work towards this goal, OHL released a training

[203] These included schools for company and platoon commanders; non-commissioned officers; and specialists of every type. Meyer, "Operational Art and the German Command System in World War I," 351–352.
[204] Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 101–102.
[205] Or to Ludendorff for that matter. In May 1916 Falkenhayn directed every Army on the Western Front to send a cadre to Rohr's assault battalion for initial training. The goal was to recreate Rohr's training battalion in every Army. Samuels, *Command or Control?*, 240–241.

manual for assault units, titled the "Training Manual of the Foot Troops" (*Ausbildungs-vorschrift der Fusstruppen)* in December 1916.[206]

Training structure as of December 1916
Table 5.24

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites	X	

VI. 1917

Assault tactics	Dem
Combined arms	Dem/Yes
Elastic defense in depth	Dem/Yes

Command culture	Mod Decentralized
Assessment mechanism	Yes
Training structure	Centralized

Doctrinally, 1917 was a capstone year for the German army. By April the entire Western Front had been restructured to support an elastic defense in depth. The new defensive network immediately proved its worth, undermining Nivelle's attempt to end the war with a single '*brutal et continus*' assault on Chemin des Dames and nearly knocking France out of the war in the process.[207] Bruchmüller's combined arms doctrine was similarly enshrined

[206] Ibid., 241.
[207] As chapter 7 discusses, although the offensive lasted only days and cost the French a 'mere' 117,000 casualties, the "moral effect on the French army and nation was more important than the casualty list. They had been promised a victory which would drive the Germans out of France and end the war, but, instead, not even the Chemin des Dames Ridge had been captured." Wynne, *If Germany Attacks: The Battle in Depth in the West*, 188. While the German army's elastic defense in depth played a major role in defeating Nivelle's offensive, it was far from the only factor. See chapter 1 for an in depth discussion.

in doctrine. It was demonstrated in striking fashion at Riga in September. Its repetition at Caporetto and Cambrai prove that implementation was complete by year's end. Only assault tactics remained a work in progress, although OHL and front line units continued to make progress on this front. Ultimately, it took the army's demonstration of these tactics and their utility during a major counterattack at Cambrai to convince Ludendorff that his army's assault tactics were ready for widespread implementation.

Political, strategic, and operational situation

The German army suffered from strategic whiplash in 1917. As 1917 began the Germans had no choice but to stay on the defensive.[208] It was fighting a four-front war, with contingents in the West, East, Romania and Italy. The prospects for decisive action on the Western Front were especially dismal. As Ludendorff himself reported in late 1916, the "outlook for the coming year was exceedingly grave. It was certain that in 1917 the Entente would again make a supreme effort, not only to make good its losses, which it was certainly in a position to do, but to add to its strength everywhere and well its superiority in numbers."[209] Economic and industrial trends were also not reassuring. While French manpower was certainly ebbing, the British army had finally arrived in full force; the United States was leaning towards the Entente;[210] Russia was raising new formations; and

[208] Verdun and Somme cost the German army approximately 1 million casualties. Timothy Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917-1918* (London ; New York: Routledge, 1992), 11–12.
[209] Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, 361–362. As of January 1917 Germany had 154 divisions on the Western Front. The Entente had 190. Ibid., v2 Pg 3.
[210] At least in the minds of Germany's top political and military leaders. See Ludendorff, *The General Staff and Its Problems; the History of the Relations Between the High Command and the German Imperial Government as Revealed by Official Documents*, 1920, vol. 1, chap. 4.

industrial trend lines clearly favored Germany's adversaries[211]. If it were possible, Germany's situation seemed even more dire by late spring.[212]

A mere six months later the tables had turned and it was the Entente's turn to shift to the defensive. By year's end Russia was on the verge of collapse, the French army was recovering from mutinies, and the British faced a manpower crisis of its own. To Ludendorff and OHL these events presaged a brief window of opportunity to strike before the Americans arrived in force.[213] Thus, for the first time since Verdun the German high command contemplated a major offensive in the West.

Dependent Variable

Offensive tactics

Although storm troop battalions were actively retraining German soldiers across the Western Front in 1917, the army still lacked an overarching assault doctrine. General Staff officers led the effort to write one. Many of the ideas came from Rohr's earlier work and the *Training Manual of the Foot Troops*. Ironically, defensive operations were also a useful source of information.[214] The elastic defense in depth was based on aggressive small units

[211] It is hard to overstate what industrial capacity meant in terms of combat power in World War I. At Loos (1915) Haig had 233,000 shells to fire at German defenders. At the Somme he had 2.3 million.Wynne, *If Germany Attacks: The Battle in Depth in the West*, 165.

[212] The high command's misguided faith in the unrestricted submarine campaign, combined with the diplomatic debacle that was the Zimmerman Telegram, triggered American intervention in April. Germany's chief ally, Austria-Hungary, began to fall apart. Erich Ludendorff, *The General Staff and Its Problems; the History of the Relations Between the High Command and the German Imperial Government as Revealed by Official Documents*, vol. 2 (New York: E.P. Dutton and company, 1920), v2 42.

[213] Stephen Bull, "The Somme and Beyond," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 251–252.

[214] Balck, *Development of Tactics: World War I*, 61–62; Lupfer, *The Dynamics of Doctrine*, 19; Erich Ludendorff, "Experiences in Flanders and at Lens (Translation of a German Document)," August 22, 1917, Joint Services Command and Staff College Archives, Shrivenham.

independently falling back and counterattacking as the situation requires. Defenders often used assault tactics and techniques when mounting a counterattack. Shock squads dealt with unexpected resistance; emphasized rapid, independent movement; and used loose, flexible formations.

Before adopting assault tactics army-wide, Ludendorff wanted to prove that they worked on a large scale. The army therefore relied heavily on assault tactics to at Riga (on the Eastern Front in September 1917) and Caporetto (on the Italian Front in October 1917).[215] Both attacks were unmitigated successes. However, it was not Cambrai that Ludendorff found the validation he sought.[216]

Cambrai was initially a major British success. Relying on tanks and a Hurricane barrage, British forces quickly penetrated German defenses. In fact, the attack came as such a shock that it took German units ten days to launch a counterattack. Unfortunately for the British, the counterattack was a masterpiece.[217] Like the British attack, the German counterattack started with a Hurricane barrage. Then, advancing behind a creeping barrage, specially trained assault units penetrated the forward most British lines. Infantry squads followed, moving forward in flexible formations and augmented by field guns to knock out any strong points they bypassed. Ultimately, the counterattack succeeded in regaining almost all of the

[215] Gudmundsson, *Stormtroop Tactics*, 139.
[216] Ludendorff, *Ludendorff's Own Story*, *August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, v2 Pg 112; 117–118.
[217] Gudmundsson, *Stormtroop Tactics*, 141–145.

lost territory and creating a minor political crisis in the British high command for good effect.[218]

Offensive Doctrine as of December 1917
(Large-scale demonstration in September 1917)
Table 5.25

Irregular & dispersed formations	Dev
Independent small unit action	Dev
Fire and movement (small unit level)	Dev
Organic firepower	Yes
Bypass resistance	Dev

Combined arms

As discussed above, Bruchmüller's artillery doctrines were actively incorporated into operations on both the Eastern and Western Fronts by the end of 1917.[219] The Hurricane barrage that preceded the counterattack at Cambrai demonstrated the degree to which the concept had matured since Lake Narotsch.[220] In the seven days leading up to the counterattack German gunners emplaced 13 divisions worth of supporting artillery batteries undetected. Without firing a single registration round for accuracy, the guns unleashed an hour-long barrage to neutralize defenders. Moreover, artillery units were fully integrated with their infantry counterparts. Each assault unit was given an artillery battery to provide direct support during the attack. Since this was an exceedingly dangerous assignment (since it meant exposing artillery guns to enemy small arms fire) each battery was given a platoon of engineers (to assist with mobility) and a light machine gun (to suppress enemy infantrymen).

[218] Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 270–273.
[219] Bruchmuller served as the commander of artillery at Riga.
[220] Balck, *Development of Tactics: World War I*, 61–62.

The German army did lag behind its British and French adversaries in one important respect: by 1917 the Germans were the only army on the Western Front without tanks.[221] Nevertheless, it refined its ability to combine arms in other ways, working on anti-tank gunnery, fielding the first German made light machine gun,[222] and incorporating close air support into defensive operations[223]

Combined Arms Doctrine as of December 1917
(Large scale demonstration in September 1917)
(Implementation Fall/Winter 1917)
Table 5.26

Hurricane barrage	Yes
Predicted fire	Yes
Flexible C2	Yes
All arms integration (fire and movement)	Yes*

*Tanks not included

Defensive tactics

The most remarkable aspect of the German army's transition to an elastic defense in depth was the speed with which it was implemented. As Timothy Lupfer points out, when French soldiers 'went over the top' at Chemin des Dames in April 1917 "they faced a German army that in only seven months, despite severe economic and manpower constraints, was organized, trained, equipped, and led according to new defensive principles."[224] Throughout the massive Entente offensives during the first half of 1917, British and French

[221] The A7V was not introduced until 1918. Chapter 8 points out that tanks were not an integral part of combined arms in the First World War. They represented only one way to provide infantry with mobile firepower and, as recent research demonstrates, were not decisive.
[222] The MG08/15
[223] Bidwell and Graham, *Fire-power*, 143.
[224] Lupfer, *The Dynamics of Doctrine*, 11. It is important to keep the years of preceding development and testing preceding this transition in mind. While it may have only taken the German army seven months to write and implement the doctrine, it took nearly two years of development and experimentation before that to make such rapidity possible.

soldiers found themselves fighting their way through a radically transformed defensive system.

The shift to an elastic defense in depth started quickly after Ludendorff's Cambrai Conference on September 8, 1916. One of his first commands as the new Quartermaster General was to begin work on a new line of defenses along the entire Western Front. This new line of defensive structures eventually came to be known as the Hindenburg (or Siegfried line).[225] Built several miles behind existing lines in some places, the entire effort represented OHL's consensus that it was more important to hold defensible terrain than it was to occupy as much ground as possible.[226] German units began falling back to the new positions as early as September 1916.[227] However, large scale withdraws did not take place until early 1917.[228]

As important as the Hindburg/Siegfried line was (not least of all because it tricked Nivelle and Haig into thinking the German army was weakening) it merely facilitated the elastic defense in depth. In fact, after occupying its new position in February 1917 the German First Army realized that their entire sector had been built according to the outdated, pre-elastic defense in depth doctrine.[229] As applied on the Western Front, the elastic defense in depth was actually defined by three core features:

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[225] Neither term is entirely accurate. It was Ludendorff's concept, not Hindenburg's. And the Siegfried line was the German name for only the first section of the line to be built (it ultimately consisted of five zones).Wynne, *If Germany Attacks: The Battle in Depth in the West*, 133–135.
[226] Balck, *Development of Tactics: World War I*, 51–52.
[227] Ludendorff, *The General Staff and Its Problems; the History of the Relations Between the High Command and the German Imperial Government as Revealed by Official Documents*, 1920, 2:365.
[228] Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 96–97.
[229] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 140.

Depth In many sectors, including Passchendaele, German defenses now extended up to 10,000 yards behind the forward most positions.[230] Positions were organized in a three-tiered system of zones.[231] The forward sector was called the outpost zone. Held by small groups of sentries (usually two soldiers per position) the outpost zone's purpose was to give warning and slow an attack. Depending on terrain, the outpost zone extended from 600 meters to 1 kilometer in depth. Fortified strong points were scattered throughout. The second zone, or battle zone, started with a series of trenches located at the rear of the outpost zone. Sentries and support troops garrisoned these trenches. Unlike the outpost zone, this position was expected to hold out against minor attacks, raids and incursions. However, when confronted with a massive assault, the garrison was allowed to 'yield elastically.' The battle zone extended from 1.5 to 3 kilometers in depth and was also littered with strong points, machine gun bunkers, and obstacles. Another set of trenches holding a much larger force of troops was located at the rear of the battle zone. Finally, a rearward zone extended another 3 kilometers. Storm troop battalions and reserve units were prepositioned in the rearward zone, ready to launch large-scale counterattacks to regain lost terrain. Throughout the entire defensive system trench lines were no longer linear or continuous. Moreover, defenders held frontages that would have been unimaginable even a year or two earlier. Under the elastic defense in depth scheme a regiment held a front 1-kilometer wide, and a division 2.5 kilometers. In some areas this

[230] Ibid., 297. For a diagram of German defenses in the Ypres sector in early 1917, see Wytschaete, "Notes on the Construction of Positions on the Ypres Battle Front for the Coming Winter (Translation of a German Document)," May 9, 1917, 2, Joint Services Command and Staff College Archives, Shrivenham.
[231] What follows is from Wynne, *If Germany Attacks: The Battle in Depth in the West*, 152–157; Balck, *Development of Tactics: World War I*, 90–93; Samuels, *Command or Control?*, 180–182.

meant a single man covered 50 meters of ground – a shocking statistic compared to the 1914 average of 1 soldier every 3 meters.

Elasticity Although German defenses extended further than ever before, depth was not really a new concept to the German army. Elasticity was the truly novel element. Elasticity meant that troops in the outer most positions "should not be tied rigidly to one point when they can no longer find cover," and therefore they "may, within certain limits, change their position in order to escape from a very intense bombardment."[232] In practice this meant lines were no longer to be held at all costs.[233] Aside from raids and minor attacks, which could be repulsed in the outpost zone, the elastic defense in depth was designed to intentionally let major assaults into the battle zone itself. Ideally, attackers would

> First encounter resistance from pockets of German survivors in shell holes. Having been concealed from aerial observation, units positioned on the reverse slope would then open fire unexpectedly. The allies would also encounter fortified strongpoints… Placed mostly in the battle zone, they were built to provide for all-around defense and they engaged the attackers, whenever possible, with devastating enfilade fire. The strongpoints would remain fighting even if cut off by he enemy advance.[234]

The trick was to find a way to yield ground without triggering a general retreat. The concept made sense in theory, but in practice there was a lot of room for miscommunication and shirking.[235] Small groups of soldiers fighting independently always had an incentive to defect. Worse yet, it was always possible that units would confuse commands to pull back, leading to a massive, unintended retreat. This dilemma proved a major friction point in the implementation of the elastic defense in depth. Indeed, Lossberg himself criticized the concept of elasticity and refused to yield ground at Passchendaele.

[232] Chief of the General Staff of the Field Army, "S.S. 561," 1.
[233] Samuels, *Command or Control?*, 183.
[234] Lupfer, *The Dynamics of Doctrine*, 15.
[235] Balck, *Development of Tactics: World War I*, 91.

Counterattack Counterattacks were the lynchpin holding the entire scheme together. Ground could only be yielded voluntarily if there was a way to take it back. Otherwise, the Entente's 'bite and hold' attacks would prove devastatingly effective at slowly 'chewing' through even the deepest defensive network. Therefore, the new doctrine called on troops to retake ground at the earliest possible opportunity.[236] In this way the elastic defense in depth assumed an almost offensive nature.[237] To dislodge attackers before they had sufficient time to organize a new defensive perimeter counterattacks had to be delivered as quickly as possible. This meant that units did not have time to ask for permission from higher headquarters. Units down to the squad level were authorized (and equipped) to launch counterattacks. The strong points scattered throughout the defensive network were critical to this end.[238] They harassed enemy attackers and provided shelters for defenders to organize counterattacks.

Defensive Doctrine as of December 1917
(Widespread Implementation as of April 1917)
Table 5.27

Depth	Yes
Elasticity	Yes
Counterattack	Yes

[236] Technically, the doctrine distinguished between immediate counterattacks (attacks mounted within 24 hours by units in the immediate vicinity of a penetration) and deliberate counterattacks (well prepared, mini offensives launched by assault divisions in situations where an immediate counterattack could not be launched within 24 hours.) The distinction was based on the fact that after 24 hours attackers generally had sufficient time to organize a strong defense. Therefore, hasty counterattacks were likely to fail and more preparations – most notably an artillery plan – became necessary.
[237] Lupfer, *The Dynamics of Doctrine*, 19.
[238] Which is why soldiers occupying strong points were not allowed to fall back under any circumstances

Independent Variables

Command culture

The German army remained moderately decentralized throughout 1917. At the lowest levels, both elasticity and counterattacks depended on small unit leadership and initiative to work. Similarly, the new defensive doctrine required that flexibility be built into higher levels of command as well. To limit the amount of time needed to mount a larger counterattack, front line battalion commanders were allowed to coordinate directly with division headquarters (thereby bypassing their regimental and brigade staffs entirely) when they deemed it necessary. Moreover, front line commanders at every level were given total control over all forces in their sector.

At the same time, autonomy and authority were far from unlimited. While OHL and Ludendorff tolerated an open debate over elasticity, they also punished commanders who refused to implement the new doctrine. As is discussed below, training standards were also increased significantly to ensure compliance at all levels. Initiative required sound judgment. While schools and training programs were established for non-commissioned officers, Ludendorff recognized that senior officers were the most likely source of resistance, and so schools were set up for them as well.

Command culture as of December 1917
Table 5.28

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

Assessment mechanism

OHL and the General Staff continued to assess and refine the elastic defense in depth throughout 1917. The most important adjustments were in response to the British army's new 'bite and hold' attacks at Passchendaele.[239] OHL released a number of updates and amendments over the course of 1917 and early 1918.[240] Additionally, the staff spent much of the latter half of 1917 finalizing and writing the army's new assault doctrine.

Given the degree to which Ludendorff 'looms' over doctrinal development (and indeed, much of German policy, diplomacy, and strategy) it is also worth pointing out that OHL and the General Staff did not simply serve as his mouthpiece. In reality, the General Staff fostered active doctrinal debates. None were as heated as the one between Lossberg and Ludendorff over elasticity. Lossberg disagreed with the entire idea. In his mind the defensive battle needed to be fought in the front lines, not within the battle zone. Depth was a way to prevent penetrations from turning into breakthroughs.

The important point is that Ludendorff and OHL allowed Lossberg to write about his dissenting views. In fact, they actually circulated his memo around the army.[241] Ludendorff

[239] Bite and hold attacks were characterized by their shallow objectives, which ensured that they did neither progress beyond their artillery's maximum range nor occupied dangerously overextended positions. Both factors made counterattacks harder to mount.

[240] Changes included shifting forces forward such that units did not have to waste time calling for reinforcements before launching a counterattack; more effective coordination with artillery units; and reiterating that the forward zone was still a part of the defense and still needed to be defended before troops were allowed to withdraw. Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, v2 102–103; Erich Ludendorff, "German Principles of Elastic Defence (Translation of a German Document)," August 30, 1917, Joint Services Command and Staff College Archives, Shrivenham.

[241] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 288–290. See Below, "Experience Gained from the September Offensives on the Fronts of the Sixth and Third Armies (Translation of a German Document)," July 1917, Imperial War Museum.

incorporated many of Lossberg's views into updates to the army's defensive doctrine. He recognized that the defensive fight would have to be waged both for and within the front lines, thereby accepting Lossberg's preference that more troops needed to be stationed in the outpost zone and that they should not immediately withdraw at the first signs of a pending attack.[242]

Assessment mechanism as of December 1917
Table 5.29

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

Training structure

Training remained centralized in the German army. Given the number of senior commanders who clearly did not understand (or who refused to implement) the elastic defense in depth's basic principles,[243] Ludendorff continued to send commanders and staffs to formal schools near the front.[244] More important, as the year drew to a close OHL organized training centers to retrain units on the forthcoming assault tactics. As early as Christmas 1917 Ludendorff started pulling units out of the front lines to attend a month long course at either Sedan or Valenciennes.[245] He also directed the creation of yet another commander's school in Solems. This school focused on preparing generals and their staffs to execute the new assault doctrine. The school even had an entire infantry division at its disposal to facilitate realistic training for high-level staffs.[246]

[242] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 302; Chief of the General Staff of the Field Army, "S.S. 561," 8.
[243] As was the case at Verdun in December 1916, units at Arras in 1917 almost gave way to a British breakthrough after commanders positioned too many troops in the front lines, thereby exposing them to the bulk of the 20 day, 2.6 million shell preparatory barrage. Lupfer, *The Dynamics of Doctrine*, 29–30.
[244] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 184–185.
[245] Herwig, "The Dynamics of Necessity: German Military Policy During the First World War," 101–102.
[246] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 162.

Training structure as of December 1917
Table 5.30

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites	X	

VII. 1918

Assault tactics	Yes
Combined arms	Yes
Elastic defense in depth	Yes

Command culture	Mod. Decentralized
Assessment mechanism	Yes
Training structure	Centralized

By March 1918 the German army had an optimal doctrine. It was the first and only army in the First World War to completely adopt assault tactics, combined arms, and an elastic defense in depth. To be sure, not every unit demonstrated the same degree of proficiency executing these doctrines. This was most apparent with assault tactics. OHL lacked the time and resources to retrain all of its 192 Western Front divisions in time for the Spring offensive.[247] Nevertheless, German operations in 1918 demonstrated a greater degree of doctrinal uniformity than those of its adversaries. More important, German units went into action armed with a doctrine that we now know to have been the most effective and

[247] The key is that this reflected a calculated risk. Given finite resources and time, OHL traded quantity for quality. We should keep in mind that it did manage to retrain 70 divisions in approximately three months – a monumental accomplishment for any army in peace, let alone in the middle of a global war.

efficient one possible. The ultimate irony is that doctrinal perfection led the German army to strategic defeat. Chapter 8 addresses why and how.

This section departs from the rest of chapter 5's format because of the German army's unique situation in 1918. Doctrinally, only its assault tactics changed to a significant degree. Organizationally, its command culture remained moderately decentralized, its training structure centralized, and its assessment mechanism continued to function (at least it did until the Entente counter-offensive beginning in July 1918. After that point doctrinal optimization was the least of the German army's concerns). For these reasons this section does not address combined arms (beyond its use in the March offensives), the elastic defense in depth, command culture, or assessment mechanisms. Although the German army's training structure did not change, the fact that it helped Ludendorff retrain 70 divisions in four months warrants mention.

Political, strategic, and operational situation

If 1917 started with setbacks and ended with opportunity, 1918 was the opposite. As mentioned, OHL and Ludendorff recognized that Germany would have a rare strategic opportunity in early 1918.[248] Russia was out of the war. France was still recovering from Nivelle's offensive and the ensuing mutinies. Moreover, although Britain had reached peak strength, American forces would not arrive in strength until late spring. Quantitatively, these factors meant that for a brief period German forces would enjoy numeric superiority

[248] Ludendorff, *Ludendorff's Own Story*, *August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, v2 158–167.

on the Western Front. Qualitatively, after Riga, Caporetto, and Cambrai, Ludendorff believed his army had the solution to stalemate. Thus, he decided it was time to attack.[249]

Ludendorff launched his offensive on March 21st, 1918.[250] It was, at least initially, a major success. Assault units advanced 1,500 meters in the first 80 minutes. By March 22nd they had captured 140 square miles,[251] inflicting 300,000 casualties on the Entente by the end of April.[252]

Yet success paved the way for defeat. The army lost nearly 1.5 million soldiers in three months of fighting.[253] By June logistical failures,[254] compounded by Ludendorff's decision not to set a strategic objective, forced the Germans back to the defensive. Under constant attack by the Entente (led by the British army) the German army lacked the time, resources and manpower to reconstitute its elastic defense in depth. July brought with it the Allied counter-offensive, which ultimately ended the war.[255] The same German army that started

[249] Ludendorff actually made the decision to mount a war-ending offensive on November 11, 1917. Lupfer, *The Dynamics of Doctrine*, 37.
[250] The initial attack was code named Operation Michael. Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012).
[251] Compare this to Entente operations on the Somme, where a combined British and French force lost nearly a million men to capture less than 100 square miles of ground. Lupfer, *The Dynamics of Doctrine*, 50.
[252] Ferdinand Foch, *The Memoirs of Marshal Foch* (Garden City, N.Y: Doubleday, Doran and Company, incorporated, 1931), 303.
[253] 760,000 were casualties (420,000 killed and over 340,000 wounded). Another 750,000 deserted. Travers, *How the War Was Won*, 154.
[254] Some German soldiers, even those in elite storm troop units, refused to press the attack after conquering British food and supply depots.
[255] For a detailed discussion of the so-called Last Hundred Days, see Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012). See also Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, chap. 20.

1918 with 190 infantry divisions had 98 on August 1st; 47 on September 1st; 14 by October 15th; and 4 on November 11th.[256]

Dependent Variable

Offensive tactics

Written in 1917's final months, OHL published its definitive assault doctrine on published on January 1, 1918. Ludendorff's used the manual, titled *The Attack in Position Warfare*, as the basis for his spring offensives. The 'new' doctrine was not very new at all. It mostly reiterated concepts espoused by Captain Rohr as early as 1916 and implemented on a large scale at Riga, Caporetto and the Cambrai counteroffensive. The goal was to disrupt the enemy defensive network, not destroy it. Surprise, speed, firepower and flexibility were the means.

Conceptually, the emphasis on surprise, speed, and flexibility had a number of practical implications.[257] Disruption meant knocking out enemy command posts and artillery positions so the defense could no longer rely on its two most powerful assets: reinforcements and artillery barrages. Since command posts and artillery units were located deep behind the front lines assault units needed the autonomy and firepower to exploit weak points. This required surprise, which was easier to achieve since the artillery barrage did not need to try to destroy everything in its path and the initial assault units did

[256] Travers, *How the War Was Won*, 154.
[257] What follows is taken from "German Methods in the Attack, and Indications of an Offensive," February 16, 1918, Joint Services Command and Staff College Archives, Shrivenham; Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, v2 201 – 205; Samuels, *Command or Control?*, 241–244; Lupfer, *The Dynamics of Doctrine*, 43; Stephen Bull, "The Somme and Beyond," 252–253; Foch, *The Memoirs of Marshal Foch*, 248–249.

not need to be so large that their movements were easily detected. It also meant giving every small unit as much firepower as they could carry: light machine guns, flame throwers, and hand grenades. Each became an all-arms team in miniature. It also meant training these units to bypass strong points; to use flexible formations; and to maneuver towards their objectives without halting to make contact with commanders or other units.[258]

Offensive Doctrine as of November 1918
(Widespread Implementation as of March 1918)
Table 5.31

Irregular & dispersed formations	Yes
Independent small unit action	Yes
Fire and movement (small unit level)	Yes
Organic firepower	Yes
Bypass resistance	Yes

Independent Variables

Training structure

Ludendorff was explicit about his long-term ambition: he wanted to model the entire army around the assault battalion concept.[259] To this end OHL directed that a copy of *The Attack in Position Warfare* be issued to every officer down to the battalion level. An updated *Training Manual of the Foot Troops* was released on the same day. [260] The problem was that he lacked the time and resources to transform the entire army before the spring. Troop quality was a major constraint. By 1918 the German army had finally started to run out of men. It necessarily resorted to drafting men previously deemed unfit, to include older men,

[258] Erich Ludendorff, "Notes on the Offensive Battle (Translation of a German Document)," January 25, 1918, Joint Services Command and Staff College Archives, Shrivenham.
[259] Drury, "German Stormtrooper," 30–31 &37.
[260] Although the new training manual contained very little that was new, "it did serve, nevertheless, an important doctrinal function – it legitimized and systematized what had been going on at the front for nearly two years." Gudmundsson, *Stormtroop Tactics*, 148.

and recently convalesced soldiers. This compounded the problem – many of these 'new' soldiers were no physically capable of fighting in accordance with the new doctrine. The solution was to institute a tiered system. Younger, healthier soldiers would be consolidated in first line assault divisions. Everyone else would be placed in second line, 'trench' divisions.[261]

These manpower and resource constraints should not obscure what the German army accomplished between December 1917 and March 1918. In a little over three months Ludendorff managed to restructure and rotate nearly 70 infantry divisions through month long assault training centers. *This was equivalent to retraining the entire British army in France*.[262] And the Germans did it while maintaining an elastic defense in depth along the entire Western Front.

In the final analysis, the German army could not have retrained over 1/3rd of its Western Front divisions in 120 days were it not for the fact that it already possessed a highly centralized training system. Ludendorff and OHL had experience running large training centers. They had both the infrastructure and the standard operating procedures in place to rapidly undertake a doctrinal shift. What the schools taught was less important than the fact that they existed in the first place, and that they were subject to tight control in the second. Finally, these schools pertained to all ranks. Although front line soldiers had to

[261] Travers and Griffith argue that German units regularly used outdated wave tactics during the Spring offensives. This is not surprising, since roughly 120 of the 192 Western Front divisions were not trained on assault tactics. See Travers, *How the War Was Won*, 88–89; Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916-18* (New Haven: Yale University Press, 1994).
[262] Samuels, *Command or Control?*, 245–246.

know how to apply the principles, Ludendorff knew that the real obstacle to doctrinal change usually came from generals and their staffs – career officers with personal or principled reasons for resisting change.[263] For this reason, OHL insisted that division commanders attend training just like their soldiers.[264]

Training structure as of December 1918
Table 5.32

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites	X	

VIII. Concluding thoughts

The German army's experience on the Western Front offers compelling evidence to support CAT theory. The theory's independent variables – the German army's command culture, assessment mechanisms, and training structure – operated as predicted. The German army started the war with a moderately centralized command culture, a highly effective assessment mechanism, and a moderately centralized training structure. As the war progressed, its command culture grew slightly more decentralized while it consolidated control over training. The army's tactical doctrine evolved towards the optimal solution as

[263] Ludendorff, *Ludendorff's Own Story, August 1914-November 1918; the Great War from the Siege of Liège to the Signing of the Armistice as Viewed from the Grand Headquarters of the German Army*, v2 209.
[264] Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York: Cambridge University Press, 2011), 111.

this occurred. At no point during the war did the German army optimize its doctrine before the key independent variables were in place.

The evidence presented also suggests that this was not just a case of spurious correlation. Rather, the German army optimized *because* it developed a moderately decentralized command culture; possessed an advanced assessment mechanism; and arranged training hierarchically. Front line units experimented. Senior leaders were receptive to input from increasingly junior officers. The General Staff collected, analyzed, and selected the best ideas for further testing. This was especially evident in the case of the army's work on storm troop tactics, but it also played out with combined arms and the elastic defense in depth. And the army was able to rapidly transmit its new tactical doctrines, no matter how radical, through an efficient, top-down approach to training.

Finally, the evidence does not suggest that other factors were responsible for doctrinal optimization. Chapter 8 deals with several important alternative explanations in detail. For now it suffices to say that the most common explanations do not stand up to scrutiny. Defeat (or prospective defeat) did not inspire innovation. Furthermore, Ludendorff's decision to employ them during the March 1918 offensives – like his decision to mount an offensive in the first place – was not a Hail Mary pass based on hope and a prayer. Rather, it reflected rational analysis and the reasonable belief that a system, under development since 1915, and recently used to great effect, was ready for large-scale implementation. The story behind the elastic defense in depth and combined arms is similar.

Nor were these innovations the work of one man (be that Hutier, Rohr, Geyer, Bruchmüller, Ludendorff, or any other individual). They reflected a collective effort made possible through effective organizational dynamics, not individual genius. It is telling that Falkenhayn - not Ludendorff - supported early work on storm troop tactics, even after early setbacks in 1915 and 1916. Were it not for his advocacy, and the work of other junior and senior officers, these ideas would not have been ready for Ludendorff to implement them in 1917 and 1918.

Most clearly, none of these ideas were the product of civilian intervention. Details mattered and seemingly minor differences had a major impact on the battlefield. As chapter 6 describes, the British learned this lesson when they tried to employ an elastic defense in depth in early 1918. Civilian leaders simply lacked the expertise and access to information to enforce these kinds of changes. There is no evidence that any even tried. And unlike the British army, there were no Winston Churchill-like figures to put political pressure on the army to try different tactics (a statement that presumes pressure alone translates into the kind of methodical search, analysis, and implementation needed to optimize tactical doctrine.)

Of course, the British did have Winston Churchill. And unlike the German army, the British Expeditionary Force was firmly under civilian control. For these reasons it is now worth exploring their experiences on the Western Front in detail.

Chapter 6

The British Army on the Western Front

"We say, after our way, that our rivals [the Germans] area a nation of well-trained mediocrity. Could there be a more formidable thing? We say that Germany has, indeed, vast numbers of males, but no *men*. The land of Luther, Frederick, Stern, and Brunswick has never in modern time lacked personalities equal to her crisis. But genius is not necessary any more than it was in Japan during the late war. It is the system that matters. It is the mass of well-trained mediocrity that turns the scale. It is the best machine that wins."[1]

I. Overview

The standard narrative about the British Expeditionary Force (BEF) on the Western Front is one of 'lions led by donkeys.'[2] Dogmatic generals ordered brave soldiers to their deaths *en masse* in a grotesque rendition of 'if at first you don't succeed, try, try, try again.'[3]

Ingrained though it may be, this account is wrong.[4] While the British lagged behind its German adversary and French ally for much of the war, the gap was never large. By war's end the British were converging on the optimal doctrine, although the transition remained incomplete. Thus, the real story is one of learning and belated progress, not gross

[1] Colonel Haldane, quoting an anonymous writer, while advocating for greater uniformity in training standards at the 1909 General Staff Conference. "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909" (The War Office, 1909), 61–62, Joint Services Command and Staff College Archives, Shrivenham.
[2] While this phrase predates the First World War, it is now often associated with British performance on the Western Front. It also inspired the title of Alan Clark's *The Donkeys.* See Alan Clark, *The Donkeys* (New York: Morrow, 1962).
[3] That Sir Douglas Haig proclaimed "this war has given us no new principles" in his final dispatch as the British Expeditionary Force's Commander in Chief helps explain why this myth has proven so enduring. Douglas Haig, *Sir Douglas Haig's Despatches (December 1915-April 1919)* (London, Toronto, New York: J.M. Dent & Sons Ltd.; E.P. Dutton & Co, 1919), 330.
[4] A 'new' historiography makes the case. See Shelford Bidwell and Dominick Graham, *Fire-power: British Army Weapons and Theories of War, 1904-1945* (London: Allen & Unwin, 1982); Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916-18* (New Haven: Yale University Press, 1994); M. A. Ramsay, *Command and Cohesion: The Citizen Soldier and Minor Tactics in the British Army, 1870-1918* (Westport, CT: Praeger, 2002); Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012); Andy Simpson, *Directing Operations: British Corps Command on the Western Front 1914-18* (Stroud, U.K.: Spellmount, 2006).

negligence and failure. British soldiers were as brave as their French and German counterparts, and their officers were aware of the tactical challenges they faced.

This case offers proof to support CAT theory.[5] The British army's culture and structure were not ossified, and changed throughout the war. In terms of command culture, the army started with a moderately centralized command culture. However, senior British officers resisted granting autonomy and, in 1915 and 1916, consolidated authority in the hands of a select few. The centralization of command discouraged experimentation and isolated the high command from new ideas. The army also lacked an assessment for the war's first two years.

Things started to change in the war's second half. Tactical imperatives forced senior commanders to delegate authority and encourage initiative. Similarly, an assessment mechanism came into being after 1917. Housed in GHQ's newly created Training Directorate helped the army update its doctrine. However, the war ended before implementation was complete. The army had the right concepts in place. Its tactics were as advanced as anything developed by the Germans. But they were not well transmitted across the entire organization, in large part because the army's training structured remained decentralized until very end of the war.

[5] Aside from offering proof that supports CAT theory, this case also useful because it suggests that command cultures can change. And they can do so in unexpected ways and in the midst of a war. For those who are familiar with the German army, it is not necessarily surprising that it responded to tactical stalemate by decentralizing authority. The British army lacked the same proclivity and so it is worth paying close attention to how its command culture evolved throughout the war.

Analytic challenges

Three factors make it hard to isolate the structural and cultural sources of British optimization. First, the British army had to expand more than the French or German armies. In 1914 it was not ready to fight a prolonged war on a global scale. It sent six infantry divisions to France, drawn from a small, professional army of long service volunteers. [6] By 1917 the British had 62 infantry divisions on the Western Front alone, drawn from a conscripted mass of 9 million men under arms.[7] The unprecedented size and unparalleled speed of this growth is an important confounding variable, as managing expansion diverted time, energy, and resources.[8]

Second, historians do not agree about the degree to which the British mastered the optimal doctrine.[9] Alan Clark, T.H.E. Travers and Martin Samuels take a critical stance on this question, arguing that the British did a poor job of learning and adapting on the Western Front.[10] Others, take the opposite extreme, asserting that the British were as innovative

[6] It is important to point out that fully 60% were reservists. This fact undercuts another popular misconception – one of an early BEF made of 'Old Contemptibles.' It also demonstrates the degree to which manpower considerations were at odds with strategic requirements. The only way the British government could meet its Continental commitment was to raise a force of dominated by second-line soldiers. Hew Strachan, *The First World War: Volume I: To Arms (First World War*, New Ed (Oxford University Press, USA, 2003), 200.

[7] This represents roughly a ten-fold increase. At war's end the British had more soldiers than France. While Germany had more (approximately 11 million) it only had to grow 2.5 times its prewar size to accomplish this number.

[8] This is not to say that France and Germany did not also have to wrestle with expansion. It is only to suggest that Britain's experience was of a different magnitude – a fact that must be taken seriously when explaining its path to doctrinal optimization.

[9] For a recent review of the historiography surrounding this debate, see Boff, *Winning and Losing on the Western Front*, 10–21.

[10] The basic critique being that instead of learning, the British high command – personified in Haig – insisted on repeatedly using old techniques on an ever-larger scale. See T. Travers, "Learning and Decision-Making on the Western Front, 1915-1916: The British Example," *Canadian Journal of History* 18, no. 1 (1983); Tim Travers, "A Particular Style of Command: Haig and GHQ, 1916–18," *Journal of Strategic Studies* 10, no. 3 (September 1987): 363–376; Martin Samuels, *Doctrine and Dogma: German and British Infantry Tactics in the First World War*, Contributions in Military Studies no. 121 (New York: Greenwood Press, 1992); Clark, *The Donkeys*. For his part, Haig's memoirs and "Final Despatch" do little to refute this accusation. From the sub-section entitled "The value of

and competent as the German army.[11] Paddy Griffith is one of the most vociferous proponent of this view.[12] Most historians fall between these extremes. While they diverge on specifics, historians in this 'middle ground' suggest that the British army learned, adapted and innovated (especially after 1916), but that learning remained uneven across the army. Shelford Bidwell and Dominick Graham's *Fire-power* was pioneering in this regard.[13] Recent work by M.A. Ramsay, Jonathan Boff, Paul Kennedy and Gary Sheffield echo a similar view.[14] This chapter adopts this 'middle view,' recognizing the British army's tremendous advances without ignoring the incomplete nature of its transition.

Third, the British army's command culture evolved in a counterintuitive way during the war. Renowned for its decentralization before the war, it quickly developed a reputation for being highly centralized once the fighting started. Almost everything was controlled from the top.[15] The army's hierarchical nature surprises many given Edwardian individualism.[16] Nevertheless, the army had a different culture than the society it served, and it was not until late in the war that the army started delegating autonomy and authority.

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cavalry in modern warfare" to quotable excerpts such as "This war has given no new principles" and "The rapid collapse of Germany's military powers in the latter half of 1918 was the logical outcome of the fighting of the previous two years. It would not have taken place but for that period of ceaseless attrition which used up the reserves of the German Armies… It is in the great battles of 1916 and 1917 that we have to seek for the secret of our victory in 1918." Haig, *Sir Douglas Haig's Despatches (December 1915-April 1919)*, 311–362.

[11] Andy Simpson refers to this as the 'learning curve' historiography. Simpson, *Directing Operations*.

[12] Griffith, *Battle Tactics of the Western Front*. For a concise yet compelling critique of Griffith, see Hew Strachan, "The First World War," *The Historical Journal* 43, no. 3 (2000): 900–903.

[13] Their core thesis is that the British army mastered artillery techniques and that when applied under favorable conditions these allowed the British to fight more effectively than the Germans. Bidwell and Graham, *Fire-power*.

[14] Boff, *Winning and Losing on the Western Front*; Ramsay, *Command and Cohesion*; Paul Kennedy, "Britain in the First World War," in *Military Effectiveness*, vol. I, 3 vols. (Boston: Allen & Unwin, 1988), 31–79.

[15] On the battlefield at least. Training remained decentralized for much of the war.

[16] See G. D. Sheffield, *Leadership in the Trenches: Officer-man Relations, Morale and Discipline in the British Army in the Era of the First World War*, Studies in Military and Strategic History (New York: St. Martin's Press in association with King's College, London, 2000).

The foregoing issues complicate causal analysis, because the army's internal challenges may have over-determined the outcome. Unprepared for mass mobilization, the army had no choice but to look inward to manage its radical expansion.[17] Although it is impossible to quantify how much growth cost the British army in terms of doctrinal learning, it is safe to say that a trade-off occurred.

While over-determination makes it hard measure causal relationships precisely, it does not mean no such relationship exists. As this chapter endeavors to show, the core relationship between doctrinal optimization and its determinants – command culture, assessment mechanisms and training structures – was still at play, even if other facts obscure and confound its presence. We still see the British army stagnate when it centralized control over battlefield decision-making in the war's first years. Experimentation was limited through much of the war since commanders below the division level were rarely trusted to make their own decisions.[18] Even when the army started to delegate control, the decentralized training system made it hard to disseminate and enforce new practices. Finally, because the British General Staff system was new (having only been created in

[17] Simon Robbins, *British Generalship on the Western Front 1914-18: Defeat into Victory*, Cass Series--military History and Policy (London ; New York: F. Cass, 2005), 18.This is an analytic claim, not a normative one. Whether or not the British army (and its government and people for that matter) should have been better prepared is another matter entirely. Given that this was not the first time Britain's defense apparatus was ill-prepared to expand in support of major contingencies – the Napoleonic, Crimean, and Boer wars all occurred within the past 100 years – is another matter entirely.

[18] It is more accurate to say that they were often not even with their men in battle, since the command and control system evolved such that company commanders and above were required to stay in telephonic contact with their higher headquarters – an edict that, due to the technological limitations of the day, meant commanders at levels where we might first suspect autonomy were forced to stay at their command post.

1904);[19] and because it was preoccupied with expansion and transformation for much of the war; it was never able match the German General Staff.

II. Prewar

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Mod Centralized
Assessment mechanism	No
Training structure	Decentralized

Political, strategic, and operational situation

The British army's faced an intractable strategic situation before the war: Its requirements exceeded its resources.[20] Three irreconcilable tasks pulled the army in different directions before the war.[21] First, a colonial mission meant it had to garrison a far-flung colonial empire. Second, a continental mission to assist France and Russia meant it needed to organize a force ready to fight other Great Powers. Third, a home defense mission meant it had to protect a population that, ironically, feared standing armies almost as much as it did invading ones.[22]

[19] David French and Brian Holden Reid, *The British General Staff: Reform and Innovation c. 1890-1939* (Psychology Press, 2002), 33; Harold R. Winton, *To Change an Army: General Sir John Burnett-Stuart and British Armored Doctrine, 1927-1938*, Modern War Studies (Lawrence, KS: University Press of Kansas, 1988), 11.
[20] This is of course true of all organizations. Nevertheless, as I will argue, the British army's dilemma was uniquely pernicious.
[21] For brief overviews see Strachan, *The First World War*, 2003, chap. 1; Michael Carver, *Britain's Army in the Twentieth Century* (London: Macmillan in association with the Imperial War Museum, 1998), chap. 1. For an in depth discussion as it pertains to military planning, see rench and Reid, *The British General Staff*, chap. 1–8. For a discussion of the historical antecedents, see Hew Strachan, *Wellington's Legacy: The Reform of the British Army, 1830-54* (Manchester, UK: Manchester University Press, 1984).
[22] This is an important issue insofar as it helps to demonstrate the Schlieffen Plan's lack of political foresight. The British took the threat of an amphibious invasion originating from the Low Countries seriously. As late as 1912 they organized major combined exercises simulating counter-invasion operations. Minitstry of Militia and Defence, "British and French Manoeuvres, 1912" (C.H. Parmelee, 1913), Z190, Joint Services Command and Staff College

For most of the prewar era, the colonial mission dominated the other two. This kept the army small.[23] Mass conscription was incompatible with colonial duty. It took years to train and deploy a unit to one of Britain's distant holdings. Therefore, instead of adopting the French and German model the British relied on a small cadre of long serving professionals.[24]

The army's Continental commitment played second fiddle, even after the mismanaged Second Boer War (1899 – 1902) helped lead to a standing expeditionary force.[25] In many respects, this was because domestic and economic constraints (real and imagined) hamstrung the army's ability to coherently man, equip, and train such a force. [26] It was not until 1911 that the BEF was finally fixed in size[27] and function.[28]

Archives, Shrivenham. Securing the Belgian coast (both to eliminate the threat of an invasion force and to clear the U-boat bases) remained a key goal throughout the war, as did maintaining some semblance of home defense force throughout the war.

[23] These included geography, domestic politics, bureaucratic structure, and threat perception. Winton, *To Change an Army*, 8. There were also budgetary considerations. As Hew Strachan frames it "after 1815 the empire became the army's raison d'etre. Here lay the likelihood of immediate employment, and therefore here too lay the argument for attracting parliamentary funds." Strachan, *Wellington's Legacy*, 268.

[24] The definition of "long service" changed during the late 19th century. Before 1847 British soldiers enlisted for 20 years. Between 1847 and 1868, manpower shortages led the army to reduce this commitment to 10-12 years. In 1870, as part of the Cardwell reforms, British soldiers enlisted for a minimum of seven years. Those who preferred to stay for 20 could, while the rest were ushered into the reserves.

[25] An entire series of reforms – the so-called Haldane reforms – aimed to redress the army's perceived shortcomings in Africa. These included abolishing the post of Commander-in-Chief; and creating a new Imperial General Staff; reorganizing (and somewhat professionalizing) the reserves;

[26] Aaron L. Friedberg, *The Weary Titan: Britain and the Experience of Relative Decline, 1895-1905* (Princeton, N.J: Princeton University Press, 1988); G. C. Peden, *Arms, Economics and British Strategy: From Dreadnoughts to Hyrdrogen Bombs*, Cambridge Military Histories (Cambridge: Cambridge University Press, 2007), chap. 1.

[27] Six divisions and one cavalry brigade John Strawson, *Gentlemen in Khaki and Camouflage: The British Army 1890-2008* (Barnsley, UK: Pen & Sword Military, 2009), 88–89.

[28] The function was to land in France in the event of a general European conflict The BEF was created to give Britain a standing expeditionary force for global deployment. It was not initially conceived of as Britain's contingency force for a Continental war. In fact, for many years British leaders assumed the BEF would be used in a conflict against Russia – not on her behalf. Hew Strachan, "The British Army, Its General Staff and the Continental Commitment, 1904-14," in *British General Staff: Reform and Innovation*, ed. David French and Brian Holden Reid, 1st ed. (Routledge, 2002), 76–77.

Cumulative, these missions and constraints meant the British army was unprepared to fight a long campaign on the continent.[29] This explains why Britain mobilized an army of craftsmen to wage a war of machines.

Dependent Variable

As was the case in the German army, British prewar tactical doctrine was shaped by the firepower versus shock power debate. As was the case in the German army, most British officers knew linear formations were obsolete.[30] And as was the case in the German army, they could not agree on the tactical system to replace them. The difference was that the British had firsthand experience fighting a war under modern conditions.

Indeed, the Second Boer War (1899-1902) triggered a heated debate within the British army, not least because it took three years, 400,000 soldiers, and the might of entire empire to subdue Dutch farmers.[31] [32] To quote a German observer:

> The spectacle of a small race of peasants and herdsmen, whose total numbers fall short of the population of towns like Munich or Cologne, maintaining a war for nearly three years against the first

[29] Robbins, *British Generalship on the Western Front 1914-18*, 18.
[30] Anthony Clayton, *The British Officer: Leading the Army from 1660 to the Present*, 1st ed (Harlow, England ; New York: Pearson Longman, 2006), 100; Ramsay, *Command and Cohesion*, 23 – 77.
[31] Griffith, *Battle Tactics of the Western Front*, 48; Winton, *To Change an Army*, 10–11; T. H. E. Travers, "The Offensive and the Problem of Innovation in British Military Thought 1870-1915," *Journal of Contemporary History* 13, no. 3 (July 1, 1978): 537.
[32] The British government estimated that the Boers started the war with approximately 65,000 combatants. Howard Vincent, "The Situation in South Africa: Further Personal Observations and Impressions; Being a Continuation of the Special Address of April, 1900, and Subsequent Discussion," *The Journal of the Royal United Service Institution* XLVI, no. 288 (February 1902): 141–206. For estimates on the total size of British forces, see Halik Kochanski, "Planning for War in the Final Years of Pax Britannica, 1889-1903," in *The British General Staff: Reform and Innovation c. 1890-1939*, ed. David French and Brian Holden Reid, Cass Series--military History and Policy 10 (London ; Portland, OR: F. Cass, 2002), 22–23; Strawson, *Gentlemen in Khaki and Camouflage*, 62&71.

> Power in the world, and compelling that Power to put forth the most extraordinary efforts to bring the war to a successful conclusion, is a matter which calls for earnest consideration.[33]

And consider the British did – a slew of official inquiries and reforms followed.[34] So too did the first doctrinal manuals, including the *Field Service Regulations* (FSR) and *Infantry Training* manuals. "A landmark in British military thinking, the FSR were intended to provide officers with precise instructions designed to meet every wartime contingency that could be imagined."[35] Between the Boer and First World Wars the army published three Infantry Training manuals – 1902, 1911, and 1914 – and two FSR – 1909 and 1912. Collectively, these documents capture how the British army thought about war.

Offensive tactics

Debate and change The debate centered around how infantry should close the final 1000 yards when attacking well-armed defenders. [36][37] Shock power advocates defended the status quo, or what they called 'normal tactics.'[38] Like their German counterparts, British shock power advocates knew that modern weapons create a storm of steel, and that dense

[33] Colmar Von Der Goltz, "What Can We Learn from the Boer War?," *The Journal of the Royal United Service Institution* XLVI, no. 298 (December 1902): 1533–1539.
[34] With respect to tactical doctrine, the most important of these were the Elgin Committee, which investigated the army's shortcomings in the Boer War, and the Esher Report, which led to the creation of a General Staff. See French and Reid, *The British General Staff*.
[35] Ramsay, *Command and Cohesion*, 98.
[36] Travers, "The Offensive and the Problem of Innovation in British Military Thought 1870-1915," 542; Bidwell and Graham, *Fire-power*, 51–57; Martin Samuels, *Command or Control?: Command, Training, and Tactics in the British and German Armies, 1888-1918* (London ; Portland, OR: Frank Cass, 1995), 102. For examples of this debate at the highest echelons, see the Reports on the Conference of General Staff Officers of the Staff College from 1908, 1909, 1910, 1911, 1912, 1913, and 1914.
[37] This was not an arbitrary distance. Based on observations from the Franco-Prussian and Boer Wars, British tacticians agreed that volley fire from entrenched infantrymen became decisive at these distances. For example, during the infamous 'Black Week' of 10 – 17 December 1899 British attackers found themselves pinned down by accurate rifle fire at 1,000 yards. Ramsay, *Command and Cohesion*, 28–29; 80–81; 87.
[38] Advocates of shock tactics deliberately used the term 'normal tactics' to rhetorically cast alternative tactical schemes as abnormal. General Sir Launcelot Kiggell, who served as Chief of the General Staff under General Haig during much of the First World War was a leading proponent of normal tactics in the prewar period. For an example of this kind of argument, see See F.N. Maude, "Continental Versus South African Tactics: A Comparison and Reply to Some Critics," *The Journal of the Royal United Services Institution* XLVI, no. 289 (March 1902): 318–354.

formations invited heavier casualties. However, they accepted the risk for two reasons. First, density maintained speed, which limited exposure to enemy fire. Second, density subjected men to peer pressure. Groups could be induced forward against withering fire in a way individuals could not.

In contrast, firepower advocates argued that infantry needed to spread out and carry their own lightweight, rapid-fire weapons to survive on a modern battlefield.[39] Like firepower advocates in the German army, British firepower proponents called for 'swarm' formations – groups of soldiers that made their own way toward a common objective. For their part, they knew dispersion slowed an attack down. However, they disagreed that higher casualties would result from a slow attack, since swarm formations allowed men to take advantage of the ground for protection.

As a brief, but important aside: The First World War rather decisively proved the firepower advocates right. Individual soldiers – even short service conscripts – could be trained to attack in loose formations.[40] The psychological benefits of mass formations did not offset their grotesquely excessive manpower costs. Yet this does not mean that shock power proponents were blind to the obvious or given over to a 'cult of the offensive.' Their views were not based on blind articles of faith or a negligent lack of reason, as the pejorative term 'cult' implies.[41] Even if the language they used (morale, esprit de corps and élan) are

[39] For an example of the firepower perspective, see Cecil Battine, "The Offensive Versus the Defensive in the Tactics of To-Day," *The Journal of the Royal United Service Institution* XLVII, no. 304 (June 1903): 655–672.
[40] While firepower advocates were certainly closer to the 'right' answer than their shock power interlocutor's, they were also not endorsing the modern assault tactics that eventually evolved on the Western Front.
[41] Interlocutors on both sides appealed to historical examples and mathematical formulae to make their cases. For example, see Maude, "Continental Versus South African Tactics: A Comparison and Reply to Some Critics."

archaic by modern standards, it reflected a well-considered solution to an unprecedented problem. Moreover, to reiterate a point that has already been made, the Boer and Russo-Japanese Wars were not nearly as clear-cut in their implications as subsequent events make them seem.[42] As is often the case, well intentioned, well informed, unbiased and perfectly rational individuals can draw different conclusions despite looking at the same evidence.

The first doctrinal publication in the Boer War's immediate aftermath, the 1902 *Infantry Training Manual*, gave firepower advocates the upper hand and departed from the status quo in important ways.[43] It argued that "the main object of the attack is to attain superiority of fire," although commanders were to still rely on linear tactics to mass fire.[44] Commanders were to divide their attack force into three echelons: scouts, a firing line, and reserves. Scouts moved ahead of the main force to locate the enemy. Once the enemy was found, scouts would take the enemy position under fire at a range of about 600 yards.[45] At this point, the firing line would advance and reinforce the scouts. The goal was to put as many men in the firing line as possible to achieve fire superiority. The ideal firing line had one soldier per yard.[46] The manual did note that "on open ground and at effective ranges, long lines of men rising simultaneously, and making even short rushes forward, will generally suffer heavy losses."[47] Solders were therefore told to advance in small groups,

[42] Griffith, *Battle Tactics of the Western Front*, 51.
[43] What follows is a summary of the relevant portions of the1902 Infantry Training Manual "Infantry Training (Provisional)" (The War Office, 1902), 194–202, Joint Services Command and Staff College Archives, Shrivenham.
[44] Ibid., 200.
[45] Scouts should move no more than ½ mile ahead of the main body in open terrain and no more than 200 yards in wooded terrain. Ibid., 207–208.
[46] Ibid., 207.
[47] Ibid., 201.

with one shooting while another moved forward. Once the line overwhelmed the enemy with fire, a final charge was made and to sweep the enemy from the battlefield with the bayonet.

Although the 1902 *Infantry Training Manual* did break from the past, it still had a lot in common with the doctrines that preceded and followed. Formations were still linear. The bayonet charge was still swept the enemy from the field of battle. Groups - not individuals - moved across the battlefield. Nevertheless, the 1902 manual represented the high water mark for firepower advocates. The idea of putting one soldier per yard in the firing line was radical compared with the densities called for in subsequent doctrinal manuals.[48] More important, the 1902 manual suggested that infantrymen might need more than just rifles to generate enough firepower.[49] Finally, the 1902 manual demonstrated a degree of caution about movement across open terrain that its successors would discard.[50]

Retrenchment and uncertainty The shift was short-lived. With the publication of the army's first field service regulations in 1909, and the two infantry training manuals that followed in 1911 and 1914, the army quickly re-emphasized shock power. [51] [52]

[48]"Field Service Regulations, Part I" (The War Office, July 29, 1912), 135. See also, Travers, "The Offensive and the Problem of Innovation in British Military Thought 1870-1915," 538.
[49] "Infantry Training (Provisional)," 209.
[50] Travers, "The Offensive and the Problem of Innovation in British Military Thought 1870-1915," 538.
[51] This pattern of experimenting with firepower tactics only to revert back to shock tactics was not unique. As you might recall from Chapter 5, the German army also flirted with a firepower-oriented doctrine with the 1888 *Exerzier-Reglement fur die Infanterie*, only to return to a more traditional shock power doctrine in 1906. Chapter 6 suggests that the French army followed a similar path as well. While some might interpret this doctrinal covariance as proof that organizations inevitably favor the status quo, it probably has at least as much to do with the fact that all three armies actively copied one another's doctrines. Bidwell and Graham, *Fire-power*, 19.
[52] This shift may have reflected a changing power dynamic within the army. The army's leading firepower advocates, Commander-in-Chief Lord Frederick Roberts and Colonel George Francis Henderson, were both forced out of the army by 1905, albeit for reasons unrelated to their doctrinal perspectives. Colonel George Francis

Although we now know shock power was the 'wrong' answer, the British army compounded the error by reverting in an incomplete way. The British 1909 *Field Service Regulations* (FSR), [53] like the German army's 1906 FSR from which it borrowed liberally, occupied an uncomfortable middle ground. In terms of continuity, the 1909 FSR reiterated that rapid-fire weapons dominated modern battlefields.[54] It discouraged movement across open terrain without suppression, and advocated fire and movement.[55] Even the basic scheme of maneuver for an attack remained unchanged. [56] Crucially, the 1909 FSR reminded infantry commanders, "the climax of the infantry attack is the assault, which is made possible by superiority of fire."[57] Therefore, the final bayonet charge was not to be a wild dash into the teeth of enemy defenses, but a deliberate assault predicated on having effective suppression.[58]

The problem was that logical inconsistencies plagued the 1909 FSR. Take, for example, the prescribed density for the firing line. The 1902 manual called for soldiers to reinforce the firing line until it had one soldier per yard. Despite acknowledging that firepower was the dominant problem on the battlefield, the 1909 FSR called for men to line up with *three to*

Henderson was forced out because he died in 1903; Lord Frederick Roberts, the army's final Commander-in-Chief, was forced out when his post was abolished as part of the larger post-Boer War reforms in 1905. Samuels, *Command or Control?*, 97–99.

[53] Amended in 1912

[54] "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 10.

[55] Griffith, *Battle Tactics of the Western Front*, 49.

[56] What follows is taken from "Field Service Regulations, Part I," 133–140.

[57] Ibid., 138.

[58] As the 1909 FSR states: "The fact that superiority of fire has been obtained will usually be first observed from the firing line; it will be known by the weakening of the enemy's fire, and perhaps by the movements of individuals or groups of men from the enemy's position towards the rear." Ibid., 138–139.

five soldiers per yard.[59] This meant the men were standing shoulder to shoulder! The assumption was that the only way to mass firepower was to mass men.[60] Similarly, although the 1909 FSR actually went into greater detail than the 1902 manual about the importance of fire and movement, it made no provision for bringing machine guns or other rapid-fire weapons into the firing line or to have the support the assault force.[61]

The manual was full of other inconsistencies. [62] It preached that modern weapons required fire superiority, yet firepower alone could not win the battle. It claimed that the bayonet

[59] Ibid., 133.

[60] During the 1909 General Staff Conference several staff officers complained that infantry units were ignoring the requirement to increase the density of their firing lines before the assault. As then Colonel Haldane phrased it: "If a battalion builds up a very thick firing line, so fixed is the idea – an idea for which the South African war is to blame – in the heads of umpires [exercise observers] that it is laying itself open to suffer heavy casualties, that in nine cases out of ten it would be put out of action [by the umpires observing the exercise]. Our infantry officers in many battalions still regard a thick firing line as an absurdity and think that troops can only advance when spread out over a very wide front, instead of realizing that it is by obtaining superiority of fire and not by avoiding loss that infantry alone can win battles." This quote rather succinctly demonstrates how shock power advocates squared the circle between recognizing what rapid fire weapons meant on the battlefield and calling for more density – instead of more dispersion – as the antidote. "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 10–11.

[61] The FSR assumed that artillery would provide most of the firepower to cover infantry movement (138-139). Machine guns, although considered "especially valuable" remained behind the firing line in "well concealed positions provided with good cover." (136). If neither we available, the FSR called on the infantry to generate its own fire support without specifying how it was to generate a volume of fire equal to or greater than that being poured upon it by defenders exclusively with bolt action rifles. At the 1910 General Staff Conference Major N.R. McMahon forcefully called on the army to field a light machine gun for use in the infantry assault. He was quickly shot down by the majority, which believed that giving assault forces more organic firepower would deter them from making the final charge, because they would be tempted to try and clear the objective by fire alone. This would rob attackers of their momentum, ultimately exposing them to even more enemy firepower. Kiggell's response is particularly illuminating and worth repeating: "I would like to make one suggestion on that point. May not the reason for it be the theory we went on almost absolutely until very recently, vis., that battles can be won by fire? That, in the words of the old 'Combined Training,' it is fire that decides the combat. With that idea in their heads troops dissociate movement from fire. They hope to shoot the enemy out of his position and they do not realize that the great object must be to close with the enemy. If it is accepted and realized that the object is to close with the enemy, then fire will be used to enable us to do it… After the Boer War the general opinion was that the result of the battle would for the future depend on fire-arms alone, and that the sword and bayonet were played out. But this idea is erroneous and was proved to be so in the late war in Manchuria. Everyone admits that. Victory is won actually by the bayonet, or by the fear of it, which amounts to the same thing so far as the conduct of the attack is concerned. This fact was proved beyond doubt in the late war. I think the whole question rather hangs on that; and if we accept the view that victory is actually won by the bayonet, it settles the point." "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910" (The War Office, 1910), 25–28, Joint Services Command and Staff College Archives, Shrivenham.

[62] What follows is from "Field Service Regulations, Part I," 130–139.

remained king in an age of rapid, long-range firepower. It offered no practical standard by which a commander could decide when he had – and when he had not – achieved fire superiority. Worst of all, rhetoric obscured substance. Even as the manual warned against bayonet charge without fire support, it continued to use language that endorsed rash action. Attacks were to be "decisive". Soldiers were "to press forward at all costs." Commanders could not tolerate "half-hearted measures" and a "lack of determination." In the end, we should not be surprised that many front line commanders ignored the 'letter of the law' while adhering to its spirit in August 1914. The military historian Paddy Griffith summarizes the situation aptly.

> The whole officer corps therefore remained uncertain about just what assault tactics it was supposed to follow… It all made for a central ambiguity, which has been rightly blamed for many of the disasters of the war. Although it was far from the case that everyone embraced a reckless cult of the offensive, it remained true that too little prohibition was imposed upon those who might be leaning in that direction.[63]

Offensive Doctrine as of July 1914
Table 6.1

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	Yes (crude)
Organic firepower	No
Bypass resistance	Yes

Combined arms

If the British army's prewar assault doctrine was ambiguous, its corresponding combined arms doctrine was downright vague. Certainly, the army knew infantry and artillery needed to coordinate on the battlefield.[64] In 1902 Lord Roberts authorized a manual for

[63] Griffith, *Battle Tactics of the Western Front*, 50. Griffith is not the only historian to make such a critique. See also Bidwell and Graham, *Fire-power*, 18–19; Ramsay, *Command and Cohesion*, 93.
[64] To quote the introduction to the 1902 *Combined Training* manual: "Each arm of the service possesses a power peculiar to itself; yet is dependent, to a greater or less degree, upon the aid and co-operation of the other arms."

combined training to improve inter-arm cooperation. Unfortunately, the 1902 *Combined Training* manual was the apogee for rigorous thinking about combining arms. While the subject remained a recurring topic during the annual General Staff conferences held between 1908 and 1914,[65] the 1909 FSR and 1911 and 1914 *Infantry Training* manuals dedicated remarkably little space to the subject.

Indeed, one of the biggest problems with prewar combined arms doctrine was that it waxed philosophically about fundamental principles without delving into the practical details. For example, the 1909 FSR called on artillery to initiate attacks by taking the enemy position under fire, displacing if needed to maintain heavy and accurate suppression.[66] Artillery commanders were to "keep themselves informed as to the progress of their infantry," ensuring that their guns continued firing until last possible moment.[67] However, the practical matter of who controlled the guns was ignored. In practice artillery fell under the control of the senior infantry officer who had organic control over it.[68] For example, in a corps-level attack, the corps commander retained control over all corps-level artillery, while his division commanders retained control over all of their respective division level guns. The problem was that close coordination called for in the 1909 FSR

"Combined Training (Provisional)" (The War Office, 1902), 13, Z112, Joint Services Command and Staff College Archives, Shrivenham.

[65] "Report of a Conference of General Staff Officers at the Staff College 7th to 10th January, 1908" (The War Office, 1908), 46, Joint Services Command and Staff College Archives, Shrivenham; "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 6; "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 69; "Report of a Conference of General Staff Officers at the Staff College 9th to 12th January, 1911" (The War Office, 1911), 53–74; 81–82, Joint Services Command and Staff College Archives, Shrivenham.

[66] "Field Service Regulations, Part I," 138–139.

[67] "Artillery fire will be continued until it is impossible for the artillery to distinguish between its own and the enemy's infantry. The danger from shells bursting short is more than compensated for by the support afforded." Ibid., 138.

[68] Samuels, *Command or Control?*, 102.

meant much lower level commanders (i.e. those at the company and battalion level) needed to be able to control fires in the final stages of an assault. [69] Cumulatively, the doctrine outlined precepts without resolving the command and control mechanism needed to translate theory into action.[70]

Deficient though British prewar combined arms doctrine may have been, it is important to remember that they were not significantly worse than either the French or the Germans. No army paid enough attention to inter-arm coordination before he war. The British also had a better excuse for not working harder on the combined arms problem. They faced unique geographic and financial constraints that undercut their ability to practice with all three arms during large-scale exercises.[71] In some ways, British gunners had a small head start over their French counterparts. While France had the best artillery gun in Europe – the quick fire 1897 75 mm,[72] - British gunners were better at controlling indirect fire.[73] Similarly, the British army showed greater interest in acquiring more howitzers, since their higher angle of fire (relative to cannon) allowed gunners to fire from covered positions and

[69] Samuels, *Doctrine and Dogma*, 102.
[70] As Chapter 4 argued, this approach had the virtue of being the worst of all worlds. It was too centralized to facilitate the close coordination needed in the final stages of an attack; it was also too decentralized to coordinate all of the guns on a wide front for a pre-assault bombardment. It is, however, unrealistic to have expected anyone to recognize the need for mass pre-assault barrages before late 1914/early 1915.
[71] Strachan, *Wellington's Legacy*, 163; "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 68–70.
[72] A fact that ultimately worked against them, since the 75mm was ill suited for the kind of indirect fire that would come to dominate trench warfare.
[73] Nevertheless, many British officers – especially infantry officers – felt that indirect, long range fire wasted time and ammunition, sapping the assault of its momentum. Indeed, infantry officers seemed to suggest that artillery officers were only interested in long range fire because of its technical challenges. "Report of a Conference of General Staff Officers at the Staff College 9th to 12th January, 1911," 53–74; 81–82.

the infantry to get even closer to the enemy before the artillery would have to stop firing (for fear of hitting their own soldiers.)[74]

Combined Arms Doctrine as of July 1914
Table 6.2

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

While, the British (like everyone else) saw the attack as the key to victory, they did not ignore defensive warfare entirely.[75] The Boer war, Russo-Japanese war, and the Hythe Trials (1910 – 1912) helped British officers appreciate the degree to which modern firepower benefited defenders.[76] Officers, especially those with experience in South Africa, argued that defensive doctrine needed to shift away from linear positions, stop packing men into small areas, place more emphasis on camouflage, and make better use of fortifications.[77]

[74] "Report of a Conference of General Staff Officers at the Staff College 7th to 10th January, 1908," 44–45.
[75] "Decisive battle can be gained only by a vigorous offense." "Field Service Regulations, Part I," 126. "The surrender of the initiative entailed by a defensive attitude… is undoubtedly a disadvantage." "Combined Training (Provisional)," 36.
[76] Bidwell and Graham, *Fire-power*, 29.The 1902 *Combined Training* manual states that "The tactical outcome of the effects of modern fire and of smokeless powder is that a small force, judiciously posted… can easily hold its own against superior numbers. To a certain extend this favors the force that stands on the defensive." "Combined Training (Provisional)," 16. To be sure, prewar doctrine did not see the defense as dominant, but it did concede that attackers and defenders might be on an equal footing.
[77] Alsager Pollock, "The Training of the Army," *The Journal of the Royal United Service Institution* XLVII, no. 300 (February 1903): 176–180.

While short on details, British prewar regulations were at least more balanced than those used by the French and Germans.[78] When initially occupying a defensive position, commanders were to divide their forces equally.[79] Half of the men were to occupy a single, non-continuous firing line (with one man per yard per man). The other half was to be held as a local reserve.[80] Troops were expected to dig in if time permitted.[81] Trenches were to be placed either at the bottom or near the top of the forward slope.[82] Commanders were to establish outposts, but the soldiers in the outposts were only there to warn of an impending attack.

If it came under attack, the defense was to fight in four phases. First, the outposts fell back to the main line. Next, commanders kept the bulk of their force concealed until it became apparent where the enemy's main thrust would fall. Third, commanders were to seek fire superiority with the firing line while using aggressive counterattacks to maintain the defensive system. Finally, commanders were to mount a large-scale counterattack to route attackers from the battlefield. Since the entire purpose of the defense was to set favorable conditions for offensive operations, commanders were instructed to transition to the attack as soon as possible.

[78] The 1902 *Combined Training* manual spent 17 pages on the attack and 15 on the defense. The 1909 FSR dedicated nine pages to each. What follows is taken from "Field Service Regulations, Part I." 142 – 150.
[79] "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 22.
[80] Larger units could also organize a general reserve to be positioned further to the rear and available for a large scale – or so-called 'decisive' – counterattack. As the defensive position was improved upon men were to be pulled from the front line and placed in the local reserve.
[81] At the 1910 General Staff conference officers discussed using engineering officers to build defensive trenches in light of the increasingly powerful artillery available to attackers. "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 15–20. Officers at the 1912 conference called on troops to make entrenching a regular part of peacetime maneuvers, but lamented the fact that troops were usually prohibited from digging holes on public lands in Britain. "Field Service Regulations, Part I," 74.
[82] Reverse slope trenches were suggested only as a place to hold reserves and supports.

While parts of this prewar doctrine might seem like a precursor to the late-war elastic defense in depth, the two systems should not be confused. True elastic defenses require defenders to deliberately give up ground, allowing attackers to waste energy and momentum taking the front line.[83] Counterattacks then strike them *behind* the front line. British doctrine did not advocate giving up ground. British positions were also still made up of a single (non-continuous) line and were therefore too shallow to allow survive a penetration. In the prewar system counterattacks were simply used to repulse attackers that managed to seize the unoccupied ground between defenders (recall that the position was not to be continuously held), or to attack forward of the front line to dislodge attackers before they could mount an assault. In other words, prewar doctrine called on defenders to fight forward of the front line, not in or behind it.

Defensive Doctrine as of July 1914
Table 6.3

Depth	No
Elasticity	No
Counterattack	No

Independent Variables

Command culture

The British army had a moderately centralized command culture before the First World War. Those at the top of the organization exercised autonomy, while those at the bottom obeyed orders. Although this arrangement was roughly similar to that found in the German army, it is more puzzling in the British context. The German army was built around conscripts drawn from an authoritarian society. Both these reasons make it unsurprising

[83] In a true elastic defense-in-depth outposts were also expected to hold out as long as possible in order to slow an attack.

that German military leaders would yield little autonomy to their men and junior officers. In sharp contrast, British soldiers were long service volunteers.[84] Compared to conscripts British infantrymen were "highly trained and well disciplined,"[85] and were widely regarded as the most effective soldiers in the world.[86] Furthermore, British volunteers were recruited from a rapidly liberalizing society.[87] Nevertheless, these highly trained, voluntary professionals were discouraged from demonstrating initiative and exercising autonomy.[88] For these reasons it is worth exploring the army's command culture, its origins, and its implications in greater detail.

Hierarchy at the bottom To those at the bottom of the organization, the prewar British army was a restrictive institution. Decision-making was deliberately centralized. Senior commanders (battalion commanders and above) issued highly detailed orders. Subordinates were expected to execute them to the letter.[89]

Even junior officers (subalterns and company commanders) and non-commissioned officers (NCOs) were discouraged from demonstrating initiative.[90] In part this reflected a

[84] Before 1870 British soldiers enlisted for 21 years (except in times of war). As part of the Cardwell Reforms (which included prohibitions against most forms of corporal punishments and the beginning of geographically based regiments) enlistments were reduced to a 'mere' seven years (not including a mandatory reserve commitment).
[85] Sheffield, *Leadership in the Trenches*, 21.
[86] Ramsay, *Command and Cohesion*, 153.
[87] We should be careful not to overstate this point. British civil society was surely more liberal than German civil society at the same time. Nevertheless, the British army actively recruited in the countryside, in part because its senior leaders preferred 'traditional' country values; in part because they feared drawing manpower from the cities where Edwardian values had taken greater hold; and in part because urbanites were not volunteering for a seven year stint in the army.
[88] Sheffield, Leadership in the Trenches, 21.
[89] Samuels, *Command or Control?*, 3–6.
[90] For a discussion of junior officer training in the prewar period, see Tim Travers, "Learning the Art of War: Junior Officer Training in the British Army from the Eighteenth Century to 1914," in *Forging the Sword: Selecting, Educating, and Training Cadets and Junior Officers in the Modern World*, ed. E. V. Converse (Imprint, 1998), 13 – 25.

fear among senior leaders that inexperienced subordinates would make mistakes by using the wrong formation or mounting an assault prematurely.[91] Yet there are less rational explanations as well. Martin Samuels argues that the officer corps practiced a 'cult of rank.'[92] In theory the cult meant, "an officer of a particular rank was ipso facto more able and more knowledgeable than any officer of a more junior rank."[93] In practice it meant, "suggestions or criticisms made by subordinates were seen as a challenge to the authority of the commander."[94]

Conditions were even more repressive for enlisted men. This was by design. Officers were deliberately encouraged to behave paternalistically towards their soldiers.[95] As Gary Sheffield describes in his study of officer-enlisted relations in the prewar army, "Paternalism in this era meant a rather coherent social theory of authoritarian, hierarchical values… Officers tended to regard their men as children: they needed to be closely supervised because if left to their own devices they would get into trouble."[96] The assumption was that enlisted soldiers were incapable of independent thought and action.

[91] Samuels, *Command or Control?*, 96.
[92] Samuels is perhaps unnecessarily harsh in his assessment of prewar British command culture. At the same time, he is not the only historian to comment on British officers' undue deference to authority. Tim Travers ascribes this tendency to the public school education shared by almost all officers. "Public school education stressed such values as group loyalty, deference and obedience to the accepted hierarchy… values such as these were not conducive to criticism of the prevailing army system." Tim Travers, "The Hidden Army: Structural Problems in the British Officer Corps, 1900-1918," *Journal of Contemporary History* 17, no. 3 (July 1, 1982): 524. See also Ramsay, *Command and Cohesion*, 57–60; Sheffield, *Leadership in the Trenches*, 2–3; Robbins, *British Generalship on the Western Front 1914-18*, 11.
[93] Samuels, *Command or Control?*, 58.
[94] Ibid.
[95] Ramsay, *Command and Cohesion*, 61–62.
[96] Sheffield, *Leadership in the Trenches*, 5–6. As Sheffield points out, there was a give and take aspect to this relationship. In exchange for their obedience, officers were expected to take care of their men's needs. This itself was progress, since officer-enlisted relations were even more asymmetric in pre-Edwardian Britain.

As M.A. Ramsay tells us, it is highly telling that no prewar manual or regulation depicted an image of an individual soldier.[97]

To be fair, the army's command culture was starting to change prior to the First World War. Senior British officers began calling for decentralization after the Boer War.[98] Indeed, by the eve of the Great War the army seemed poised to grant more autonomy to soldiers and junior officers alike. Officers who once endorsed restrictive command and control were by this point calling for increased autonomy. For example, G.F.R. Henderson, who was commander-in-chief Roberts' Director of Intelligence and a fierce shock power proponent before the Boer War, began calling for subordinates to seize the initiative.[99] Given that the Commander-in-Chief himself supported decentralization, these ideas started to make their way into official doctrine. The 1902 *Infantry Training* manual argued, "since the conditions of modern warfare render decentralization of command in action an absolute necessity, no good results are to be expected unless the subordinate leaders have been trained to use their wits."[100] Or, as Commander-in-Chief Roberts wrote in his preface to the 1902 *Combined Training* manual,

> Success in war cannot be expected unless all ranks have been trained in peace to use their wits. Generals and commanding officers are, therefore, not only to encourage their subordinates in doing so… but they will also check all practices which interfere with the free exercise of the judgment, and will break down, by every means in their power, the paralyzing habit on an unreasoning and mechanical adherence to the letter of orders and to routine.[101]

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[97] Ramsay, *Command and Cohesion*, 153.
[98] Ramsay argues that some officers began pressing for more autonomy and authority for junior leaders before 1899. Ibid., 145–146.
[99] It is not surprising that many of the leading advocates for decentralization also supported the shift from normal (shock power) tactics to firepower tactics. Samuels, *Doctrine and Dogma*, 96–98; Sheffield, *Leadership in the Trenches*, 21–23. For examples of calls to increase autonomy and initiative, see Battine, "The Offensive Versus the Defensive in the Tactics of To-Day," 672; Pollock, "The Training of the Army," 176.
[100] "Infantry Training (Provisional)," 191.
[101] "Combined Training (Provisional)," 3.

Nevertheless, the shift towards initiative among the lower ranks was just beginning when the First World War broke out. Change took root slowly for at least two reasons. First, cultures are, by definition, slow to change. Obedience, deference, paternalism, and the cult of rank had been drilled into soldiers and junior leaders for generations, and were unlikely to change in a few short years. Hierarchy was also self-perpetuating. [102] It proved "difficult in the extreme to create a system of devolved command on to a rigidly hierarchical army whose other ranks were regarded and treated as little more than cogs in a machine… or as children who had to be spoon fed by their officers."[103] Second, the senior-most officers who fought for decentralization found themselves out of power by 1905. Shock power and centralized command and control shared a natural link, so it comes as no surprise that the ascent of one mirrored the emphasis on the other. For these reasons, while the 1909 FSR did not completely revert to a call for strict obedience on the battlefield, it certainly demonstrated a retreat from Lord Robert's bold call for initiative.[104]

Permissive autonomy In stark contrast to the restrictive command culture at the bottom of the organization, those at the top of the organization possessed extraordinary latitude. Senior commanders might issue general directives, but they did not interfere with how their subordinate commanders interpreted or carried out their tasks. [105] On the battlefield

[102] "The more adherence to strict regulations was insisted upon, the more individual initiative was repressed. The more individual initiative was repressed, the greater the need for strict regulations." Samuels, *Command or Control?*, 96–97.
[103] Sheffield, *Leadership in the Trenches*, 24.
[104] As it states in its introductory paragraph, "The principles given in this manual have been evolved by experiences as generally applicable to the leading of troops. They are to be regarded by all ranks as authoritative." "Field Service Regulations, Part I," 12.
[105] Martin Samuels refers to it as 'umpiring.' In his view it represents an excessive and counterproductive version of decentralization in which "the umpire often avoids 'interfering' out of an excessive respect for the feelings and reputation of the subordinate… decentralization therefore becomes an end in itself." See Samuels, *Command or Control?*, 51–53.

this meant that individual units (at the battalion level and above) tended to fight independently, eschewing coordination with higher and adjacent units.[106] Commanders also viewed their units as a "personal possession."[107]

There was, however, an important exception to this permissive environment. Autonomy did not imply a two-way relationship. Leeway and discretion from above was not an invitation for input or advice from below. Put simply, officers did not criticize their superiors.[108] Thus, the cult of rank permeated the entire army and was as true for a subaltern as it was for a high-ranking general.

Two related factors produced the army's permissive command system among high ranking officers. The first was the army's regimental structure.[109] Starting in 1871, Britain was divided into 66 districts, with an army regiment located in each district. Recruits joined the regiment in their district.[110] While the regimental system ameliorated manpower problems, it also turned the army into an amalgamation of autonomous units.[111] Regiments formed their own traditions,[112] and it was common for soldiers and officers to feel more loyalty to their unit than to the army or nation.[113]

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[106] Griffith, *Battle Tactics of the Western Front*, 47–48.
[107] Samuels, *Command or Control?*, 55.
[108] Ibid., 58.
[109] Itself a product of Cardwell's system of geographically based linked battalions. For an in-depth discussion about these important reforms, see Winton, *To Change an Army*, 8–9; Clayton, *The British Officer*, chap. 8. For its historical antecedents, see Strachan, *Wellington's Legacy*, chap. 6.
[110] Prior to these reforms recruits could be assigned to any unit anywhere in – or outside of – Britain.
[111] Sheffield, *Leadership in the Trenches*, 3; Samuels, *Doctrine and Dogma*, 53; Strawson, *Gentlemen in Khaki and Camouflage*, 34–35; Strachan, *Wellington's Legacy*, 51–52.
[112] Robbins, *British Generalship on the Western Front 1914-18*, 12.
[113] Ramsay, *Command and Cohesion*, 60.

The army's colonial mission similarly fostered permissive command. Battalions spent years overseas. Given the technological limits to intercontinental communications, commanders exercised unfettered control over their men while deployed. Similarly, units were on their own to solve problems, exacerbating the already fiercely independent unit identities.[114]

The permissive nature of senior officer interactions proved extremely resilient. As this chapter points out, resilience had a lot to do with the fact that the army's upper ranks remained unchanged through the war.[115] The effect on the army's ability to optimize its doctrine was deleterious. Regimental loyalty engendered parochialism, undercutting attempts to impose new ideas on the army. The army's command culture also impeded the army's ability to generate new ideas in the first place. Regimentalism led to "military dynasties" in which powerful individuals became associated with specific regiments.[116] In these units favoritism and personal ties were more important than merit. While this happened in the French and German armies, this tendency was most pronounced in the British army.[117]

Command culture as of July 1914
Table 6.4

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

[114] Ibid., 92.
[115] While battalion commanders and below were fired with stunning regularity, the same was not true above the division level. Corps commanders and the senior most staff officers proved especially impervious to removal. There was, in fact, only one leadership change at the top of the organization, when Sir Douglas Haig replaced Sir John French in 1915. Travers, "The Hidden Army," 535.
[116] Robbins, *British Generalship on the Western Front 1914-18*, 12.
[117] Ibid., 13.

Assessment mechanism

The prewar British army did not have an effective assessment mechanism before the war. It did have a general staff, modeled on the German army's. However, the two staffs functioned in different ways. Namely, the British general staff did not systematically and objectively convey information from the front lines to the upper echelons; failed to attract top talent and to perform rigorous analysis; and lacked the autonomy and prestige needed to tell uncomfortable truths to high ranking leaders.

The British General Staff's greatest shortcoming was its youth. Britain was the last European power to centralize its staff system.[118] Despite reforms undertaken after the Napoleonic wars, the Crimean war, and during Cardwell's term as Secretary of State for War, a true General Staff did not exist until 1905.[119] Moreover, the general staff lacked a chief until 1906.[120] Like any new organization, the British General Staff experienced growing pains as it developed procedures, tested boundaries, and discovered gaps.

[118] The aforementioned regimentalism and need to police a far flung empire both worked to impede the creation of a central staff. Strachan, *Wellington's Legacy*, 146–150.

[119] The Boer war also proved to be the impetus for the General Staff. The Esher Committee – itself an offshoot of the Elgin Royal Commission, which was tasked with finding the reasons for the army's poor preparations in South Africa – recommended the creation of a general staff in 1904. Bidwell and Graham, *Fire-power*, 44–49. One reason the government may have been reluctant to form a general staff earlier was the widespread belief, especially among Liberal politicians, that "planning for war led to war." Halik Kochanski, "Planning for War in the Final Years of Pax Britannica, 1889-1903," 10. For more on the general staff's origins, see John Sweetman, "Towards a Ministry of Defense: First Faltering Steps, 1890-1923," in *The British General Staff: Reform and Innovation c. 1890-1939*, ed. David French and Brian Holden Reid, Cass Series--military History and Policy 10 (London ; Portland, OR: F. Cass, 2002), 34–35; Ian F.W. Beckett, "'Selection by Disparagement': Lord Esher, the General Staff and the Politics of Command, 1904-14," in *The British General Staff: Reform and Innovation c. 1890-1939*, ed. David French and Brian Holden Reid, Cass Series--military History and Policy 10 (London: F. Cass, 2002), 41–56; Peden, *Arms, Economics and British Strategy*, 20.

[120] The Chief of the General Staff, renamed the Chief of the Imperial General Staff in 1909, replaced the Commander-in-Chief position last held by Lord Roberts. Strawson, *Gentlemen in Khaki and Camouflage*, 80–82.

Foremost among these was the fact that the General Staff had no section specifically tasked with conducting tactical intelligence and doctrinal analysis.[121] The Chief of Staff recognized this deficiency, pointing out "until some systematic method of interpreting and amending our war regulations is adopted, it is impossible for the general staff to gain the confidence of the army."[122] Unfortunately, the General Staff would have a long way to go before reaching this goal.[123]

Compounding matters, the British General Staff lacked authority and prestige. It was only one part of the decision-making apparatus that controlled long-term planning. General Staff officers had to compete with the Quartermaster General's office, which controlled supplies, and the Adjutant General's office, which controlled administrative matters. Although one might assume that the Quartermaster General and Adjutant General would have been subordinate to the General Staff, this was not the case.[124] Nor was the General Staff even the most powerful of the three staffs. This honor went to the Adjutant General's staff, which was staffed with senior officers and had a longer institutional history.[125]

General Staff officers lacked access to top ranking officers. While the Chief of the General Staff was supposed to replace the commander-in-chief (C-in-C's) when the latter position

[121] Bidwell and Graham, *Fire-power*, 128.
[122] This point was part of a larger call by the Chief of the General Staff to develop a mechanism for collecting opinions and ideas from units for analysis and decision by the General Staff during the 1908 General Staff Conference. "Report of a Conference of General Staff Officers at the Staff College 7th to 10th January, 1908," 47. In 1909 Colonel Haldane called for the creation of an after action system so units could submit their ideas for central distribution. "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 60–61.
[123] In 1910 it was discovered that the General Staff did not even possess a complete record of the army's 19th century campaigns. "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 77–78.
[124] Bidwell and Graham, *Fire-power*, 44.
[125] Samuels, *Command or Control?*, 40.

was dissolved in 1905, many of the C-in-C's powers were not transferred to the new billet. In practice the Chief of the General Staff was an advisor to the Secretary of State for War.[126] More important, General Staff officers attached to field units did not have the right to communicate directly with their commanding general.[127] This was in stark contrast to the German General Staff, whose Chiefs of Staff possessed de facto veto power over their commander's decisions.

Nor were British General Staff officers prepared to do rigorous doctrinal analysis. The British army's Staff College was part of the problem. It was a pale imitation of the German War Academy. It was only two years long; only had nine permanent instructors (the War Academy had 42); and hardly challenged students (only two students failed out in one three year period). Nevertheless, it barely graduated 40 officers a year – far too few to meet even a small army's modest demands.[128]

Finally, the Staff College and General Staff did not attract top talent. Officers did not see either as prestigious.[129] Command and promotion did not depend on a Staff College degree or General Staff tour. In 1913 only 65 of the 252 regular cavalry, artillery and infantry regiments had a commanding officer or executive officer that attended the school.[130] There

[126] Ibid., 38–39.
[127] The General Staff was divided into two sections: those who served in the War Office (including the Directorate of Military Operations, the Directorate of Staff Duties, and the Directorate of Military Training) and those who served in the regional commands. Ibid., 39-40
[128] Samuels, *Command or Control?*, 43–50.
[129] Strachan, "The British Army, Its General Staff and the Continental Commitment, 1904-14," 202.
[130] "Report of a Conference of General Staff Officers at the Staff College 13th to 16th January, 1913" (The War Office, 1913), 47–50, Joint Services Command and Staff College Archives, Shrivenham.

were usually fewer applicants than seats at the Staff College, regimental life discouraged officers from leaving the regiment for a multi-year posting at school and on staff.[131]

Admittedly, it is still possible that the British institutionalized doctrinal assessment outside of its General Staff. Yet it does not appear that the British army went that route either. The regimental system, combined with the fact that colonial deployments rarely required anything larger than a battalion, meant that all high level staffs (brigade, division and corps) were ad hoc. Division staffs might exist in peacetime, but usually only included the commanding general, his assistant commander, and two field officers. During a mobilization up to four additional officers might augment this Spartan group. With the exception of Aldershot, there were no standing corps commands. When war broke out, these higher level staffs were so hastily thrown together and put in charge of units with whom they had never worked that it was hard "to overcome the unprogressive idiosyncrasies and to create common doctrines."[132]

The army also did not empower an organization to experiment with new tactical ideas. A School of Musketry did exist at Hythe. However, its official mission was to test and validate new technologies.[133] While this did not stop its officers from endorsing new ideas (it was a home for firepower advocates like Major McMahon), it still lacked the authority to impose any of these ideas across the army.

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[131] Long overseas postings made it hard even for those who wanted to apply to the Staff College. In the early 20th Century the army realized that one way to reduce the fear that attending school would hurt an officer's standing in the regiment by alternating post-Staff College assignments between the staff corps and the officer's regiment. Clayton, *The British Officer*, 109–111.
[132] Bidwell and Graham, *Fire-power*, 42–43.
[133] Samuels, *Command or Control?*, 100–102.

Assessment mechanism as of July 1914
Table 6.5

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

Training in the prewar British army was highly decentralized. There were no central schools for infantry, artillery, or cavalry.[134] New recruits underwent initial training at depots located in their regimental district. More importantly, each regiment had tremendous latitude over how to train its soldiers and officers. The result was that virtually every unit had a different training scheme or system.[135] Commanders did not train their soldiers to the same standard. While regulations (like the 1902, 1911 and 1914 *Infantry Training* manuals and the 1909 FSR) existed, units varied dramatically in how they interpreted and implemented them. For example, during one major exercise an observer noted that two divisions built a defense on the exact same ground, yet they occupied two different frontages. One division built a defense 13 miles wide. The other division built one three miles wide.[136] Training for officers was equally uneven.[137]

[134] The Territorial army was roughly equivalent to the American National Guard. The lack of centralized schools was especially problematic for Territorial units because they lacked the capacity and expertise to train their own recruits. Bidwell and Graham, *Fire-power*, 42–50.
[135] "Report of a Conference of General Staff Officers at the Staff College 7th to 10th January, 1908," 6.
[136] "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 17–18.
[137] Ibid., 59.

Commanders guarded their power over training jealously.[138] "Commanders at all levels opposed the conception of Arms Schools or centralized training fearing that either would weaken their own power and responsibilities."[139] There was also a less parochial, more rational reason for decentralized training. The army's colonial mission meant that units deployed to different locations around the world. Some operated in a garrison environment while others fought active insurgencies. The tactics and strategies that worked in one environment might fail in another.[140] It is therefore unsurprising that commanders might prefer to control how they trained their troops.

Not everyone agreed with the army's laissez-faire approach to training. Critics tried to inject a degree of order and uniformity into the system as early as the 1830s, but their efforts were in vain.[141] Firepower advocates were the most critical. They realized the lack of central schools impeded their ability to disseminate new ideas.

Progress had to wait for the General Staff reforms. The Directorate of Military Training, created under the auspices of the General Staff, tried to impose some order.[142] However, it had no authority to inspect or remove commanders for failing to adhere to regulations. Some officers talked about creating a permanent, centralized recruit depot and issuing a

[138] The fact that the British army relied on volunteers also complicated training. The French and German armies could count on annual conscript drafts, which meant that all new recruits could be trained at the same time each year. Volunteers showed up when they showed up, meaning the training process lacked uniformity. The fact that some units were posted overseas complicated matters even further, since the need for replacement sometimes meant that recruits were hastily trained and deployed.
[139] Bidwell and Graham, *Fire-power*, 43.
[140] Clayton, *The British Officer*, 103–104.
[141] Ibid., 74–75.
[142] Housed in the War Office.

Manual of Applied Tactics.[143] These suggestions were ultimately quashed for fear they would undercut commander's authority and encourage 'stereotyped' tactics. Ultimately, the army resisted centralizing control over training until 1917. Indeed, it was the last piece of the optimization puzzle to fall into place.

Training structure as of July 1914
Table 6.6

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

III. 1914

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Mod. Centralized
Assessment mechanism	No
Training structure	Decentralized

Neither Britain nor her army was ready for war in 1914. To paraphrase Hew Strachan, she agreed to fight on a continental scale without bothering to raise a continental army first.[144] The British army was spread so thin during the July crisis that it had to mobilize reservists

[143] "Report of a Conference of General Staff Officers at the Staff College 18th to 21st January, 1909," 44–48; "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910," 33–36; "Report of a Conference of General Staff Officers at the Staff College 9th to 12th January, 1911," 28.
[144] Or as Henry Wilson put it, the British Expeditionary Force's six divisions were 'fifty too few.' Strachan, *The First World War*, 2003, 200.

just to meet its six-division commitment. It is a little known fact that 60% of the 'Old Contemptibles' were reservists.[145]

As a result, the British army had a hard time scaling up to war. Units faced crushing ammunition shortages.[146] The army had to figure out how to absorb 2.46 million volunteers in the war's first 15 months – an influx 10 times its prewar size.[147] Even the civilian government was ill equipped to deal with the crisis. In fact, even the initial decision to send the British Expeditionary Force (BEF) to France was made not by the cabinet, but by an ad hoc committee.[148]

Political, strategic, and operational situation[149]

British army operations in France during 1914 can be divided into four phases. It spent early August mobilizing and transporting the BEF from Southampton to Maubeuge.[150] From August 23rd to September 10th, it fought a series of rearguard actions at Mons and Le

[145] F. W. Perry, *The Commonwealth Armies: Manpower and Organisation in Two World Wars*, War, Armed Forces, and Society (Manchester ; New York : New York: Manchester University Press ; Distributed exclusively in the U.S. and Canada by St. Martin's Press, 1988), 8.
[146] The shell crisis would ultimately bring down Asquith's Liberal government in May 1915. Ammunition shortages and quality issues would continue to plague the British in France until late 1916.Peden, *Arms, Economics and British Strategy*, 60; Bidwell and Graham, *Fire-power*, 68. Paul Kennedy points out that the British munitions industry was told to produce 7 million bullets per week before the war only to find that the first wartime order was for 176 million. Kennedy, "Britain in the First World War," 34. The shortage of artillery shells was even more dire. Prewar establishments planned for each quick fire cannon to deploy with 1,000 rounds of ammunition (of which only 176 would be on hand and another 220 immediately available). "War Establishments," 1914, 6, Z501, Joint Services Command and Staff College Archives, Shrivenham. Units found that a gun could fire its entire allotment of ammunition in France in a matter of 75 minutes. J. B. A. Bailey, *Field Artillery And Fire Power* (Taylor & Francis, 2004), 118.
[147] 5.7 million men would eventually serve in the British army by war's end. Strachan, *The First World War*, 2003, 160.
[148] Some advocated keeping part of the BEF at home to defend against an invasion or to form the core for the New Armies. These alternatives were very much on the table as late as August 5th. Ibid., 204.
[149] For a detailed discussion of British war aims during the First World War, see H. E. Goemans, *War and Punishment: The Causes of War Termination and the First World War*, Princeton Studies in International History and Politics (Princeton, N.J.: Princeton University Press, 2000), chap. 7.
[150] The BEF arrived on August 20th.

Cateau. By stalling the German right hook the BEF bought time for General Joffre to consolidate his forces near Paris and launch a counterattack at the River Marne.[151] In September and October it took part in the 'Race to the Sea.' As maneuver gave way to stalemate at the Yser in mid-October, the BEF defended against a final German attempt to breakthrough at Ypres in late October and early November. The BEF spent the remainder of 1914 on the strategic defensive, holding about 20 miles of front north of the River Somme.[152]

It is difficult to summarize British strategy during this chaotic period. This is because it one probably did not exist. Britain's overarching goal was obvious enough: it wanted to expel the German army from Belgium to eliminate the threat of invasion. By extension this also meant pushing the Germans out of France, since the six division BEF needed help from the French army to do anything to the German juggernaut. It was less obvious how the BEF was to accomplish these goals. There were more questions than answers: how would the BEF support its ally and contribute to the war effort while it was still trying to mobilize a viable field army? Was the army Britain's primary tool for waging war against Germany? Was tactical stalemate a permanent feature on the Western Front? If so, should the BEF (and the navy) seek decisive victory in another theater?[153] If not, what combination of technical and tactical innovations might restore maneuver?

[151] A battle in which the BEF also participated from 5 – 12 September.
[152] BEF units still mounted a number of tactical offensives.
[153] At least in 1914 the BEF did not have to worry about losing manpower and resources to support operations in other theaters, although the British did mount small missions in China and Africa.

These questions went unanswered in 1914.[154] However, the BEF could not just sit around waiting for answers. Units dug trenches wherever they happened to stop during the 'Race to the Sea.' Many were poorly located and needed repositioning. Britain also needed to reassure its ally that it was doing something to eject the German invaders. Both tasks meant the army had to mount small-scale attacks. As a result, experimentation began to occur. The problem was that the army lacked a mechanism to capture and transmit it across the organization.

Dependent Variable

Offensive tactics

British soldiers quickly recognized two main problems with their prewar doctrine. First, dispersion was far more important than prewar regulations suggested. German advantages in artillery meant that soldiers had to spread out as soon as they came within range. An early set of tactical notes circulated by the General Staff admonished the use of column formations (which commanders liked to use because they facilitated speed), especially for advance guards.[155] The same note suggested using "loose, elastic formations adapted to the ground with men at 8 to 10 paces," although this was not to become standard practice until the end of the war.[156] Second, front line units needed more firepower. Infantry battalions went to war with only four machine guns, none of which were allocated to companies or platoons.[157] Nor did units use them in the best way possible. As late as 1915 commanders

[154] One might argue that they still had not been answered by 1918.
[155] "Notes from the Front, Part I" (The General Staff, 1914), 4–5, Z204, Joint Services Command and Staff College Archives, Shrivenham.
[156] "Notes from the Front, Part II" (The General Staff, 1914), 13, Z204, Joint Services Command and Staff College Archives, Shrivenham.
[157] Ramsay, *Command and Cohesion*, 176.

persisted in using machine guns as light artillery, firing from behind cover to rain bullets down on defenders.[158]

Offensive Doctrine as of December 1914
Table 6.7

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	Yes (crude)
Organic firepower	No
Bypass resistance	Yes

Combined arms

When the war started, British artillery supported attacks by advancing as close to the infantry as possible.[159] Such tactics were unsustainable for three reasons. First, it wasted too much ammunition. War planners failed to adjust ammunition supplies to match doctrinal requirements. As a result, gunners fired at rates prescribed by doctrine, but which quickly used up all of their ammunition. Second, the army's field guns fired rounds that were too light to penetrate fieldworks. Similarly, when gunners fired over open sights the guns' trajectory was too flat to hit entrenched soldiers. Worse yet, German guns had a longer range and German gunners were better trained to use indirect fire. Thus, British guns were knocked out before they support the infantry assault.

The war's first months exposed another critical gap in prewar doctrine and training: Infantry commanders did not know how to coordinate with artillery. As Shelford Bidwell and Dominck Graham describe, infantry commanders "did not grasp how to coordinate the

[158] Ibid., 176–177.
[159] Peden, *Arms, Economics and British Strategy*, 63.

different arms… artillery was regarded merely as an accessory."[160] Like their German adversaries, British infantry officers would race into the attack without waiting for artillery preparation. The lack of experience coordinating long-range fires also meant commanders failed to bring forward observers with them and neglected to lay telephone wire or even make use of established visual signals.[161]

British gunners could not do anything about the ammunition shortages or the lack of heavy howitzers, especially not in 1914. They could and did, however, improve their survivability. Gunners quickly learned to conceal their positions and to fire from behind intervening terrain. Units also experimented with neutralization fire – a cornerstone to the late-war Hurricane barrage.[162]

Combined Arms Doctrine as of December 1914
Table 6.8

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

The British were quick to adapt the war's new defensive realities. As mentioned, prewar doctrine called on units to entrench when time permitted. In fact, many BEF units dug made a habit of digging in whenever they halted.[163] The first *Notes from the Front* leant

[160] Bidwell and Graham, *Fire-power*, 3.
[161] "Notes from the Front, Part I," 6–7.
[162] Bidwell and Graham, *Fire-power*, 23. One must wonder whether this reflected ammunition shortages rather than deliberate experimentation.
[163] Peden, *Arms, Economics and British Strategy*, 59.

official credence to this intuitive practice.[164] Although early trenches tended to be crude affairs, units quickly began to improve their survivability by adding overhead cover, traverses (even 'linear' trenches were not built in a completely straight line, since these were easy to enfilade and were vulnerable to shell bursts), and communication trenches (to allow men to enter and exit the trench without exposing themselves to enemy fire). We also see the earliest mention of reverse slope positions during the period, although once again this came in the form of a recommendation, not a directive.[165]

While the trenches themselves evolved quickly and automatically, the basic concept of how to defend remained unchanged.[166] Commanders held their positions at all costs, and little was done to develop secondary lines for reserves or to fall back upon in the event of a major breach.

Defensive Doctrine as of December 1914
Table 6.9

Depth	No
Elasticity	No
Counterattack	No

Independent Variables

Command culture

It is difficult to make definitive statements about the British army's command culture during the war's first months. In large part this is because the BEF, as the army's main contribution to the war in 1914, represented a tiny subset of the larger organization.

[164] "Notes from the Front, Part I," 8.
[165] "Notes from the Front, Part II," 17.
[166] What follows is taken from Samuels, *Command or Control?*, 200.

Moreover, the massive influx of New Army volunteers – an obvious agent of cultural change – did not make itself felt until 1915.

Given that organizational cultures are hard to change in five months, it is safe to infer that the army's early war command culture was similar to its prewar command culture. Change, insofar as it could take hold in such a brief period of time, seemed to be in the direction of centralization. Discipline in the ranks was repressive.[167] The situation facing officers – even senior ones – was not much better as division and battalion commanders were fired with regularity. In some respects this is not surprising. We expect some officers who advanced through the ranks in peace would not be up to the challenges of leading in war.[168] Nevertheless, the practice of relieving relatively senior officers had a toxic effect on the officer corps. In his critique of the British officer corps Travers argues that, "the possibility of removal and disgrace reveals the enormous pressure and leverage that the higher command could exercise primarily against middle range staff and officers at the battalion, brigade, and divisional levels."[169] It is not hard to see how this practice discouraged experimentation and criticism. In fact, early war dismissals may have also deterred mid and high ranking officers from exercising the autonomy that had once been theirs. Thus, at a minimum, we can surmise that the British army's command culture did not become more decentralized by December 1914.

[167] It was also a touch absurd. Although armies are known for their sometimes arbitrary regulations, the BEF took it to another level. During the 1914 campaign soldiers could be punished for taking fruit from trees as they marched past. Martin Pegler, in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 116.
[168] Many early war officers were also retirees and reservists brought to active duty. Ramsay, *Command and Cohesion*, 159–160.
[169] Travers, "The Hidden Army," 533.

Command culture as of December 1914
Table 6.10

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

The General Staff was overwhelmed by the challenges facing the British army. It went to war with a total staff of around 450 officers and therefore lacked the capacity to engage in rigorous doctrinal analysis, let alone manage the army's breakneck expansion.[170] The result, as M.A. Ramsay describes, was that "early tactical reforms would offer an uncoordinated chorus of innovation rather than an orchestrated refrain." While the army was as quick as any other to realize that prewar tactics were not going to break the stalemate, the army had no system to coherently generate or identify a viable alterative.[171] The General Staff did start disseminating army-wide after action reports (the *Notes from the Front)* in October.[172] However, the *Notes* did little more than distribute ideas. No attempt was made to experiment and refine those that seemed most promising. Nor is it entirely clear how the ideas described in the *Notes* were vetted for dissemination in the first place. Practices that might have worked for a unit attacking in Ypres would prove irrelevant or dangerous if applied by a unit entrenching in the Vosage Mountains.

[170] By comparison, in 1918 there wee 3,000 staff officers assigned to the Western Front alone. Bidwell and Graham, *Fire-power*, 3.
[171] Samuels, *Command or Control?*, 103.
[172] Stephen Bull, "The Early Years of the War," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 203.

Assessment mechanism as of December 1914
Table 6.11

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

The British army's training structures did not change in 1914. Individual regimental depots managed all training for the soldiers comprising the BEF's first contingent.[173] Although young men flocked to volunteer for Kitchener's New Armies, none saw action in 1914 and so their training will be discussed in the next section. The eleven divisions that reinforced the BEF by year's end were all built around existing Territorial units. Therefore, their training was also based on the prewar model.

Training structure as of December 1914
Table 6.12

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

[173] It is unclear how well the reservists, who comprised 60% of the early BEF, had been prepared given the aforementioned challenges faced by part-time soldiers in a regimental depot system.

IV. 1915

Assault tactics	Exp*/No
Combined arms	No
Elastic defense in depth	No

*Experimentation ended after May 1915

Command culture	Mod Centralized to Centralized
Assessment mechanism	No
Training structure	Decentralized to Mod Decentralized

Historians and political scientists often give 1915 cursory treatment. Aside from the debate between 'Westerners' and 'Easterners,' (see below) the year is typically ignored as an unremarkable interval separating 1914's chaos and 1916's epic battles. This is a mistake. Grand strategy in the First World War turned on battlefield tactics; and 1915 marked a critical turning point in British tactics. For much of the year British units actively experimented with innovative assault tactics that would not have been out of place in 1918. Indeed, January to May marked the high point of small unit experimentation in the BEF as soldiers searched for ways to integrate firepower and maneuver. This approach changed after the disastrous Battle of Aubers Ridge in May. After Aubers Ridge, instead of integrating fire and movement, the BEF sought to separate and sequence them. Until at least late 1917 the plan was to fire then move – to crush German defenses with artillery and then occupy their trenches with infantry.[174]

From this perspective, 1915 was a year of major institutional and doctrinal change for the British army. Institutionally, the BEF quadrupled in size between January and December.[175]

[174] G.C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber and Faber, 1940), 51–52.
[175] From 11 infantry divisions in January 1915 to 38 in December.

Its missions grew apace as the war morphed from a continental conflict into a global one. By year's end British troops were supporting combat operations in Gallipoli, Mesopotamia, Palestine, Persia and South Africa. Meanwhile, the army in France participated in major offensives at Neuve Chapelle, Aubers Ridge, Festubert, and Loos.[176] Doctrinally, 1915 marked the beginning of the army's long turn towards 'the artillery conquers, the infantry occupies.' This is puzzling, since individual British units experimented heavily with modern assault tactics and short, intense preparatory bombardments during the spring campaigns.[177] However, after May 1915 Haig's First Army started to impose a concept of the 'methodical battle' – long bombardments followed by waves of infantry seeking limited objectives. The rest of the army was soon to follow, not least because Haig assumed command of the BEF in December.

This section argues that 1915 also supports CAT theory's predictions. Insofar as the army's moderately centralized command culture allowed, some units experimented with nascent assault tactics. Yet the army lacked an assessment mechanism to capture these ad hoc experiments and detect their potential, especially because they were used in attacks that failed. As the army's command culture centralized in response to tactical failure and the influx of reserve, Territorial, and New Army soldiers, the space for experimentation disappeared. Perversely, the man now in control of the BEF, Douglas Haig, was both fully committed to victory through attrition and utterly disinterested in tactics. Compounding matters, the army's centralized command culture limited his exposure to countervailing

[176] British forces also defended against a major German offensive at Ypres during the Second Battle of Ypres.
[177] Especially Neuve Chapelle (March) and Aubers Ridge (May).

views while the aforementioned absence of an assessment mechanism ensured a coherent alternative to 'the artillery conquers and the infantry occupy' did not emerge.

Political, strategic, and operational situation

The British army faced a strategic conundrum in 1915. On the one hand, it was not ready to wage a multi-theater war of attrition. Millions of men volunteered to serve under the colors, but it took time to train and equip them and they would not arrive in decisive numbers until 1916.[178] Munitions and equipment shortages created similar constraints. On the other hand, the British army could not sit idle on the Western Front, husbanding its resources for a decisive offensive in 1916. Such a strategy was politically unacceptable and militarily suspect. As was the case in 1914, the French would not tolerate inaction. General Joffre made it clear that "the best and largest portion of the German army was on our soil, with its line of battle jutting out a mere five days' march from the heart of France."[179] The British army simply "could not stand on the defensive while their allies bled to death."[180] Militarily, even though the Germans were occupied in the East and therefore unlikely to attack in the West during 1915 German defenses grew stronger with time. The only option was to mount attacks despite their poor chances for decisive success.

[178] It is hard to overstate unprepared the army was to absorb millions of volunteers. In August 1914 the army only had enough barracks space to accommodate 174,000 trainees. As late as 1917 recruits were still being housed in tents, huts, and the homes of local citizens. Ilana Bet-El, *Conscripts: Lost Legions of the Great War* (Phoenix Mill, Gloucestershire: Sutton, 1999), 48.

[179] France's single-mindedness is understandable. As General Joffre makes clear, "the best and largest portion of the German army was on our soil, with its line of battle jutting out a mere five days' march from the heart of France." Joseph Jacques Césaire Joffre, *The Personal Memoirs of Joffre: Field Marshal of the French Army*, vol. 1 (New York and London: Harper & Brothers, 1932), 327–328.

[180] Bidwell and Graham, *Fire-power*, 70.

Army leaders faced another challenge from the British high command. Even as the army worked frantically to build its combat power in France, a faction (led by Winston Churchill and Lloyd George) sought to divert resources to other theaters.[181] Everyone agreed that the Western Front was now deadlocked. They disagreed, however, about whether there was a better way to end the war. Churchill and his supporters advocated an 'Eastern' strategy to attack in the Dardenelles.[182] On the other side, John French and, after his removal, Douglas Haig believed that the only way to defeat Germany was to wear down and defeat its army in France. In their view, diverting resources from the Western theater prolonged the war.[183]

Operationally, the only way for the British army to thread the needle between the political imperative to attack and the material constraints against decisive action was to continue making small-scale attacks. Timed to coincide with larger French offensives, British units deliberately sought modest, limited objectives instead of a massive penetrations or decisive breakthroughs. This was especially true after Haig took command of the BEF in September, 1915. Having espoused the belief that a continental war would be one of attrition, Haig now commanded an army incapable of mounting a decisive operation.[184] Thus, Haig's goal for

[181] Paddy Griffith, *The Great War on the Western Front: a Short History* (Barnsley: Pen & Sword Military, 2008), 19–20.
[182] The campaign's initial objectives were to draw Turkish forces off of the Russians and to give Bulgaria and Greece reason to join the Entente. Originally, Churchill hoped to force the Dardenelles by naval power alone. After this failed in March, 1915, a combined force of British, Australian, and New Zeland soldiers under Sir Ian Hamilton mounted an amphibious assault in April. Both the initial and subsequent landings were failures. The British withdrew its ground troops in late 1915 and 1916. Bulgaria joined the war on Germany's side and Turkey remained in the war until 1918. For an in depth discussion on the campaign, see Merrill L Bartlett, *Assault from the Sea: Essays on the History of Amphibious Warfare* (Annapolis, Md.: Naval Institute Press, 1983); Peter Hart, *Gallipoli* (Oxford; New York: Oxford University Press, 2011).
[183] Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 86.
[184] Bidwell and Graham, *Fire-power*, 70 & 80.

the rest of 1915 was to kill German soldiers while husbanding his own until a chance to breakthrough presented itself.[185]

Dependent Variable

Offensive tactics

Shoot and move: Neuve Chapelle and Aubers Ridge British divisions demonstrated a remarkable willingness to experiment and innovate during the early battles of 1915. For the most part these tactical experiments involved giving infantry units more firepower, allowing them to advance under the effects of their own suppression.[186] At Neuve Chapelle (March) artillery units used the cover of darkness to position field guns directly in the front trenches.[187] Parts of the assault force actually penetrated German lines during this attack. It ultimately failed not because the tactics were unsound, but because units did not know what to do after breaking into the German line. Instead of pressing the attack, British soldiers stood fast. They waited seven hours for reinforcements and orders.[188] By the time they renewed their attack the Germans managed to build a hasty reserve line behind the breach.

[185] It might seem that Haig's focus on attrition undercut the army's interest in, and incentives to develop, modern assault tactics, combined arms, and defense in depth. This view, however, conflates modern tactics with maneuver warfare (the attempt to seek decisive victory by hitting an enemy's so-called center of gravity instead of wearing him down). The two are not synonymous. Modern tactics can be used in attrition warfare just as surely as they can be used in maneuver warfare, although the reverse may not be true (i.e. wave formations, the lack of combined arms, and shallow defenses may not be conducive to maneuver warfare goals). In fact, assault tactics, combined arms, and elastic defenses in depth all allow – or aspire to allow – one side to impose disproportionate casualties on the other side. Therefore, it is entirely likely that the British might have been even better at waging attrition warfare had they adopted these techniques earlier in the war. See chapter 8 for a detailed version of this argument.
[186] Samuels, *Command or Control?*, 109.
[187] Strawson, *Gentlemen in Khaki and Camouflage*, 113; Samuels, *Command or Control?*, 104–105.
[188] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 30–31.

Tactics at Aubers Ridge were even more progressive. Having learned that positioning field guns in the front trenches made them vulnerable targets, the First Army put light cannon, heavy machine guns, and engineers directly into the assault waves.[189] The goal was to give infantrymen enough firepower to press the attack without having to wait for traditional artillery support.[190]

Unfortunately, these innovative tactics did not save the assault from disaster. Attacking units lost 10,000 men (in exchange for 900 Germans), most of who were killed in the first ten minutes.[191] The problem had nothing to do with the novel tactics and everything to do with poor infantry-artillery coordination and inappropriate formations.[192] The pre-assault barrage lifted before the first infantrymen climbed out of their trenches. As a result, German gunners were free to pour fire into the infantry as they tried to climb out of their trenches and get into formation for the assault. Worse yet, soldiers lumbered across No Man's Land in long waves with men three paces apart. The long lines were a perfect target for German machine gunners, who stopped firing once they could no longer stand the carnage.[193]

As always, cause and effect was hard to establish. Rather than parse through the battle to figure out which tactical experiments worked, and which did not, the high command

[189] Ibid., 42. See also "Trench Warfare," February 1915, 7, Joint Services Command and Staff College Archives, Shrivenham.
[190] Units had already learned that it was virtually impossible for assault waves to maintain contact with the artillery units supporting them once the attack was under way. "Tactical Notes," 1915, 1, WO 33/721, The National Archive, Kew.
[191] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 48–51.
[192] Samuels, *Command or Control?*, 105–109.
[193] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 48–49.

rejected the approach wholesale. It is telling that in the German army, Major Kalsow's was experimenting with similar techniques at roughly the same time.[194] Kalsow's initiation by fire was also a failure. The difference was that the German high command recognized the difference between poor implementation and a flawed underlying concept. Instead of abandoning the entire project the Germans made a leadership change and continued with the project.

Shoot then move: Festubert and Loos After Aubers Ridge the British abandoned fire and movement. From this point until late in the war the BEF focused on firing then moving.[195] British officers thought it technically and tactically impractical for infantrymen to carry their own firepower. Therefore, the only other option was to make the pre-assault bombardment so powerful the infantry would not need much firepower at all. At Festubert (mid-May – ten days after Aubers Ridge) British infantry went over the top after the army's first multi-day bombardment. And they did so armed with only rifles and bayonets.[196] Unfortunately, British commanders failed to redress the real sources of failure at Aubers Ridge. Infantry-artillery coordination was still poor, and the pre-assault barrage again

[194] This was also when Captain Andre Laffargue began work on his pamphlet, which described a set of tactics similar to those eventually adopted by the Germans. Andre Laffargue, "Impressions and Reflections of a French Company Commander Regarding the Attack" (Harrison and Sons, 1916), Imperial War Museum; Griffith, *The Great War on the Western Front*, 22. However, unlike the Germans (but like the British) the French did not adopt these practices army-wide by war's end.

[195] Aubers Ridge and Festrubert took place ten days apart. However, this was not a case of one attacking unit trying out a different technique than another. Haig's First Army conducted both attacks.

[196] Wynne, a British officer during the First World War, wrote that the pre-assault bombardment at Festubert lasted for three days. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 60. Martin Samuels concurs with this account. Samuels, *Command or Control?*, 109. Interestingly, Haig, whose First Army mounted the attack, recalls that the barrage lasted only 40 minutes. Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 93. The official history of the war concurs with Wynne and Samuels and so I rely on their estimates. Also, the entry in Haig's diary lists the assault as having occurred on the 9th of May. The battle did not begin until the 15th. It is worth pointing out that Festubert was also the first major infantry attack launched at night.

lifted before assault units were out of their trenches. Nor did they alter their dense assault waves. This meant German defenders were once again free to pour fire – especially from the flanks – into the ranks of tightly packed British infantrymen.[197]

Festubert, while not an abject failure like Aubers Ridge, was also not a major success. It was not even a minor one.[198] Yet it must have represented a relative success to someone in the high command, because British commanders decided to reuse the tactics at Loos. The Loos offensive was preceded by a four-day bombardment. Infantry-artillery coordination remained poor. Assault units did incorporate greater depth in their formations, but they attacked in even more densely packed lines. The assault formation used by the 9th Scottish Division was representative.[199] The division covered a 1,600-yard front. Its forward most units attacked in three waves. Three more waves followed behind. The role of this second echelon was to leapfrog over the first three waves once the first trenches were taken. In fact, aside from the larger scale, there were only two major differences between Loos and Festubert: assault battalions now had four Lewis light machine guns to augment the firepower of their rifles;[200] and the British used gas as part of the pre-assault bombardment for the first time.

[197] The General Staff clearly began warning units to increase their dispersion and to guard against enfilading fire, for which German machine gunners were good at delivering, in 1914. This suggests the degree to which front line units ignored tactical updates from the General Staff and high command. "Notes from the Front, Part I," 6; "Notes from the Front, Part II," 14.
[198] The multi-day assault yielded around a kilometer of ground.
[199] What follows is taken from Griffith, *Battle Tactics of the Western Front*, 54.
[200] There were not enough to make a significant difference (by 1918 a platoon would have two Lewis guns, and a battalion 36). Stephen Bull, "The Early Years of the War," 249. More important, units lacked appropriate tactics to maximize their potential.

If Aubers Ridge was an abject failure, Loos was an unmitigated disaster. Not only did British units make the same mistakes they made at Aubers Ridge and Festubert, but they repeated them in the face of significantly improved German defenses.[201] The BEF lost nearly 43,000 soldiers as compared with 10,000 German casualties. Loos also cost Sir John French command of the BEF. Douglas Haig replaced him, even though Haig had been the one in command of the assault forces at Loos, just as he had been at Neuve Chapelle, Aubers Ridge and Festubert – four 'limited' offensives that killed or injured over 90,000 British soldiers. Unsurprisingly, given the decision to promote Haig, the change in leadership did not translate into a change in tactics.[202] As 1916's epic battles would soon demonstrate, instead of experimenting and evaluating alternatives, Haig chose to double down on the status quo.

Offensive Doctrine as of December 1915
Table 6.13

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	No
Organic firepower	No
Bypass resistance	No

[201] By Loos German defenders were making widespread use of reverse slope defenses and were adding depth to their positions – both lessons learned during the Entente offensives in March and May. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 72–77.

[202] It is actually rather shocking to see how little Haig cared about tactics, especially when one considers how operations, strategy, and grand strategy depended on the ability to solve the tactical stalemate. His memoirs, written on a near daily basis throughout the war, mention tactical issues perhaps a half dozen times. This is striking when compared to Ludendorff's or even Joffre's memoirs (and while Haig commanded army forces in one theater, Ludendorff acted as a de facto dictator of the entire German nation by 1918. Yet Ludendorff clearly recognized that tactical problems were central to the war effort and paid them corresponding attention.) In fact, one finds that Haig writes about having lunch or dinner with his wife more than he writes about the tactical problems plaguing his ability to win the war. See also Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York: Cambridge University Press, 2011), 86. For examples of Haig's rare interest in tactical issues, see Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 268; 269; 270.

Combined arms

Neuve Chappelle and Aubers Ridge At Neuve Chapelle and Aubers Ridge British forces flirted with proto-hurricane barrages;[203] and integrating artillery fire with infantry maneuver.[204] The pre-assault bombardment at Neuve Chapelle was kept deliberately brief – it was only 80 minutes long – to maximize shock and surprise.[205]

At Aubers Ridge the bombardment was half as long. While it achieved surprise, it was far too brief to do any serious damage to German defenses given the gunnery techniques in use at the time.[206]

Festubert and Loos As discussed, after Aubers Ridge commanders sought to separate fire and maneuver.[207] Essentially, they decided, "to adopt the existing French practice of long methodical bombardments… to wear the enemy down."[208] The British called these 'attacks for limited objectives,' or 'bite and hold' tactics.[209] The approach had its logic.[210] British commanders knew that their infantry needed firepower to move across the battlefield. Since they had decided (or at least assumed) that it was impossible to achieve by integrating fire and maneuver, the next best option was to sequence the two activities.

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[203] It would be inaccurate to call them true hurricane barrages for at least two reasons. First, British gunners lacked the ability to execute predicted fire in 1915. This means that the pre-assault barrages at Neuve Chapelle and Aubers Ridge were, round for round and minute for minute, less devastating than those at Cambrai (1917) or during the Hundred Days (1918). Second, it is not entirely clear that the barrages at Neuve Chapelle and Aubers Ridge were deliberately kept brief to retain the element of surprise; or whether they were brief because of ammunition shortages. Certainly, the fact that the pre-assault barrage at Aubers Ridge on May 5th was 40 minutes long, while the barrage at Festubert a mere week and a half later lasted for three days suggests deliberate design.

[204] "The action of the artillery and infantry must be simultaneous and combined." "Trench Warfare," 9.

[205] The pre-assault bombardment at Neuve Chapelle was the most concentrated one the British would use (in terms of shells per minute) until 1917.

[206] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 42.

[207] Peden, *Arms, Economics and British Strategy*, 63.

[208] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 51–52.

[209] The French called it methodical battle.

[210] Again, the overarching argument is not that the British were wrong. It is that there was a better solution.

From Festubert on the artillery fired. Then the infantry moved. If everything worked according to plan a large-scale offensive could 'nibble' its way through German lines by mounting a series of shallow attacks. The problem was that 'bite and hold' tactics came with a built-in trade-off: objectives had to be kept shallow.[211] The infantry could only occupy what the artillery smashed, and the artillery had a finite range.

The system's logic notwithstanding, 'bite and hold' were not the answer to deadlock. They were not the best way to achieve Britain's overarching goal of pushing the German army out of Belgium. Nor were they even the best way to wage a war of attrition.[212] The approach had three insurmountable flaws. First, it was impossible to achieve tactical surprise in an attack for a limited objective. Long bombardments gave defenders ample warning, allowing them to bring up reserves. British planners knew this was happening, but hoped that surprise would become less important as the artillery's killing power increased. After all, there was no need to surprise that which was already dead. Second, 'bite and hold' attacks robbed an attack of its momentum and flexibility. Since artillery provided the firepower, assaulting troops had no way to exploit unanticipated opportunities or overcome unanticipated resistance. The assault waves could not take advantage of opportunities or openings that might arise. Pushing beyond preplanned objectives meant the artillery had to shift, and this took time. The inability to deal with unanticipated setbacks was the bigger problem because fierce pockets of resistance could thwart an attack for even the shallowest of objectives. Third, no matter how powerful pre-assault bombardments grew, defenders

[211] British commanders seemed well aware of this trade-off.
[212] It is not even clear that they were the answer to winning a battle of attrition. By mid-war attackers and defenders achieved a crude parity in terms of their ability to kill one another. This was definitely not the best way to win a war of attrition.

always survived. This fact presented a real problem when a single machine gun position had the power to cut down a battalion. The Germans also had an easy solution – they increased the depth of their defensive position, keeping counterattack units safely beyond the artillery's reach.[213]

The fact was that no artillery bombardment, no matter how powerful or methodical, could replace the need for organic firepower within the assault waves themselves.
To be clear, it was not wrong to attack for limited objectives. It made sense to wear German defenses down until conditions were appropriate for a decisive push. The problem was that the British tried to attack for limited objectives by separating fire and maneuver.

It is also fair to state that the ability to combine fire and maneuver with an attack of any sort (deep or shallow) was beyond all three armies' in 1915. Methodical battle; attacks for limited objectives; and bite and hold tactics made sense in the war's earliest phase. The British cannot be criticized for taking this interim step given the industrial, political, tactical and technological constraints they faced in 1915. They can, however, be criticized for abandoning fire and movement wholesale and doubling down on methodical battle instead. Given that the Germans continued to systematically work on fire and maneuver throughout 1915 and 1916 gave them a tremendous tactical advantage once the industrial and technical prerequisites were in place by 1917.[214]

[213] And they were in the right place given the aforementioned lack of surprise.
[214] As a side note: some may ask about the creeping barrage (a wall of shells that advanced ahead of the assault waves to protect them as they moved across No Man's Land.) Some British units did experiment with the creeping barrage in 1915. It was reportedly used on a small scale at Loos. However, creeping barrages were not used on a large scale until 1916. It will therefore be discussed as a development during that year.

Combined Arms Doctrine as of December 1915
Table 6.14

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

The British made few changes to their defensive doctrine in 1915. In most sectors, units added second and third trenches to support the forward trench line. Trenches were generally no more than 200 yards behind one another, giving the total network a depth of less than 600 yards.[215] The front trench was often shallow and lightly held, with the bulk of troops located in the second and third lines.[216] Commanders knew that in a major attack the front line might be lost and its defenders forced to fall back on the support trenches.[217] However, there was no provision for deliberately abandoning the front line. Nor were troops allowed to fall back beyond the support trenches. Other defensive improvements included positioning trenches on reverse slopes and deliberately concealing positions – especially those of artillery batteries - from aerial observation.[218]

The fact that British defenses did not evolve significantly in 1915 might seem to make sense. After all, the German army shifted into a defensive posture on the Western Front after the First Battle of the Ypres (October, 1914). Aside from a small offensive in Ypres in

[215]"Trench Warfare.". Balck argues that second and third lines were no more than 25 yards behind the front line, although this seems extremely shallow, even by 1915 standards. Wilhelm Balck, *Development of Tactics: World War I* (Fort Leavenworth, Kan: The General Service Schools Press, 1922), 32.
[216] "Trench Warfare," 16.
[217] Ibid., 15.
[218] Balck, *Development of Tactics: World War I*, 32. See also "Notes from the Front, Part III" (The General Staff, February 1915), 31–33, Z204, Joint Services Command and Staff College Archives, Shrivenham.

April 1915, British units faced no major attacks from the Germans. Yet such an explanation is superficial as it incorrectly equates the defense with passivity.[219] German units were never idle. They kept continuous pressure on British and French lines through minor attacks, raids, and feints, any of which could result in a rupture. This was especially true given that most parts of the Entente's lines lacked significant tactical depth.

Defensive Doctrine as of December 1915
Table 6.15

Depth	No
Elasticity	No
Counterattack	No

Independent Variables

CAT offers a strong explanation for why British doctrine 'muddled along' through 1915. The army's command culture centralized as the organization grew in size; it continued to lack an effective assessment mechanism; and training remained decentralized. In effect, it shifted into the worst possible category for doctrinal optimization.

Command culture

The British army's command culture centralized rapidly in 1915. Only top leaders exercised significant autonomy by year's end. Leaders at every other level were conformed to their wishes. Evidence supporting this assertion is manifest. As the war entered its second year, planning became excessively top down, rigid, and stereotyped.[220] A General Staff memorandum issued in February, 1915 stated that "it is essential that the most

[219] Griffith, *The Great War on the Western Front*, 27–28.
[220] Ramsay, *Command and Cohesion*, 166.

minute details should be thought out and prepared."[221] Commanders at all levels, including division and corps commanding generals, "froze into inaction waiting for orders from higher command."[222] This is certainly what happened at Neuve Chapelle.[223] As one company commander complained in December, 1915, "initiative was 'asked for, but woe to the man who displays it.'"[224]

Of course, centralized planning did not inevitably lead to bad planning. The problem was that the British army combined hierarchical planning with a culture that did not tolerate criticism.[225] Officers were expected to demonstrate optimism and a can-do spirit, not to question their superiors' orders. This expectation reached its zenith after Haig ascended to the BEF's supreme command.[226] There was also the issue of misplaced priorities. Throughout the war senior BEF officers were notorious for obsessing over pomp and circumstance. Haig regularly criticized army and corps commanders when their soldier failed to salute or walked around in dirty uniforms. The obsession with form over substance was pathological among senior officers. "Allenby (Third Army) was notorious for haranguing a dead body for not wearing a helmet; Gough (Fifth Army) went around the trenches spotting dirty rifles; and Hunter-Weston inspected latrines whenever he visited a unit."[227]

[221] "Trench Warfare," 3.
[222] Robbins, *British Generalship on the Western Front 1914-18*, 61.
[223] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 28.
[224] Robbins, *British Generalship on the Western Front 1914-18*, 61.
[225] Kennedy, "Britain in the First World War," 52–54.
[226] Bidwell and Graham, *Fire-power*, 70–71.
[227] Robbins, *British Generalship on the Western Front 1914-18*, 16.

Cumulatively, a culture of conformity dominated the British army for the next two years.[228] As one staff officer remarked about general officers, they were "far more 'terrified of their own rules and regulations' than they were 'of the Germans; or of losing the war; or of getting uselessly killed many thousand men.'"[229] The effect on doctrinal optimization was toxic. It meant officers could not debate doctrinal decisions.[230] It was also made it harder for commanders to suggest alternative tactics or to advertise local experiments. In short, the culture of conformity stymied the variation that is essential to learning and evolution.

This of course begs the question – why did the British army centralize control on the battlefield given the obvious costs? Aside from the fact that British leaders did not know that rigid control undercut learning, centralization may have been a logical response to the army's massive expansion.[231] The army grew by 27 divisions in 1915 alone. Civilians with no military experience comprised the overwhelming majority of this influx, and the army's senior leaders were deeply suspicious of their warfighting abilities.[232] Compounding matters, the prewar British army lacked a deep reserve of leadership, but someone had to lead the legions of citizen-soldiers into action. The only solution was to promote civilians directly to positions of authority; transform enlisted men into officers; or bring retired officers back on active duty.[233] None of these options were appealing to the small and insular British officer corps.

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[228] The key point is that it permeated every level of command, from the army to the platoon level. Ramsay, *Command and Cohesion*, 169.
[229] Robbins, *British Generalship on the Western Front 1914-18*, 62.
[230] Kennedy, "Britain in the First World War," 52–54.
[231] Ramsay, *Command and Cohesion*, 169.
[232] Griffith, *The Great War on the Western Front*, 35. It did not help that their training was necessarily ad hoc and abrupt.
[233] Stephen Bull, "The Early Years of the War," 29.

It is important to remember that centralization was still a choice. It was not an inevitable response to expansion. British officers had other options other than to use hierarchy as a buttress against inexperience and incompetence. The German army also grew rapidly, accepting large numbers of reservists (albeit ones with military training) and conscripts into their ranks. Nevertheless, the German army's command culture grew more decentralized as the war progressed. Indeed, German war planners were unique in their willingness to press reserve formations into front line action.[234]

Command culture as of December 1915
Table 6.16

Senior generals only	X
Battalion commanders and above	
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

The British army did not develop a doctrinal assessment mechanism in 1915. No agency, organization, or group met the three criterion described in chapter 3. Manpower shortages and the demands of a rapidly expanding army continued to prevent the General Staff from doing rigorous doctrinal analysis.[235] No other civilian or military entity filled this gap. The War Office, although receptive to new ideas, did not intervene to "create a clearing house for information, doctrine, or analysis."[236] Nor did the BEF's General Headquarters (GHQ) in France. As the Travers explains, through at least 1916 GHQ failed to institute "any method

[234] Whether this was tactically wise or not is another matter entirely. Gudmundsson's discussion of a reserve unit's attack at Ypres suggests that there were significant drawbacks to such an approach.
[235] Robbins, *British Generalship on the Western Front 1914-18*, 34.
[236] Ramsay, *Command and Cohesion*, 167.

for analyzing lessons learned or for a meaningful discussion of tactics."[237] For the most part, GHQ existed simply to carry out General Haig's orders.[238] It also did not help that GHQ stopped sending staff officers to visit the front.[239] Thus, whether through deliberate design or unintentional omission, the army's highest headquarters and staffs (to include its most powerful civilian officials) abdicated control over doctrinal thinking. As a result, doctrinal development remained ad hoc.

Two other factors exacerbated the army's doctrinal challenges. The first is highly related to the army's command culture at the time. Doctrinal analysis is only as good as the information on which it is based. In the British army it was not based on good information. The fact was that front line officers felt compelled to whitewash their reports to avoid 'unpalatable truths.'[240] Officers at each step of the chain of command strategically incorporated what they anticipated their superiors wanted to hear into their after action reports, limiting the amount of accurate information reaching top level planners. For their part, senior officers tended to pack their staffs with officers that agreed with them.[241] This created powerful incentives to conform in an army where patronage and promotion were strongly linked.[242]

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[237] Travers, "Learning the Art of War: Junior Officer Training in the British Army from the Eighteenth Century to 1914," 95–96.
[238] Travers calls GHQ Haig's 'rubber stamp,' Travers, "A Particular Style of Command," 367–368. Note that there is no evidence suggesting that Lloyd George intervened to improve the army's doctrinal foresight. He did, however, want to undercut Haig's power without removing him as the BEF's C-in-C outright, which would have been a politically perilous move given Haig's stature.
[239] GHQ made this decision because too many staff officers were getting killed while visiting the front lines. Lower ranking staff officers were sent in their place. Ibid., 366. Abandoning this practice meant that neither the army's highest ranking officers nor its most experienced staff officers had first hand knowledge of front line conditions.
[240] Robbins, *British Generalship on the Western Front 1914-18*, 8–9; Griffith, *Battle Tactics of the Western Front*, 6–7.
[241] Travers, "A Particular Style of Command," 366.
[242] Kennedy, "Britain in the First World War," 52–54.

Second, the army's ability to pass and record information was also broken. Staff procedures were not standardized across divisions, corps, or armies.[243] This hampered information flow between units as well as up and down the chain of command. Similarly, higher formations (armies and corps) did not 'own' their subordinate units (corps and divisions, respectively). Instead, the BEF rotated divisions through corps. A division might join a corps just long enough to participate in one offensive; then it would find itself attached to another. IV Corps had 12 different divisions rotate through it in 1916; XVII Corps owned 30 different divisions in 1917. This practice impeded institutional memory at the highest levels.

Collectively, the absence of a central assessment mechanism, the army's culture of conformity, and crude organizational lines of communication undercut the army's ability to learn from its experiments at Neuve Chapelle and Aubers Ridge.[244] It is perhaps unsurprising then that the British high command would emulate French tactics rather than develop their own.

Assessment mechanism as of December 1915
Table 6.17

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

[243] An inevitable consequence of the fact that neither corps nor armies existed in the prewar army. This, and what follows in the rest of this paragraph, is taken from Robbins, *British Generalship on the Western Front 1914-18*, 20–26.
[244] Samuels, *Command or Control?*, 116.

Training structure

1915 marked the beginning of the British army's long transition towards centralizing control over its training – one that would not culminate until mid-1918. The massive influx of volunteers for Kitchener's New Armies drove centralization. The differences were modest and there was still more continuity than change. Recruits still reported to their local regimental depot for an initial uniform allotment and field gear. The depots did conduct some basic training in drill, discipline, and regulations, however the main goal of depot training was to 'toughen' the men for live in the ranks, not to teach them how to fight.[245] From there, depots shipped recruits to their respective battalions. In 1915 this meant that most men were sent to New Army battalions stationed throughout England, although for some it meant reporting directly to France. Battalions continued to handle all field and combat training, just as they had done before the war.[246] Understandably, this led to tremendous variation in how different recruits were trained.[247]

The seeds for change were planted when GHQ began to worry about the quality of their junior officers and non-commissioned officers. The solution was to organize schools located in France for new officers and NCOs in each field army. Units could send their junior leaders to these schools for training. The Third Army seems to have been the first to organize such a training program.[248] As time went on commanders also realized that it was easier to train specialists (e.g. officers, machine gunners, grenadiers, etc.) at centralized schools rather than in the unit itself.

[245] Perry, *The Commonwealth Armies*, 11; Pegler, 96–97.
[246] Pegler, 95–96.
[247] Samuels, *Command or Control?*, 154.
[248] Robbins, *British Generalship on the Western Front 1914-18*, 91.

Again, the changes were subtle. Most new soldiers were not specialists and commanders saw no need to relinquish control over their training. The schools themselves were not coordinated or uniform. A school for machine gunners in one division may have had a different curriculum than the same school in another division. Most importantly, neither the army nor GHQ appointed a senior officer to inspect and control the various schools. Length, content, and quality varied accordingly.[249]

Training structure as of December 1915
Table 6.18

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites		X

V. 1916

Assault tactics	No
Combined arms	Exp.
Elastic defense in depth	No

Command culture	Centralized
Assessment mechanism	Dev.
Training structure	Mod. Decentralized

1916 was a year of contradiction for the British army. It marked the low point for doctrinal learning. At no point and in no place was this more evident than it was on the 1st of July at the River Somme. Here, 58,000 British soldiers were cut down as they lumbered across No

[249] Ibid.

Man's Land in waves 16 men deep. 1916 also marked the high point for centralized authority, as Haig and his small cabal of hand picked officers exerted singular control over the army.[250]

Yet 1916 also marked the beginning of change.[251] Having successfully navigated the munitions shortages and rapid expansion, GHQ started thinking about doctrine in a more coherent way. Equally important, we also start to see a shift away from centralized command and control, as the first senior officers started to see a need for small unit autonomy. While offensive and defensive tactics continued to lag, 1916 also marked two key advances in British combined arms doctrine (at least its artillery and tank components). These changes did not yield doctrinal optimization in 1916. They did, however, lay the foundation for rapid doctrinal change in the war's final two years.

[250] Except, ironically, how they trained and how they fought. Chapter 8 deals with why Haig's lack of interest in tactical methods did not constitute decentralized control over this important issue (i.e. that disinterest did not create a free and protected space for the army to develop alternative methods). The gist of the argument is twofold. First, Haig set the assumptions framing how the army would fight (i.e. methodical battle; war of attrition; the need to separate fire and maneuver). Even if he did not take an active interest in how those assumptions translated into concrete tactics, those assumptions framed and drove tactical thinking. Why would officers experiment with fire and maneuver tactics if they knew the army's overarching stance was to separate the two activities? Second, the army's culture of conformity compounded the problem. Not only did Haig's assumptions frame the debate, thereby limiting experimentation; but the army's command culture magnified the incentives for junior officers to conform to his expectations and the costs of challenging his assumptions. Chapter 8 also deals with the argument that the BEF's optimization troubles were simply a function of Haig's style of leadership. Certainly, Haig is a central figure whose influence was critical. However, the fact is that Haig was not the product of nothing. He rose through the ranks in a system that already tended towards centralizing authority. Although we cannot now the counterfactual, it is plausible that other senior officers would have shared his leadership style – especially in the face of rapid organizational expansion. After all, were Haig the only dictator in an organization full of non-conformists than he would not have been able to exercise authority as effectively as he did.

[251] As I will endeavor to show, neither defeat nor civilian intervention (triggered by defeat) were responsible for these changes. Rather, change originated within the BEF as leaders started to recognize that linear formations, stereotyped attacks, and dis-integrated fire and maneuver were not yielding the desired results.

Political, strategic, and operational situation

Politically, British leaders agreed that the BEF needed to make a decisive push in 1916. They agreed on virtually nothing else.[252] Various factions inside the government and high command argued for decisive action in different theaters, including the Western Front, the Balkans, and Baghdad.[253] Other senior leaders were split over timing. Some wanted to press the attack as soon as possible, while others, most notably Lloyd George, called on the army to wait until mid-summer.[254]

British and French leaders reached an agreement in early 1916.[255] By mid-summer, French forces would lead a combined offensive on the Western Front near the River Somme.[256] For their part, the British hoped such an attack would draw German units away from the Ypres sector, allowing the BEF to mount a second breakthrough attack in Flanders.[257]

The German army did not cooperate, preempting the Entente's planned offensive with a massive attack of its own on February 21st. Striking at the historic fortress city of Verdun, the Germans sought to draw the French army in and bleed it dry. General Joffre had no choice but to shift his forces accordingly. Verdun undercut the planned Somme offensive.

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[252] Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 124–125.
[253] According to Haig, some even called on the Entente to revert to a defensive posture so the German army could wear itself out. Ibid., 124.
[254] For their part, Britain's allies were similarly split. Joseph Jacques Césaire Joffre, *The Personal Memoirs of Joffre: Field Marshal of the French Army*, vol. 2 (New York and London: Harper & Brothers, 1932), 411.
[255] General Joffre says the agreement was reached on February 14th, 1916. Ibid., 417.
[256] This point was selected because it stood at the intersection between the two armies, and not because it was particularly well suited for a major offensive. In fact, it lacked virtually everything needed to support such an undertaking, including roads, railheads, and an easily accessible water supply. All of these pre-requisites had to be built beforehand, giving the Germans ample warning about where the impending hammer would fall. Bidwell and Graham, *Fire-power*, 80.
[257] Samuels, *Command or Control?*, 124–125.

Far from a decisive push, the Somme offensive became an attempt to draw pressure away from Verdun.[258] It also became a primarily British undertaking.[259]

The Somme offensive was a major setback for the BEF, stretching from June until November without yielding a decisive result.[260] Certainly, some historians argue that the Somme was ultimately a British victory since it compelled the Germans to fall back to the so-called Hindenburg Line. This view is short sighted. The horrific casualties were a major set-back to British morale, even if Haig called July 2nd (the day after the British lost 58,000 men) "a day of downs and ups!" and pointed out that the casualties "cannot be considered severe in view of the numbers engaged, and the length of the front attacked."[261]

Regardless of how Haig judged the Somme offensive, his political masters saw it as a failure. The BEF's performance on the Western Front was one of several key issues that triggered a political crisis in London and helped bring about Prime Minister Asquith's downfall.[262] Asquith's successor, Lloyd George, was a long time critic of Haig's. Lloyd

[258] Bidwell and Graham, *Fire-power*, 81.
[259] Originally, there were to be twice as many French units as there were British units. By July 1st this ratio was inverted. Griffith, *The Great War on the Western Front*, 43. General Joffre promised 43 divisions for the attack in February; reduced this to 29 in May; and finally settled on allocating six for the initial assault. Joffre, *The Personal Memoirs of Joffre*, 1932, 2:464–467. The British supplied the remaining 11 assault divisions. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 106. For their part, the Russians launched the Brusilov offensive in June to try and draw German forces away from the Somme salient. Ironically, at the beginning of 1916 the Somme offensive had been designed to relieve pressure from the Russians.
[260] Although assault units 'went over the top' on July 1st, the pre-assault bombardment began on June, 24th.
[261] Of course, at the time Haig only thought his forces had suffered 40,000 casualties in 24 hours. One wonders if his knowing about the additional 18,000 might have dampened his enthusiasm.
[262] The immediate cause was disagreement over the Industrial Compulsion Scheme within Asquith's Cabinet. However, it is hard to see how a single issue like this could have led to Asquith's downfall absent the larger fallout and political dissent surrounding progress on the Western Front. After all, prominent British leaders were calling for an immediate end to the war; Sir John French had taken to openly criticizing the BEF's performance; and a large number of cabinet officials wanted to see a change in strategy. Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 178–184. France's government fell the same week as Asquith's.

George also took a more active role in managing the war than his predecessor, subjecting Haig to far more scrutiny than he had been forced to deal in his first year as the BEF's C-in-C.[263] From a doctrinal perspective, the important point is that this scrutiny did not extend beyond Haig and his strategic management of the war. Civilian leaders did not intervene in tactical matters. Aside from Winston Churchill, who served as a battalion commander on the Western Front in 1916, and sporadic calls from political leaders for the army to do more with tanks, civilian leaders left the army to its own devices when it came to tactics and doctrine.

Dependent Variable

Little changed in terms of official doctrine and practice between 1915 and 1916. This was especially true of the army's offensive and defensive tactics. The British made more progress in terms of artillery and armor, however, neither were truly combined with infantry maneuver in 1916. Large-scale attacks were still organized around the principle of 'the artillery conquers and the infantry occupies.' Even major breakthrough operations like the Somme offensive were, in reality, just a series of set-piece bite and hold attacks designed to eat methodically through German defenses.

At the same time, cracks started to appear in this system below the level of official doctrine. Several division and corps commanders began to see the flaws in methodical attacks. Thus, experimentation began again. This time it focused on finding a way to increase an assault's flexibility through better task organization and increased emphasis on a new level of

[263] Lloyd George did not, however, relieve Haig. Indeed, despite his future missteps at Passchedaele, Haig remained at the BEF's helm until the war's end.

command: the platoon. The following sub-section on offensive tactics describes these innovative practices. Meanwhile, the sub-section on assessment mechanisms examines how the army's emerging assessment mechanisms captured and disseminated these experiments in a more systematic and coherent way than was possible in 1915.

Offensive tactics

Official doctrine The large-scale British assaults during early July capture how BEF units translated official doctrine into practice by mid-1916. Little had changed since late 1915. The initial infantry assault on the Somme resembled Loos on a massive scale.[264] Assault formations changed little, aside from trading depth for density and positioning skirmishers and bombers ahead of the main body.[265]

The 9th Scottish Division's attack at Longueval (Somme), whose attack at Loos was described in the previous section, was once again representative.[266] The division attacked along a 1,000-yard frontage. While this was a narrower front than it occupied at Loos (about 1,600 yards), the division's men were nevertheless not packed as densely as they had been at Loos. This was because each wave held only six platoons, meaning one soldier every five yards.[267] Depth replaced density – at Loos the division attacked in three waves. At Longueval they attacked in 16. The infantrymen did have more Lewis light machine guns

[264] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 105.
[265] Stephen Bull, "The Somme and Beyond," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K. ; New York, NY, USA: Osprey Pub, 2007), 223–224. Bombers were infantrymen who carried bags of hand grenades instead of rifles.
[266] What follows is taken from Griffith, *Battle Tactics of the Western Front*, 54.
[267] The 1916 Training of Divisions for Offensive Action, written after the battle, nevertheless still called for assault waves to move in line with individual soldiers at 2-4 paces (although five was deemed acceptable if required). General Staff, "Instructions for the Training of Divisions for the Offensive," December 1916, 16, Joint Services Command and Staff College Archives, Shrivenham.

to support their attack than they had at Loos. But the guns remained under the company commander's control, which proved less than ideal for units arrayed by platoon.[268]

The waves of assaulting infantry still did not attempt to maneuver independently. Planners assumed that the week long pre-assault bombardment meant units would not need to fight their way into German lines.[269] The assault unit's depth, not its flexibility or maneuver, gave it the power to overwhelm unanticipated resistance.[270]

Official doctrine continued to espouse the distinction between fire and maneuver. In October, 1916 the Fifth Army circulated a memorandum reiterating that "the decisive factor in every attack is the bayonet" and instructing assault troops that "there must be; (a) No lying down, (b) No firing on the part of assaulting troops, (c) The men…will move over the open and keep out of the communication trenches."[271] "Complicated maneuvers" and formations were similarly discouraged.[272] The fear was that independent maneuver took too much time and risked derailing the intricately timed attack.

Seeds of change We now know how and why this approach was flawed. No matter how powerful, no pre-assault bombardment could eliminate every pocket of resistance. The

[268] Bidwell and Graham, *Fire-power*, 122.
[269] Hence the infamous claim that the infantry could "walk over and take the positions." Samuels, *Command or Control?*, 129.
[270] General Staff, "S.S. 135," December 1916, 15–16. Army planners did recognize that the Lewis gun was useful for giving the assault waves the suppressive firepower they needed to keep defenders' heads down. However, officers were also encouraged to only give their Lewis gunners one-half of their allotted ammunition for fear that they would lose or damage the magazines. Ibid., 47.
[271] Headquarters, Fifth Army, "Memorandum on Trench to Trench Attack by a Battalion Commander in the Fifth Army," October 31, 1916, 11, Joint Services Command and Staff College Archives, Shrivenham; "Lessons from Recent Operations," November 1916, Image 7182, 158/344, The National Archive, Kew.
[272] General Staff, "S.S. 135," December 1916, 9.

assault waves therefore needed the flexibility (and firepower) to overcome these. Depth may have increased the assault's 'driving power,'[273] but without a corresponding decrease in density men were still easy targets. Trained or not, assault units needed better formations and more flexible tactics.

Obviously, British officers did not have the benefit of hindsight in 1916. However, at least a few began experimenting with alternatives during the second half of the year.[274] These experiments were not 'bottom up' in the strictest sense. Only division commanders seemed to have the autonomy, authority and desire to deviate from established practice, although the ideas may have come from their subordinates.[275]

Much of the innovative work explored using the platoon as the basic fighting unit. Hitherto, platoons existed for administrative purposes only. They had no independent role on the battlefield. Some commanders thought in terms of specialist platoons different platoons would execute different tasks on the battlefield (e.g. assault platoons, consolidation platoons, and supply platoons).[276] Others wanted to turn the platoon into a self-contained fighting unit. In other words, every platoon would be functionally identical and sub-divided into two sections of riflemen, one of bombers, and one of light machine gunners.[277]

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[273] Stephen Bull, "The Somme and Beyond," 224.
[274] It is worth noting that such progressive thinking did not represent the official position. The official 'lessons learned' seem to have been that attacks needed to be even more incremental and methodical. Ramsay, *Command and Cohesion*, 181. Indeed, as the section on 1917 shows, BEF units doubled down on their tactics before finally starting to shift towards more flexible assault tactics.
[275] Historians routinely cite division commanders such as Maxse, Stephens, and Shea as early innovators and adopters. At least some of their ideas seem to have come from below. Robbins, *British Generalship on the Western Front 1914-18*, 99–100.
[276] Griffith, *Battle Tactics of the Western Front*, 57.
[277] Robbins, *British Generalship on the Western Front 1914-18*, 99=100.

Regardless of how they might be employed, the basic idea of giving platoons tactical autonomy set the stage for fire and maneuver tactics. Such a change, however, would have to wait for the army to abandon linear formations and wave tactics.[278]

Offensive Doctrine as of December 1916
Table 6.19

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	No
Organic firepower	No
Bypass resistance	No

Combined arms

The British army made a number of important advances in its artillery and armor doctrine in 1916. To be sure, these changes still did not represent 'combined arms.' Haig and others continued to keep fire and movement distinct. However, the army's eventual combined arms doctrine would not have been possible without the innovations developed and implemented in 1916.

Two advances were particularly important: the creeping barrage and the tank. The creeping barrage was an innovation designed to protect assault waves as they crossed No Man's Land. Before the 'creeper,' soldiers had two options: they could try to cross No Man's Land while the pre-assault bombardment was still underway; or they could try to race across No Man's Land after the barrage lifted. Both left a lot to be desired – the using the barrage as cover meant getting hit by British shells; racing across the battlefield meant getting hit by German bullets. The creeping barrage filled this gap. As soon as the artillery

[278]This would not happen in 1916. "The wave formation was satisfactory but there was difficulty in maintaining the distance between the waves." "Lessons from Recent Operations."In fact, most battalions on the Western Front had not organized a single platoon by the end of 1916. Robbins, *British Generalship on the Western Front 1914-18*, 94.

finished firing the pre-assault barrage some of the guns would shift to fire a line shells parallel to British trenches. The object was to force "the enemy to take cover and thereby prevent him manning his defenses before the infantry reach the trench."[279] Infantry would stay as close behind the barrage as possible. The creeper itself would advance at 75 yards a minute over good terrain and 15 yards a minute over rough ground.[280] The goal was to leap into German trenches as soon as the creeper shifted forward.

The creeper immediately showed its value. The same could not be said of the tank. Under development since 1914, Haig had hoped to use tanks en masse on July 1st. Technical challenges meant they were not ready for action until that fall. On September 15th, 50 were finally available to support a major attack near Flers. The attack's commander, Lieutenant General Henry Rawlinson, harbored doubts about the tanks.[281] For their part, the tanks met his expectations. While not an outright disaster, the tanks did not prove decisive either. This is not surprising.[282] Mechanical problems meant nearly half did not make it to the assault.[283] The tanks pulled into position under cover of darkness (to retain surprise), but this meant tank commanders started the battle disoriented. Infantry units had no time to

[279] General Staff, "S.S. 135," December 1916.
[280] Ibid., 13.. One major problem on July 1st was that the creeping barrage shifted 500 yards every three to five minutes. While this made sense given the goal of advancing rapidly, it also meant that the creeper quickly left the infantry behind. Bidwell and Graham, *Fire-power*, 82–83.
[281] Before the battle, Rawlinson told one of his commanders that "I do not think the tanks will actually capture anything for you. They are only accessories for the infantry and the latter must work in conformity with them… we will place… chief reliance on the methods which we are practicing, looking on the tanks as an auxiliary to help us by every possible means." As recounted in P. Hart, *The Somme* (Cassell Military Paperbacks, 2006), 371. In his defense, even the Instructions for the Training of Infantry for Offensive action stated that "In the present stage of their development, tanks must be regarded as entirely accessory to the ordinary methods of attack, i.e. to the advance of Infantry in close co-operation with the Artillery." General Staff, "S.S. 135," December 1916, 41.
[282] What follows is from Hart, *The Somme*, 370–407.
[283] 50 tanks were assigned to participate in the attack. 49 were operational the day of the attack. 17 broke down before the attack started and 14 more were knocked out in the battle's first moments. Elizabeth Greenhalgh, "Technology Development in Coalition: The Case of the First World War Tank," *The International History Review* 22, no. 4 (2000): 812.

rehearse with the tanks before the battle. The units to which tanks were attached were also assigned the most difficult objectives. Finally, the tanks themselves were distributed across the entire front, fatally diluting their shock power. A single unit, XV Corps, opted to use tanks en masse, spearheading its attack with 18 tanks.

Immediate setbacks notwithstanding, tanks represented a major innovation. While they never proved decisive in their own right, they were an important piece to the army's warfighting doctrine by war's end.[284] When used in decisive numbers, tanks combined shock and firepower. Their armor and (relative) mobility was key. Infantry sections could advance behind them, using them for cover. More importantly, they provided firepower when artillery support was unavailable. These advances were beyond the BEF's reach in 1916. Tanks were still too unreliable; armor-infantry tactics had not yet been developed; and infantrymen needed more experience training and fighting alongside tanks. The point is simply that 1916 laid the groundwork for these subsequent advances.

At the same time, it is important not to overstate the British army's progress towards combined arms doctrine. Even by the year's end commanders still focused on the pre-assault barrage.[285] These continued to grow in length and power, although some senior officers realized that the preparatory bombardments were robbing them of surprise.[286] No matter how powerful the pre-assault bombardment, defenders always managed to survive.

[284] Boff, *Winning and Losing on the Western Front*, 140–145.
[285] Doctrinally, these massive bombardments were supposed to demolish enemy trenches, destroy wire and other obstacles, diminish enemy morale, collapse communications trenches, isolate front line defenders from their supplies, and destroy enemy artillery. General Staff, "S.S. 135," December 1916, 9.
[286] Bidwell and Graham, *Fire-power*, 111–113.

Moreover, divisions continued to control pre-assault barrages, fracturing their ability to coherently eliminate deep targets and targets located on or near unit boundaries.[287]

Although it was an improvement, even the creeping barrage had a shortcoming as practiced by the British - corps commanders controlled them. [288] This was far too high a level to adjust the plan once it was set in motion. Assault waves carried flags and rockets to try and communicate with the artillery units firing the creeper, but preplanned timetables remained the main way to coordinate fire support. Troops also came to depend on creepers for protection. This discouraged front line experimentation with non-linear formations and encouraged commanders to pick linear targets to simplify command and control problems.[289]

Combined Arms Doctrine as of December 1916
Table 6.20

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

British defensive tactics stayed the course in 1916.[290] Defensive positions were still too shallow. Trenches were continuous and rigidly held. Commanders positioned reserve units far to the rear to keep them beyond German artillery range. The trade-off was that it took

[287] General Staff, "S.S. 135," December 1916, 61.
[288] Ibid., 14.
[289] Bidwell and Graham, *Fire-power*, 111–113.
[290] What follows is taken from Samuels, *Command or Control?*, 200–202. To be fair, while the overarching doctrine remained largely unchanged, the trenches themselves (and the obstacles protecting them) grew significantly more complex. See General Staff, "Notes on Trench Warfare for Infantry Officers," December 1916, Z251, Joint Services Command and Staff College Archives, Shrivenham.

commanders a long time to shift their reserve units back into action. A bigger problem was that commanders tended to select terrain based on factors other than its tactical defensibility. Since the German army remained on the defensive in the West, this proclivity was not necessarily fatal in 1916. However, habit proved hard to break when the tables were turned and the British found themselves on the defensive in 1918.

Defensive Doctrine as of December 1916
Table 6.21

Depth	No
Elasticity	No
Counterattack	No

Independent Variables

Command culture

The British army's command culture reached its peak level of centralization during 1916. Military historians use scathing terms to British command and control, especially before and during the Somme offensive. Martin van Creveld calls it "as extreme a form as can be found" and as the army's low point in terms of command and control during the war.[291] Williamson Murray argues that the army's culture and "norms were responsible for the catastrophe of 1 July."[292] And Martin Samuels contends that "the British soldiers' inability to carry out anything but the simplest of maneuvers may have owed more to their commanders having little faith in their capabilities than to any actual deficiency in potential skill."[293] Even Paddy Griffith, a leading apologist for the army's performance in the First

[291] Martin Van Creveld, *Command in War* (Cambridge, Mass: Harvard University Press, 1985), 166.
[292] Murray, *Military Adaptation in War*, 22.
[293] Samuels, *Command or Control?*, 151.

World War, concedes that senior officers were unwilling to challenge Haig or his assumptions about how the war was to be won.[294]

The degree to which authority was vested in the hands of senior officers was evident in mechanisms they used to monitor and control their subordinates. Operation orders were extremely detailed, covering issues that would be considered minutia by German and even French standards.[295] Company, battalion, brigade and division commanders were told *not* to go over the top with their men. Instead, these critical leaders were told to stay behind at their command post to keep senior officers apprised of developments. "At its extreme, entire brigades were sent into No-Man's Land with every officer above company level ordered to remain behind."[296] Units were ordered to move directly to their pre-assigned objectives, while rigid, preplanned timetables – not tactical realities – drove operations. Perhaps nothing summarizes the army's command culture better than this statement from a May, 1916 training manual: "During an advance under fire men must possess the habit of looking spontaneously to their leaders for direction."[297] It was top-down leadership at its finest.

One could imagine the massive influx of civilians diluted the army's rigid hierarchy, at least to a degree. Although this assumption is intuitively appealing it did not seem to have happened. Gary Sheffield argues that the New Armies mimicked the pre-war army's

[294] Griffith, *Battle Tactics of the Western Front*, 59.
[295] See the General Staff, "S.S. 135," December 1916, 5.for a list of the items to be covered in a standard operation order.
[296] Samuels, *Command or Control?*, 150.
[297] General Staff, "Training of Divisions for Offensive Action," May 1916, 2, Imperial War Museum.

discipline and culture.[298] More to the point, numbers do not count for much in a hierarchical organization. The career officers in control still doubted the citizen-soldier's ability to fight on his own. As the Fourth Army's Chief of Staff said, "We must remember that owning to the large expansion of our Army and the heavy casualties in experienced officers, officers and troops generally do not now possess that military knowledge arising from a long and high state of training which enables them to act instinctively and promptly on sound lines in unexpected situation."[299] Whatever the cause, it seems clear that the army changed the New Armies and not the other way around.

Command culture as of December 1916
Table 6.22

Senior generals only	X
Battalion commanders and above	
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

If 1916 had a silver lining it was that a semi-coherent doctrinal assessment mechanism finally started to emerge. The transition started with Major-General A.A. Montgomery's Fourth Army. In an effort to standardize how lessons learned were disseminated, Montgomery began collecting and circulating tactical notes for junior officers.[300] GHQ caught on and copied Montgomery. By late 1916 it started publishing a series of doctrinal pamphlets under the Stationary Service (S.S.) moniker.[301] Unlike earlier manuals, S.S.

[298] Sheffield, *Leadership in the Trenches*, chap. 5.
[299] As related in Samuels, *Command or Control?*, 141.
[300] Although GHQ circulated tactical notes as early as 1914 all focused on division operations and higher. Ibid., 140–141.
[301] Strachan, "The First World War," 2000, 901–902; Griffith, *Battle Tactics of the Western Front*, 56; Robbins, *British Generalship on the Western Front 1914-18*, 94–96.

pamphlets covered an entire range of tactical issues; were updated regularly; and were, in many cases, written for junior tactical leaders.[302]

By itself, the S.S. pamphlet series did not constitute a fully functioning assessment mechanism. As Hew Strachan aptly points out, "we do not know who read them, nor how they were applied."[303] More important, there is no evidence that rigorous analysis went into their substantive content, or that they underwent a systematic review. Some of these shortcomings would not be resolved until after the war.

Assessment mechanism as of December 1916
Table 6.23

Conduits	Yes
Capacity (prestige and education)	No
Autonomy	No

Training structure

Aside from the S.S. manuals, not much else changed in terms of training. Training remained the only area in which GHQ did not see fit to assert control. Conscription was introduced in September, and the training pipeline did become more systematic to handle the mass influx of draftees.[304] Recruits reported to regimental depots for gear and initial training. After no more than two weeks of training they would move to one of 112 Training Reserve

[302] S.S. 98 covered artillery tactics. S.S. 111 updated lessons learned from recent battles. S.S. 131 discussed air and artillery coordination. S.S. 135 described training divisions for offensive operations, while S.S. 143 did the same for platoons. S.S. 159 outlined training for officers and non-commissioned officers. Finally, S.S. 204 and 214 dealt with tank-infantry coordination and tank-artillery coordination, respectively.
[303] Strachan, "The First World War," 2000, 902. Strachan says this as a rejoinder to what he sees as Paddy Grifith's overly optimistic assessment of British tactical development between 1916 and 1918.
[304] What follows is taken from Bet-El, *Conscripts*, 42–57.

Battalions for six to eight weeks of individual and small unit combat training. Finally, recruits were formed into replacement drafts and sent to France.

The important point is that a well-defined pipeline did not translate into systematic training. Recruits may have gone through a series of identical and predictable steps en route to France, but this did not mean they learned the same thing at each waypoint. Training was often left to officers returning from India, retirement, or convalescent leave (often for shell shock). Often, they learned outdated tactics, techniques and procedures. Front line units were therefore still responsible for the bulk of a soldier's combat training.[305] Specialized and leader training continued to occur at one of the many overlapping Army, Corps, and Division schools in France. At no point did GHQ (or the War Office; or the General Staff) appoint anyone to oversee and regulate this unwieldy system.

Training structure as of December 1916
Table 6.24

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

[305] Perry, *The Commonwealth Armies*, 19–21.

VI. 1917

Assault tactics	Exp./Dev.
Combined arms	Dev./Dem.
Elastic defense in depth	Dev.*

**Skipped experimentation – copied directly from German army*

Command culture	Mod. Centralized
Assessment mechanism	Dev.
Training structure	Mod. Decentralized

1917 was a pivotal year for British tactical doctrine. Officially, the army started 1917 with a doctrine that had changed little since late 1915. However, the pieces were falling into place for a major transition. Unit-level experimentation became more common after the Somme debacle. Early work on mechanized warfare evolved into a coherent set of tactics. And the army deliberately copied the German army's new elastic defense-in-depth after watching it eviscerate Nivelle's offensive in April 1917.

As with all things on the Western Front, optimization still took time and came at great cost. At Passchendaele, the army had to repeat of many of the mistakes made on the Somme to fully discredit existing tactics. It also took time to experiment, refine, and transmit new practices. Only the army's combined arms doctrine was fully mature by the year's end (it was put to effective use at Cambrai in November 1917). Nevertheless, optimization was possible in 1918 because of the progress made in 1917.

1917, like 1915, provides strong evidence in support of CAT theory. Changes in the army's command culture, assessment mechanisms, and training structured preceded nascent

changes in its tactical doctrines. Moreover, the causal relationship is compelling. This is especially true vis-à-vis assessment and training. Although the British assessment mechanism was never as coherent or consolidated as the German army's, it nonetheless proved effective at collecting information from the front lines, reviewing it for utility, and transmitting it via the army's increasingly centralized training structure. Nor would many of these ideas been available for collection, were it not for the fact that units began experimenting to degree unseen since 1915.

Political, strategic, and operational situation

Britain's supreme leaders started 1917 optimistic that the war could be brought to a conclusion by year's end.[306] That such optimism was hard to understand given the twin fiascos at Verdun and on the Somme; the fact that America was still on the sidelines; setbacks on the Eastern Front; and Germany's unrestricted submarine campaign is beyond this dissertation's scope.[307] In the eyes of senior politicians and generals, 1917 presented the perfect opportunity to seek decision on the Western Front.[308]

The optimism was short lived.[309] Initially, the combined British-French strategy was to mount a massive unified offensive, larger in scale and scope than the original plan for the

[306] For his part, Haig was convinced the Germans had nearly exhausted their resources and manpower. Timothy Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917-1918* (London ; New York: Routledge, 1992), 15–16.
[307] To be fair, Nivelle was also touting his 'war winning' formula in late 1916 / early 1917. Nevertheless, given how often previous 'solutions' failed to yield results, it is puzzling that rational leaders in Britain and France would have seized on it as the near-singular basis for optimism. After all, they had just rejected both a peace offer by Germany and an offer to broker a settlement by President Wilson in December 1916.
[308] Despite agreement among French and British leaders (civilian and military) that the Western Front was the decisive theater, troops and resources were continually being diverted to support operations on other fronts. Haig, Joffre and Nivelle were aggravated most by the continual demand for divisions and artillery in Salonika.
[309] Nor did many of the leaders who held it. Prime Minister Asquith was forced out in December 1917.

Somme. The British attacked first, at Arras in early April, to draw German forces. The French attacked next, near Chemin des Dames. Since it was based on Nivelle's innovative tactics, the French attack was supposed to be decisive. However, in this case innovative did not mean effective. Nivelle (or more accurately, his soldiers) charged head long into Germany's new elastic defenses in depth. The results were catastrophic for morale, if not manpower.[310] Nonetheless, the British army was compelled to launch another diversionary attack at Messines (June 1917) to prevent the Germans from exploiting French disorganization.[311]

The British attempted a second breakthrough at Passchendaele (near Ypres) in July. Once again, failure was over-determined.[312] Haig set too many objectives.[313] The terrain was unsuitable. Germans still held the high ground (as they had since 1914). Here too, German defenses were arrayed in depth. Thus, Haig thrust his men into a series of frontal attacks against one of the deepest and strongest defenses in history.[314]

If 1917 had a silver lining on the Western Front, it was around the Battle of Cambrai in late November. Planned as an afterthought to Passchendaele the hasty offensive turned out to be Britain's most innovative attack of the war. Preceded by a Hurricane barrage (enabled

[310] In all likelihood the political fallout following the battle was out of proportion with its actual costs.
[311] See editor's note, Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 225.
[312] Bidwell and Graham, *Fire-power*, 88–91.
[313] Nor was the plan coherent. Paddy Griffith calls it a hybrid operation – neither a true breakthrough operation nor a true bite and hold attack. Griffith, *Battle Tactics of the Western Front*, 87–89. He also argues that there were too many goals, including clearing the Belgian coast for the Royal Navy; seizing Ostend (which was farther away than any offensive since 1914 had managed to penetrate); and to seize a plateau outside of Ypres. Griffith, *The Great War on the Western Front*, 73–74.
[314] Wynne, *If Germany Attacks: The Battle in Depth in the West*, 298–299.

by predicted fire), a combined tank-infantry team penetrated the Hindenburg Line to a depth of six miles.[315]

Unfortunately, the British were not in a position to capitalize on their success at Cambrai. Domestic politics after Passchendaele meant Haig could not mount another offensive. Wracked by mutiny and manpower shortages the French shifted to the strategic defensive after Chemin des Dames. Britain faced manpower issues of its own. By December the BEF needed 600,000 additional troops. 100,00 were available.[316] Although America was in the war by this point, but Italy and Russia were out. American numbers would not be decisive until 1919. However, Russia's absence meant the Germans would enjoy a numeric advantage on the Western Front for the first time since 1914.[317] In December, Haig learned that the Germans were transporting divisions west from the Eastern Theater, and so he too orders his four army commanders to shift to the defense.[318]

Dependent Variable

Although it had evolved in several important respects, the British army's official doctrine had much in common with its predecessors. [319] During their offensives at Arras, Messines,

[315] Almost all of this ground was lost in a subsequent German counteroffensive – one that made use of combined arms and modern assault tactics and served as the model for Ludendorff's Spring Offensives. But it's just meanspirited to steal from the British at this point, so we'll just leave this in a footnote.
[316] Samuels, *Command or Control?*, 198. Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 271.
[317] Samuels, *Command or Control?*, 194.
[318] Ibid., 199.
[319] Paddy Griffith makes the bold argument that the entire BEF moved to platoon tactics (or what I call modern assault tactics) by the end of 1917, pointing to various training manuals as evidence. I disagree for two reasons. First, as Hew Strachan aptly points out, there is no evidence to suggest that units in the field were using modern assault tactics on a wide scale, even by war's end. Publication in training manuals does not equal implementation and execution, especially not given the British army's problems with standardized training. See Strachan, "The First World War," 2000. Second, I did not find evidence to substantiate this claim, even in the training manuals. I do find

and Passchendaele British troops continued to rely on barrages to wipe out German defenses (most of which now lay outside effective artillery range in any case).[320] Assault units continued to cross No Man's Land in wave formations.[321] And infantrymen continued to rely on the creeping barrage, not organic firepower, for protection.

Since the army's existing tactical doctrine is as well established as its inability to deliver battlefield victory, the following discussion focuses only on change. To do this, we need to look at both official doctrine, where changes were small but evident, and front line experimentation/high level refinement, where the real transformation was taking root.

Offensive tactics

Official The important changes in British doctrine did not happen at the level of official doctrine. If anything, the August 1917 update to the army's division-level manual for offensive operations was disconcertingly similar to its predecessor. [322] However, genuine reforms were taking place in the small unit manuals.[323] The most important of these dealt

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that training manuals advocate *certain* modern assault elements (fire and movement; the organization of platoons). But the manuals also very clearly advocate linear/wave tactics; maintaining contact with flanks; and not bypassing points of resistance, all of which I establish as a core part of modern assault tactics. Fighting as a platoon in 1917 makes little difference if platoons still fought like battalions did in 1916.

[320] At Messines the British fired the largest preparatory barrage of the war to date – 3 million shells in seven days. It was to stand as a record until the Passchendaele offensive two months later, when British gunners fired 6 million shells in two weeks. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 277 & 299. See also Bidwell and Graham, *Fire-power*, 118–119.

[321] At Arras "everything had been very minutely arranged in orders and nothing was left to chance or to the initiative of the commanders." Men crossed No Man's Land in a skirmisher with 4-5 meters between soldiers. Balck, *Development of Tactics: World War I*, 53–55.

[322] Comparing the December 1916 and August 1917 versions of S.S. 135 "Instructions for the Training of Divisions for Offensive Action" one finds two documents that nearly identical in almost every important respect, especially given the major battle and significant shifts in German doctrine that occurred during this period. General Staff, "S.S. 135," December 1916; General Staff, "Training of Divisions for Offensive Action," August 1917, Imperial War Museum.

[323] The fact that the British were issuing training manuals for small units was a remarkable development in its own right.

with how units should organize for combat. For the first time in the war the army mandated that infantry battalions organize themselves in the same way.[324] From April on, every battalion would contain one headquarters element and four line companies. In turn, each company was to be comprised of four line platoons, further divided into four sections. Each platoon was to "constitute a unit for fighting and training, and should consist of a homogenous combination of all the weapons with which the infantry is now armed."[325]

From this point forward, platoons - and not companies, battalions, or divisions -constituted the primary unit of action. Each platoon was to be equipped as a self-contained fighting organization armed with the full range of available infantry weapons. This included rifles, bayonets, Lewis light machine guns (one per platoon), hand grenades, and rifle grenades.[326] Originally, the idea was for the platoon's sections to specialize: one would contain riflemen, one Lewis gunners, one bombers, and one rifle grenadiers.[327] However, a December update to the platoon training manual directed that each section integrate riflemen, grenadiers, and gunners.[328]

[324] This might sound banal. Recall that in December 1916 an inspection found that at least one infantry division had not bothered to organize a single platoon. Bidwell and Graham, *Fire-power*, 126–127. General Staff, "The Organization of an Infantry Battalion and the Normal Formation for the Attack," April 1917, 2, Z390, Joint Services Command and Staff College Archives, Shrivenham. GHQ mandated that every infantry battalion organize its companies into platoons on 7 February 1917. General Staff, "Instructions for the Training of Platoons for the Attack," February 1917, 3, Z854, Joint Services Command and Staff College Archives, Shrivenham.
[325] General Staff, "S.S. 600," 3.
[326] General Staff, "S.S. 143," February 1917, 6.
[327] Ibid.
[328] Although each platoon had only one Lewis gun by table of organization, the manual also recommended that a second gun be attached to platoons with assault missions. SS 143 Instructions for the training of platoons for offensive action December 1917 JSCSC. 6 Paddy Griffith argues that the army mandated 'balanced' sections in July 1918. Griffith, *Battle Tactics of the Western Front*, 95.

Initially, these new organized platoons were told to use old tactics. Companies were still instructed to assault in waves by platoon, with two platoons forward (abreast in two lines) and two platoons back (also abreast in two lines).[329] Platoons were told to maintain contact with units on their flanks at all costs and to keep their company commanders informed at all costs.[330] If they encountered resistance, doctrine encouraged platoon commanders to "push on to the objective at all costs and get in with the bayonet."[331]

This finally started to change with December's update to the training manuals. For the first time, doctrine told platoons to generate their own fire, and to cover their own movement.[332] Thus, fire and movement were finally official doctrine. Equally important, even if wave formations were still the norm, the advent of self contained platoons and balanced sections (i.e. each section had riflemen, gunners, and grenadiers) meant a basis existed for independent movement across the battlefield.

Experimentation and development As mentioned, BEF units actively and independently worked on new tactics throughout the year. Many of these were identified and disseminated by GHQ and the General Staff, even if they had not yet been incorporated in formal doctrine. For example, S.S. 158 captured a range of new practices tried by First, Third, Fourth and Fifth armies. These included integrating combat engineers with advance guards during an assault to breach obstacles; using fire and movement at the section and

[329] General Staff, "S.S. 600," 4 & 12. See also General Staff, "S.S. 600."
[330] General Staff, "S.S. 143," February 1917, 8.
[331] Ibid.
[332] General Staff, "Instructions for the Training of Platoons for the Attack," February 1917, 8–9, Imperial War Museum.

individual level; and attaching as many Lewis guns as possible to assault platoons.[333] The 4th Seaforth Highlanders experimented with 'dribbling' formations, crossing No Man's Land in section-sized columns (i.e. single file lines) instead of platoon-sized waves.[334] Diamond and blob formations became popular in other units.[335]

Offensive Doctrine as of December 1917
Table 6.25

Irregular & dispersed formations	No
Independent small unit action	Yes
Fire and movement (small unit level)	Yes
Organic firepower	Yes
Bypass resistance	No

Combined arms

The British army optimized its combined arms doctrine in 1917. All four elements – Hurricane barrages, predicted fire, flexible command and control, and fire and movement at the large unit level – were in place by year's end. This accomplishment represented the culmination and combination of three disparate elements.

Three strands The first of these were the technical innovations that allowed gunners to fire a barrage without registering their guns first.[336] These included using pilots to observe and shift artillery fire (a development which in turn depended on finding a way to put wireless radios in airplanes, something the British first did in 1915); adopting standard radio frequencies and procedures for calling for fire (allowing any forward observer to call for fire from any gun); radical improvements in survey and mapmaking; work on gun

[333] General Staff, "Notes on Recent Operations on the Front of First, Third, Fourth and Fifth Armies," May 1917, 2–3, Z357, Joint Services Command and Staff College Archives, Shrivenham.
[334] General Staff, "The Organization of an Infantry Battalion and the Normal Formation for the Attack," April 1917, 4 & 12, Z390, Joint Services Command and Staff College Archives, Shrivenham.
[335] Griffith, *Battle Tactics of the Western Front*, 97–98.
[336] What follows is taken from Bidwell and Graham, *Fire-power*, 102–110.

tables to track tube wear (barrels wore down over time and these changes led to predictable differences in shell trajectory); better meteorology (as wind, barometric pressure, temperature, and humidity affected trajectory); and the development of advanced counter-battery techniques.

This last technical advance is interesting because owed much to a bathroom break.[337] As Bidwell and Graham describe it, the story began when a British officer working on counter-battery targeting needed to use the bathroom. While "poised over a thunderbox" (field toilet) the officer noticed that the wind pushing against his rear was stronger when guns fired than when shells exploded. He paired his insight with another corporal's work on using air to cool platinum wires; and a lieutenant's idea to position microphones at equal distances along a straight line. Combined, these three techniques allowed gunners to record distances and directions for all shellfire and to accurately distinguish German and British guns.[338]

Cumulatively, these disparate advances made predictive fire possible. In turn, this meant Hurricane barrages were a realistic alternative. Defenses no longer needed to be destroyed. Neutralization sufficed since artillerymen could surprise defenders by hitting them accurately and without warning.

[337] Ibid., 110.
[338] For an in depth look at the technological challenges and innovations associated with sound ranging see William Van der Kloot, "Lawrence Bragg's Role in the Development of Sound-ranging in World War I," *Notes and Records of the Royal Society* 59, no. 3 (2005): 273–284.

The second set of developments facilitated flexible command and control. As mentioned, for much of the war British command and control over artillery was the worst of all worlds. Division and corps commanders retained control over their artillery assets during all phases of an assault. This was too decentralized to allow for a coherent barrage plan across the entire zone; and it was too centralized to facilitate rapid fire support during the assault. The solution lay in elevating the senior most artillery officers' status within each corps.[339] Early in the war these artillery experts were advisers and had no authority to design a corps artillery plan or to tell division commanders how to use their artillery. In 1917, the senior artillery officer in each corps was formally designated as a General Officer Commanding, Royal Artillery (GOCRA). With the title came the power to control all artillery under them. Ironically, centralization abetted decentralization. Creating a new commander in each corps inexorably meant the creation of new artillery staffs as well. When combined with standardized procedures for calling for fire, these staffs made flexible fire support possible.

The tank was the third major development. The General Staff and GHQ did not abandon the tank after its disappointing performance on the Somme.[340] Rather, the it diverted resources and energy into the Tank Corps' development. Technologically, the army invested heavily in more capable (and more reliable) tanks.[341] Doctrinally, GHQ released a series of

[339] What follows is taken from Bidwell and Graham, *Fire-power*, 151–152.
[340] It is true that GHQ considered them "as entirely accessory to the ordinary methods of attack" in late 1916. This skepticism, however, reflected the tanks' relative lack of technical progress and not a lack of faith in their potential. General Staff, "Notes on the Use of Tanks," October 1916, WO 158/852, The National Archive, Kew.
[341] That said, the Mark IV tank which was in widespread use by late 1917 was only capable of traveling .5 to 3 miles per hour and could only operate for 8 hours before the crew was overwhelmed by fumes (assuming it did not break down before that time). General Staff, "Notes on the Use of Tanks and on the General Principles on Their

instructions to guide tank training and employment.[342] On January 30th, 1917 GHQ also consolidated the various tank training schools under a single commandant and administrative staff.[343]

The key is that senior commanders no longer saw tanks as an auxiliary to the main assault – a reserve asset "to be thrown into the fight for the attack on strong points which are holding up an advance."[344] Although not yet formalized in army-wide doctrine, by October 1917 Third Army recognized what tanks' firepower and mobility could do for an infantry assault, especially when artillery could not prepare the battlefield. In a training note before the Cambrai assault the Third Army's Chief of Staff told commanders that, "Where surprise is essential, occasion may arise when it is advisable to launch an attack at such short notice that it is not possible to prepare it methodically by artillery; in this case it may be found feasible to use Tanks instead."[345] This was a crucial step towards a true combined arms doctrine. At least one senior commander recognized that tanks could fill the firepower gap when artillery was not available (or when infantry moved beyond artillery's range) or the need for surprise ruled out a long preparatory barrage.

Employment as an Adjunct to the Infantry Attack," May 1917, 1, Joint Services Command and Staff College Archives, Shrivenham.

[342] Examples of tank and tank-infantry training manuals include General Staff, "S.S. 164"; General Staff, "Instructions for the Training of the Tank Corps in France," December 1917, Joint Services Command and Staff College Archives, Shrivenham.

[343] The newly established Schools of Instruction at the Tank Corps Training Center oversaw the myriad schools and/or detachments that led training on tank operations; 6-pdr artillery – the weapon carried by 'male' Mk tanks; Lewis gunnery; compass; bombing; revolver; pigeons; and gas. "Central Tank School," n.d., WO 158/802, The National Archive, Kew.

[344] "Extracts from Reports on the Use of Tanks," 1916, WO 158/852, The National Archive, Kew.

[345] Third Army, "Training Note: Tank and Infantry Operations Without Methodical Preparation," October 30, 1917, WO 158/347, The National Archive, Kew.

Although it lagged behind Third Army, GHQ acknowledged that tanks needed to be fully integrated into the artillery and infantry plan. GHQ advocated tactics that truly combined arms.[346] Tanks provided armor and mobile firepower.[347] Infantry could use them to breach obstacles and suppress strong points. Infantrymen could also walk behind the tanks, using their armor for protection. For their part, tanks were large targets and drew heavy fire. Visibility was poor, they were vulnerable to land mines, and were easy to destroy if isolated. These were all weaknesses the infantry could offset. Later, as German artillery gunners developed sophisticated methods for hitting tanks, British artillery was also integrated into the infantry-tank fight, by firing smoke to hide the tanks and firing counter-battery missions to knock out German guns. All of this required extensive pre-battle coordination and rehearsal.[348]

Putting it together: Cambrai All three of these strands – technical innovation, flexible command and control, and tank-infantry integration – came together at Cambrai.[349] Third Army organized its attack to maximize surprise. Artillery and assault units arrived in sector at night and maintained strict light discipline as they moved into place.[350] Each of the six assault divisions had a tank battalion in support. Infantry units divided their tanks into an advanced guard and a main body. After a 1,000 gun Hurricane barrage the advance guard

[346] In other words, tactics in which one arm's strengths offset the other's weaknesses, and vice versa.
[347] This and what follows is taken from General Staff, "S.S. 164"; General Staff, "Instructions for the Training of the Tank Corps in France."
[348] The lack of infantry-tank coordination plagued early tank operations. Much of this was driven by the need to keep the tank a secret. Even the first soldiers selected to operate tanks in March 1916 were only told that they were being transferred to a section of the Machine Gun Corps. "Tank Corps Schools and Appendices," n.d., 1, WO 158/802, The National Archive, Kew.
[349] What follows is taken from Third Army, "Training Note: Tank and Infantry Operations Without Methodical Preparation"; Balck, *Development of Tactics: World War I*, 59–60; Griffith, *The Great War on the Western Front*, 81–83.
[350] Assault troops were also not allowed into the front line trenches until the night before the attack. This ensured that any prisoners captured by German patrols came from units, which knew nothing about the attack.

tanks crossed into No Man's Land, attacking German strong points and breaching the obstacle belt. Main body tanks departed next, advancing behind a creeping barrage. The first infantry units following about 100 yards behind the tanks in platoon columns. The main body crossed the already breached obstacle belt, leapfrogging ahead of the advanced guard to suppressed German infantry for the assaulting infantry. The attack was a stunning success, penetrating six miles at some points.[351] By the end of the battle the British had a workable combined arms doctrine. The challenge now shifted from experimentation, development and implementation to army-wide dissemination.

Combined Arms Doctrine as of December 1917
(Large Scale Demonstration in November 1917)
Table 6.26

Hurricane barrage	Yes*
Predicted fire	Yes*
Flexible C2	Yes*
All arms integration (fire and movement)	Yes*

**It is not clear that most of the army could employ the combined arms methods used at Cambrai. For this reason I consider the concept under development until its widespread use during the Entente counter-offensives in 1918.*

Defensive tactics

British defensive doctrine in 1917 can be divided into two phases. For much of 1917 the army focused on adding depth to their defensive network without altering its fundamental logic. Then, facing German numeric superiority late in the year, the army hastily copied Germany's elastic defense in depth. The transition would not be complete until early 1918. Nor did the British fully understand the system they chose to copy.

[351] Although almost all of Third Army's gains were lost in a subsequent German counterattack organized around a hurricane barrage and storm troop units.

January to December: Defense in depth For much of 1917 the British army was satisfied to add more depth to defenses that were otherwise unchanged.[352] Excluding the obstacle belt, British defenses were organized into four positions: a front line, support line, reserve line, and buffer zone. The front line contained a fire trench and a supervision trench. Doctrinally, although the army knew reverse slope position were superior, it nonetheless encouraged units to dig their fire trenches on the forward slope. "The occupation of the high ground gives a feeling of superiority which reacts favorably on the moral of troops."[353] Units kept as few troops in the fire trench as possible – the majority remained in the supervision trench 25-50 meters behind and could use covered communication trenches reinforce the fire trench if needed. Both trenches were continuous (although not linear given the risk of enfilading fire) Machine guns were positioned to cover the entire line with fire.

The support line was built 100 yards behind the front position's supervision trench. It was designed to hold units "ready for immediate reinforcement or local counterattack" and to shelter troops from the front line during heavy bombardments.[354] An obstacle belt was also built between the front line and support line so the latter could double as a new line of resistance if needed. For this reason the support line also consisted of two continuous trenches.

[352] What follows is taken from General Staff, "Notes on Trench Warfare for Infantry Officers," May 1917, 11–17, Joint Services Command and Staff College Archives, Shrivenham.
[353] Ibid. 11. Apparently, the feeling of moral superiority was sufficient to offset the feelings of inferiority as German forward observers hammered these exposed positions with artillery at leisure.
[354] Communication trenches also linked the front and support lines. It is not entirely clear how sheltering 100 yards behind the front line offered much protection from German artillery by this point in the war.

A reserve line was built approximately 300-400 yards behind the support line (or 600 yards behind the front line). These were designed to hold local reserves to launch counterattacks and were tied to the support line via communication trenches. Unlike the front and support line positions, the reserve line generally consisted of bunkers and dug outs instead of a continuous trench. For this reason we can surmise that the reserve line was not intended to act as a third line of resistance to plug a major penetration.

Behind these three lines lay a buffer zone up to five miles deep, the purpose of which was to slow down any assault force that managed to break through. Bunkers and strong points were scattered throughout the buffer zone to pin down attackers until reinforcements could arrive. They could also serve as rally points for counterattacking units.

Thus, we can say the British army effectively adopted a defense in depth by 1917. The problem was that these defenses did not incorporate elasticity. Commanders were told to hold their positions unless ordered to withdrawal. [355] Worse yet, all of the depth was in the rear of the position. There was no forward outpost/buffer zone to break up or slow an attack. Units in the front and support lines were well within German artillery range and were therefore dangerously exposed. The front line's continuous trenches were useful for command and control, but were easy to spot and target with artillery.

December to early 1918: Elasticity It was not until late 1917 that the army moved to incorporate elasticity into their defenses. To Haig "it became a matter of vital urgency for

[355] General Staff, "S.S. 143," February 1917, 10.

an up-to-date doctrine for defense to be adopted and put into practice, since it was clear that the existing system of rigid linear defense was inadequate to cope with the major German attacks that could be expected."[356]

Given the time constraints, the British had no reservations about copying the German army's defensive doctrine.[357] Haig commissioned three senior officers to look at German doctrine as a model.[358] In principle, it made sense to copy a proven defensive system. In application, the British made a major mistake. Instead of analyzing German doctrine holistically, the so-called Jeudwine committee of three officers focused exclusively on copying German manuals. Worse yet, they focused on the wrong one, studying the German manual for constructing defenses (which was written for engineers) and not the one on command and control. Haig wisely rejected the Jeudwine committee's recommendations. He then adopted a defensive doctrine that made all of the same mistakes.

In essence, the British copied German doctrine in form, not function. By mid-December GHQ outlined its new doctrine in a memorandum to the field armies.[359] The armies were to re-organize their positions into outpost and battle zones. The outpost zone was to hold only as many soldiers as were absolutely necessary to warn of an impending infantry attack and slow it down. The point of the outpost zone was to "compel the enemy to fight

[356] Samuels, *Command or Control?*, 202.
[357] What follows is taken from Ibid., 202–209.
[358] British units captured a copy of the new German defensive manual at Arras in early 1917. Wynne, *If Germany Attacks: The Battle in Depth in the West*, 249.
[359] Chief of the General Staff, "Memo from the Chief of the General Staff to Second and Third Armies," December 13, 1917, WO 158/209, The National Archive, Kew.

ofr every yard of his advance up to the battle zone."[360] The battlezone was to be positioned four kilometers behind the outpost zone's forward edge, thereby placing depth where it was needed most.[361] It would contain the main line of resistance in the form of trench lines. Reserve units were to be pre-positioned in the rearward zone. The defensive network was divided into sectors and placed under the command of a single officer. Units were instructed to use firepower, not manpower, to hold terrain.

Thus, British defenses started to look like German ones. Yet two crucial concepts were quite literally lost in translation. First, soldiers were still told to cling to terrain rigidly, even in the outpost zone.[362] Second, while the new British doctrine emphasized aggressive use of counterattacks to anchor the defense,[363] it continued to they be deliberate and intricately preplanned.[364] Planned counterattacks often failed because they gave attackers time to prepare.[365] The differences might seem subtle, but they nearly cost Britain the war in March 1918.

Defensive Doctrine as of December 1917
Table 6.27

Depth	Yes
Elasticity	No
Counterattack	Yes*

**In form, not substance*

[360] Ibid.
[361] Samuels, *Command or Control?*, 212.
[362] Samuels, *Doctrine and Dogma*, 211.
[363] Chief of the General Staff, "Memo from the Chief of the General Staff to Second and Third Armies."
[364] Samuels, *Command or Control?*, 208–209; Travers, *How the War Was Won*, 58–60.
[365] Recall that German doctrine distinguished between local and general counterattacks. Squads, sections, platoons, companies and battalions were instructed to launch a local counterattack without waiting for orders to retake ground. Only after 24 hours had passed, giving attackers time to dig in and reposition artillery, were small units expected to wait for higher commands to organize a general counterattack, which required detailed planning and rehearsal.

Independent Variables

Command culture

The British army's command culture began to loosen in 1917. By year's end it was best classified as moderately centralized. Senior officers at the battalion and division levels once again had the freedom to experiment. This development reflected a reversion to pre and early war practice. What was truly novel was that commanders were beginning to let their junior officers and non-commissioned officers to exercise initiative on the battlefield, although the practice was far from universal by year's end.

What explains decentralization? Citizen-soldiers had made up the bulk of the army since at least 1915 and proved their reliability under fire in 1916.[366] Haig's grip on power certainly weakened in 1917, especially after the debacle at Passchendaele. Yet this only explains why senior officers might have experienced more freedom – it does not account for why senior commanders would then delegate that autonomy to battalion, company and platoon commanders. Nor does civilian influence explain much. Lloyd George did belatedly intervene to 'shake up' Haig's senior staff and did his best to subordinate Haig to the French high command. Nevertheless, Lloyd George left him in command of the British army and there is no evidence of any civilian leader attempting to empower junior, mid or senior officers as a way to bypass Haig's influence.

[366] The fact that civilian volunteers and conscripts had long since been blooded certainly made senior commanders more willing to cede authority to them. But organizations do not just yield autonomy because there is someone reliable to yield autonomy to. Nor were there widespread calls from within the ranks for more authority. As Sheffield clearly points out, citizen-soldiers conformed to the army's values and cultures to a much greater degree than the army's values adapted to them.

Ultimately, tactical necessity imposed decentralization on the British army. Many senior leaders recognized that under modern conditions "the presence of an officer on the spot is invaluable. Much lies in the hands of Battalion Commanders in this matter."[367] They also realized that tactics they were trying out required initiative and leadership to work. The self-contained platoon could not fight as the "unit of action" in the assault if its commanders lacked the authority to make decisions in the first place.

To cultivate initiative, the army began teaching junior officers to make independent decisions. In May 1917 GHQ issued a book of tactical 'games' for young officers and non-commissioned officers. The book opened by saying its goal was "to increase the initiative of junior officers and NCOS… to teach them: to grasp sudden situations. To act quickly. To give verbal orders clearly and concisely. To write messages and reports. No opportunity should be lost in impressing on them the value of prompt decision and bold action."[368] The army also continued to develop training guides to help junior commanders carry out their newfound responsibilities. The degree to which these efforts were successful was largely a function of the army's training structure.

Command culture as of December 1917
Table 6.28

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

[367] General Staff, "Experiences of a Division in Recent Fighting," n.d., 28, Joint Services Command and Staff College Archives, Shrivenham.
[368] It is also noteworthy that the General Staff and GHQ copied this manual directly from the Fourth Army. General Staff, "Notes on Tactical Schemes (Compiled by Fourth Army)," May 1917, Joint Services Command and Staff College Archives, Shrivenham.

Assessment mechanism

The British army managed to synchronize its capabilities with its requirements in 1917, and not before, because its assessment mechanism continued to develop and mature. In its final form the British assessment mechanism was not as consolidated as its German equivalent. Whereas the General Staff performed the task in the German army, in the British army it was divided among the General Staff, GHQ, and the War Office.[369] The lynchpin linking these efforts was put in place when GHQ organized a training and doctrine section in early 1917.[370] Called the Training Directorate, this section had purview over all arms and units in France. With its creation the British army finally had a way to crystallize and disseminate the hitherto ad hoc experiments taking place in various units.

Assessment mechanism as of December 1917
Table 6.29

Conduits	Yes
Capacity (prestige and education)	Mixed
Autonomy	Yes

Training structure

As its name implies, the Training Directorate also had authority over all training in France. However, it lacked one critical power. Its first director, Brigadier-General A. Solly-Flood, did not have the authority to enforce compliance with training standards.[371] In essence, the Training Directorate had the capacity to collect lessons learned, update doctrine, and transmit it to schools and commanders. But it lacked the power to fire commanders who ignored them.

[369] This may explain why it took longer for the British to develop a coherent approach to doctrinal assessment.
[370] Robbins, *British Generalship on the Western Front 1914-18*, 94–95. Brigade and division commanders had been calling for GHQ to standardize training, doctrine, and organization for some time.
[371] Bidwell and Graham, *Fire-power*, 125–126.

Nevertheless, the Training Directorate represented a definite movement towards centralized control. In June 1917 it laid out a coherent framework for all training in France.[372] Although commanders retained primary responsibility for training, a streamlined network of schools was there to support them. These schools were organized into three tiers: a single set of GHQ schools; a set of schools in each field army; and a set of schools to be maintained in each corps. The consolidated GHQ schools covered all training for staff officers, engineer commanders, new officers and non-commissioned officers, and some rifle and artillery training. The army schools assisted with training company commanders and their enlisted advisors; artillery commanders; and for signals and gas instructors. The corps schools focused on training for platoon commanders and platoon sergeants as well as specialist courses for bombers, mortarmen, and machine gunners.[373] This manual also included a detailed syllabus to be followed by each of the schools.

S.S.152 also outlined a clear transmission mechanism to link the Training Directorate, the General Staff, and front line units. General Staff Officers whose primary responsibility was to manage training, and who maintained direct lines of communication with the Training Directorate, were attached to every field army and corps.[374] Like Solly-Flood, these General Staff officers also lacked the authority to fire instructors or commanders.[375] Aside from supervising all training and maintaining contact with GHQ, their primary duties were to

[372] General Staff, "Instructions for the Training of the British Armies in France (Provisional)," June 1917, Imperial War Museum. What follows is taken from this document, pp. 4-11 and Appendix 1.
[373] Note that unlike the schools for commanders, the schools for specialists typically trained instructors only. After completing these courses the instructors would return to their parent units to assist commanders in training other specialists.
[374] General Staff, "S.S. 152," 8.
[375] SS 152 Pg 66

organize demonstrations, schedule lectures by experts, and to personally lead periods of instruction.

In December 1917 the General Staff released a similar manual to direct training in Britain.[376] This document helped synchronize depot training with field training in France. It also reinforced the formal lines of communication between the armies in France and the units training at home, increasing the latter's ability to stay abreast of new tactical developments.

For all of these reasons, despite the fact that it had not reduced the number of schools or appointed a senior general with the authority to mandate and fire, the British army's training structure is best defined as moderately centralized by the end of 1917.

Training structure as of December 1917
Table 6.30

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

[376] SS 152 only pertained to training in France, which represented a bit of a disconnect since all initial training and training for many reinforcement drafts occurred at depots in Britain. General Staff, "Training at Home," December 1917, Z854, Joint Services Command and Staff College Archives, Shrivenham.

VII. 1918

Assault tactics	Exp./Dev.
Combined arms	Yes
Elastic defense in depth	Dem.*

Command culture	Mod. Decentralized
Assessment mechanism	Yes
Training structure A	Moderately Centralized / Centralized**

*See the following discussion about the March offensive.
**After July 1918

By 1918 the British army had turned into a true learning organization. Its combined arms tactics were as sophisticated as the German army's, and the British were markedly superior in tank technology and doctrine. By the war's end the army's assault and defense doctrines were likewise advanced.

One problem remained: the British army was still not a good teaching organization. A doctrine is only as effective as its implementation, and neither the army's assault nor its elastic defense in depth doctrines was implemented in a uniform fashion. Commanders largely determined whether their unit obeyed doctrine or ignored it. This was largely an issue of training. Commanders retained significant control over the tactics and techniques their soldiers were taught. It was not until General Maxse was given the authority to dictate training in July 1918 that the army finally began tackling the problem. The changes were too little, too late.

None of this is to say that the British only won because the Germans failed, or that the British army emerged victorious in spite of itself. These assessments are harsh and incorrect. Of the four allied armies (American, Belgian, British, and French) the British were in the best position to press the counterattack after the German army bogged down near Rheims in July. The American army would not arrive in decisive numbers until 1919. Meanwhile its tactical competence was uneven at best.[377] For its part, the French army had carried the Entente through most of the war and therefore could only play a supporting role during its concluding phase. [378] The point is simply that in 1918 the best army in Europe did not use the best available doctrine – a doctrine it already had sitting on its proverbial bookshelf. The British did not lose as a result. As chapter 1 argues, and the German case affirms, optimization does not lead to victory. However, the British army almost certainly paid a much higher price for victory than was necessary.

Political, strategic, and operational situation

Ironically, although the war would end in eleven months, victory was the furthest thing from anyone's mind in January 1918. The British faced an acute manpower crisis.[379] The French army was still dealing with the 1917 mutinies. The Russians were out of the war, while the Italians had one foot in the grave and the other on a banana peel. America was

[377] Ferdinand Foch, *The Memoirs of Marshal Foch* (Garden City, N.Y: Doubleday, Doran and Company, incorporated, 1931), 306–307.
[378] For an overview of the Hundred Days offensives and the relative capabilities of the French and British armies, see Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, chap. XX; Foch, *The Memoirs of Marshal Foch*, chap. VIII, IX, X, XI, & XIII. As Paddy Griffith describes the French position within the alliance during the war's final months, "They [the French] were of course perfectly happy to allow their allies to shoulder the main weight of the fighting at this stage in the war, since they could not forget the first two years on the Western Front, when the British had to all intents and purposes fought to the last Frenchman." Griffith, *The Great War on the Western Front*, 109.
[379] Travers, *How the War Was Won*, 22–23; 34–37.

hardly in a position to offset these deficiencies. Haig knew that Ludendorff would exploit this window of opportunity. Therefore, the British fully expected to spend 1918 on the defensive.[380]

Politically, Lloyd George wanted to fire Haig. Lloyd George's problem was that "no one could be found who was significantly better than Haig," and Haig still enjoyed widespread support within the army in any case.[381] Unable to remove him, Lloyd George did the next best thing – he dismissed Haig's main advocate (Lord Robertson, the Chief of the Imperial General Staff); his chief advisor (BEF Chief of Staff Kiggell); and placed the entire BEF under Foch.[382] The important point is that there is no evidence that senior political leaders (other than the still discredited Churchill) tried to impose a new tactical doctrine on Haig or the army. Nor did the creation of a Allied Commander in Chief cause doctrinal learning. By this point in the war the British army was more tactically and technologically advanced than its French ally.[383] Britain's most powerful political leaders may have thought Haig incompetent, but they were as oblivious to tactical realities as was. Moreover, the army was well on its way to implementing the relevant doctrinal changes before friction between Lloyd George and Haig came to a head.

Operationally, 1918 can be divided into defensive and offensive phases. The British army spent the first half of the year on the defensive, absorbing two major assaults by the

[380] The plan was to wait for the American army and tank technology might play a decisive role in 1919.
[381] Travers, *How the War Was Won*.
[382] Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 276; 297–309. Foch was given the title of Allied Commander in Chief on March 26th at Doullens and was given the authority to direct all allied strategic operations at Beuvais on April 3rd. Foch, *The Memoirs of Marshal Foch*, 264; 276–277.
[383] French and British forces still fought as separate armies as well.

German army. In July the army transitioned to the offensive, mounting a series of rapid strikes against German lines for the duration of the war. Operational constraints mattered vis-à-vis doctrinal development because the pace of operations undercut the army's ability to fully implement modern assault tactics, the one area in which British doctrine lagged. This shortcoming did not reflect an analytic failure. Official training manuals clearly endorsed irregular and dispersed formations, independent small unit action, fire and movement, organic firepower, and the need to bypass points of resistance as early as February 1918. But the army had no time to disseminate and implement this doctrine army-wide as the Western Front began to disintegrate into semi-mobile warfare[384]. The British army did not have the time to pull units from the line to retrain. First came the spring offensives, spanning from March to July. Then Foch counterattacked on the River Marne in July. Finally, the British spearheaded the war-ending Hundred Days offensive from August to November. Even Ludendorff's late 1917/early 1918 training scheme would not have worked as stasis gave way to fluidity.

Dependent Variable

Offensive tactics

On paper, British offensive doctrine was as sophisticated and advanced as the German army's. In practice, however, units varied tremendously in their ability to apply these principles. As Jonathan Boff painstakingly reconstructs, elements of Byng's Third Army demonstrated remarkable proficiency with modern assault tactics during the Hundred

[384] Ramsay, *Command and Cohesion*, 193.

Days offensive.[385] The problem was that other units persisted in using tactics that would not have been out of place on the Somme. In August 1918, 32nd Division lost 1,700 men after launching a frontal assault against a prepared German defensive position. In September another division, the 62nd, was chastised by its corps commander for taking a town by frontal attack despite explicit orders to envelop and assault it from behind.[386]

The bottom line is this: implementation was uneven.[387] It is not possible to say how uneven it was – the historical record lacks data on how many units effectively used modern assault tactics at any level (from corps to platoon).[388] What we can say with confidence is that the British high command did not control implementation. This stands in stark contrast to the German army. Not every German soldier was trained on storm troop tactics. In fact, only about ½ of the divisions on the Western Front received such training before the spring offensives. The difference is that Ludendorff deliberately selected some units for training based on his perceived operational constraints and requirements. The British high command left it to chance.

Implementation problems notwithstanding, it is still worth describing British offensive doctrine at the end of the war. On paper, and for the units that adhered to them, these ideas represented the pinnacle of tactical effectiveness in the First World War. Five interrelated shifts were critical.

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[385] For a description of one such attack, see Boff, *Winning and Losing on the Western Front*, 127–130.
[386] Both examples are taken from Robbins, *British Generalship on the Western Front 1914-18*, 30.
[387] Bidwell and Graham, *Fire-power*, 139.
[388] Boff, *Winning and Losing on the Western Front*, 134.

Fire and movement The first and most important change was that doctrine no longer separated fire and movement into distinct and sequential phases on the battlefield. From this point forward they were integrated. Fire supported movement and movement supported fire – one was impossible without the other. Integrated fire and movement undermined shock power's mythical status as well. As the August 1918 Hints on Training Manual so eloquently framed it "THE BULLET BEATS THE BOMB AND THE BAYONET."[389]

Organic firepower Second, by 1918 assault units bore primary responsibility for generating their own firepower. [390] The other arms were undoubtedly still important, but the entire tactical system was predicated on the infantry's ability to provide fire for its own maneuver. [391] "The infantry must never for a moment be permitted to consider that it merely exists to follow up an artillery barrage or to accompany a 'tank attack.'"[392]

This change in mindset freed the infantry from its longstanding prohibition against moving beyond the artillery's range. As a result, preparatory bombardments became optional, not essential. They were only to be used when the benefits of smashing a hole in well-prepared defenses outweighed the costs in terms of surprise and chopping up the terrain the infantry would have to traverse.[393] As the 1918 version of S.S. 135 illustrated, "the complete demolition of prepared defenses can in many cases only be effected by a bombardment of

[389] Capitalization in the original. XVIII Corps, "Hints on Training," August 1918, 9, Z854, Joint Services Command and Staff College Archives, Shrivenham.
[390] "The infantry must always be prepared to fight its way forward by means of its own weapons… In order to gain fire superiority with the minimum exposure of personnel, Lewis gun sections should be pushed well forward in the attack…" General Staff, "The Division in the Attack," November 1918, 23, Z441, Joint Services Command and Staff College Archives, Shrivenham; XVIII Corps, "Hints on Training," 10.
[391] General Staff, "S.S. 135," November 1918, 5–6.
[392] Ibid., 19.
[393] Ibid., 20.

such duration that it sacrifices the factor of surprise and presents the enemy with time in which to collect his reserves."[394]

Independent movement and flexible formations Third, assault units were to fight their way forward by means of independent, small unit action and flexible formations. Platoons were also no longer considered the smallest unit capable of independent action. Sections took their place. Experience proved that the section was the largest group that one leader can directly control.[395] Thus, for the first time British doctrine explicitly granted non-commissioned officers a genuine leadership role on the battlefield.

Despite their junior rank, the new doctrine allowed section leaders and platoon commanders to exercise judgment in selecting their formations. Waves were only one alternative among many. Other options included columns, worms, diamonds, and 'blobs.' [396] Commanders were to adopt formations that allowed them to generate heavy firepower, facilitated maneuver, and minimized exposure.[397] For these reasons the doctrine likewise admonished against clinging too rigidly to the creeping barrage.[398] While the 'creeper' was an important innovation, technological realities meant it could not adapt to the situation.[399] When infantry units used the 'creeper' as a crutch it therefore robbed them of flexibility (waves were the easiest way to advance behind a linear creeper) and fostered the mentality that the artillery alone took care of suppressing defenders.

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[394] Ibid., 24.
[395] General Staff, "Instructions for the Training of Platoons for Offensive Action," February 1918, 4, Imperial War Museum.
[396] XVIII Corps, "Hints on Training," 23–24.
[397] General Staff, "S.S. 135," November 1918, 22.
[398] Ibid.
[399] i.e. the creepers had to be linear and followed a preset timeline.

Bypass resistance Finally, British doctrine called on assault units to advance rapidly towards deep objectives. Speed prevented defenders from moving reserves into place. This change was not just a matter of telling commanders to 'go deep.' Indeed, deep objectives were the norm before Aubers Ridge. [400] To help units do in 1918 what they could not in 1914 or 1915 the army had to abandon many of its earlier practices, which emphasized order and coordination. Small unit leaders had to press forward relentlessly, developing the situation on their own without waiting for direction from superiors. General Maxse's advice to junior leaders was telling. "When in doubt go ahead. When uncertain, do that which will kill the most Germans."[401] Similarly, units needed to advance when the opportunity presented itself, even if this meant exposing a flank. The fact that every platoon had its own light machine guns made it easier for units to cover their own flanks during a deep penetration. Finally, the new doctrine instructed commanders to use their reserve forces to reinforce success, not failure. The units leading an assault were to bypass strong points and bunkers, leaving tanks and follow on forces to reduce and destroy them.[402]

[400] At the same time, we should not see this as a reversion to the early war attempts at penetration. It is true that both sought rapid movement to deep objectives. But early war attempts did so without giving the infantry a way to fight once it moved beyond its artillery's protective envelope. The aforementioned organic firepower; integration of fire and movement; and flexible formations were all critical to this end. No one element would have worked without the others.
[401] XVIII Corps, "Hints on Training," 10.
[402] General Staff, "S.S. 135," November 1918.

Offensive Doctrine as of November 1918
Table 6.31

Irregular & dispersed formations	Yes*
Independent small unit action	Yes*
Fire and movement (small unit level)	Yes*
Organic firepower	Yes*
Bypass resistance	Yes*

**Uneven implementation on the battlefield; no large-scale demonstration*

Combined arms

The British army demonstrated its new combined arms doctrine at Cambrai. There is no need to recap its core elements other than to say that the army continued to refine and integrate it with its aforementioned assault tactics.[403] The army also acquired more capable tanks. By 1918 the Mark IV, Mark V (Heavy), Mark V (One Star) and the Medium "A" (Whippet) tanks all saw action.[404] Implementation proceeded apace as well. Unit for unit the British army was probably more advanced in its use of combined arms than the German army during the Hundred Days offensive.[405]

[403] Combined operations with artillery and tanks became such a large part of the S.S. 135 that in 1918 the army began publishing two manual for divisions – one for offensive operations and another for defensive operations (which became S.S. 210).

[404] The Mark V (Heavy) was a faster, more reliable attack tank than the Mark IV. The Mark (One Star) was an even larger tank that specialized in carrying supplies forward and the wounded to the rear. The Whippet was the army's first light tank. Carrying only machine guns it was designed to support semi-open and mobile warfare, not trench-to-trench attacks or anti-tank operations. General Staff, "Tanks and Their Employment in Co-Operation with Other Arms," August 1918, 4–5, Z439, Joint Services Command and Staff College Archives, Shrivenham.

[405] Travers disagrees with this statement. His basic thesis is that the army reverted to its earlier artillery centric doctrine during the war's endgame, wasting countless lives. In his view British combined arms was as ad hoc as its assault tactics. Travers points out that the army's assault on the Hindenburg line (September) was highly traditional in that it relied on a long preparatory barrage. He also argues that tanks were never again used in large numbers. Travers, *How the War Was Won*. Evidence from the recent historiography undercuts Travers' core argument. While tanks and close air support were not as central to the Hundred Days offensive as popular history might make it appear, infantry-artillery coordination and the use of fire and movement at the large unit level remained widespread and the cornerstone of the army's tactical success. That the British lost over 300,000 casualties from August to November does not, as Travers suggests, mean that the British abandoned combined arms warfare. It only suggests that mobile warfare was no less dangerous than its static predecessor – a fact that casualty data from 1914 reinforces. It is also worth pointing out that the Germans lost roughly the same number of troops over the same period of time. For compelling evidence that counters Travers perspective, see Bidwell and Graham, *Fire-power*, chap. 8; Boff, *Winning and Losing on the Western Front*, chap. 5; Robbins, *British Generalship on the Western Front 1914-18*, chap. 7&8.

Combined Arms Doctrine as of November 1918
(Widespread Implementation during Hundred Days)
Table 6.32

Hurricane barrage	Yes
Predicted fire	Yes
Flexible C2	Yes
All arms integration (fire and movement)	Yes

Defensive tactics

As is the case for assault tactics, historians also debate the degree to which the British army mastered the elastic defense in depth. As mentioned, the BEF copied and attempted to implement the German army's defensive doctrine in late 1917/early 1918. We know that these defenses fared poorly against Ludendorff's offensive.[406] Timothy Travers and Martin Samuels argue that this was because British units failed to grasp understand the logic behind the system they were trying to implement.[407] Commanders kept too many men in the front trenches. The outpost zone was hastily built and its occupants clung rigidly to their trenches. Counterattacks were preplanned and inflexible. Reserve positions existed only on maps and in the minds of commanders, since most units did not bother to dig trenches behind the main line of resistance.

[406] German units penetrated British lines to a depth of 40 miles in March. Griffith, *The Great War on the Western Front*, 90–91. In comparison, British units made it six miles behind German lines at Cambrai.
[407] For example, see VIII Corps, "Defensive Scheme. Army Battle Zone. VIII Corps Divisional Sector," January 1918, WO 158/411, The National Archive, Kew. This planning document reflects the critique that the British copied the German system in form but not concept. Structurally, the system was divided into a forward, main and rear zone, similar to the German model. Conceptually, the two systems were markedly different. Counterattacks were to be preplanned using designated troops (versus flexible and the responsibility of whichever units were able to mount them); most important "the guiding principle of the defense of the Army Battle Zone is that the forward system must be held at all costs. Troops will on no account retire from the position they are in but will defend it to the last, even if their flanks are turned." Pg 6. See also, Travers, *How the War Was Won*, 56–65; Samuels, *Command or Control?*, 214–221.

In its official history of the war, the British excused the BEF's poor performance in the March offensives on three grounds.[408] First, manpower constraints made it hard for the BEF to properly build an elastic defense in depth across its entire front. The reserve sectors were non-existent because units rightfully focused their efforts on the outpost zone and main line of resistance. Second, the BEF's southernmost army, the Fifth army, recently took over 25 miles of trenches from the French army in January, giving troops little time to dig in properly. Third, the BEF faced unusually challenging weather conditions on March 21st. Fog obscured the battlefield, giving German storm troops a key advantage.

Ignoring the fact that Haig knew the offensive was coming and accurately predicted the window in which they fell, these excuses do not stand up to scrutiny.[409] Despite the shortage in men in early 1918, the Third and Fifth armies had a better force to space ratio than the Germans enjoyed at any point in 1917.[410] Fog created at least as many problems for the attacking storm troops as it did for the defending British, complicating German fire support and communication.[411] Only the argument that time and material shortages, combined with the fact that Fifth army had less than three months to prepare an additional 25 miles of front, stands out as potentially valid.

[408] Paddy Griffith makes a similar point. Griffith, *Battle Tactics of the Western Front*, 89–92. Neither are particularly compelling, especially in light of Martin Samuels detailed deconstruction of both arguments. Samuels, *Command or Control?*, 221–229. What follows is a summary of his analysis.
[409] On December 20th, 1917 Haig wrote in his diary that he anticipated a major German offensive in March, 1918. He received intelligence updates confirming this assumption on February 16th, February 28th, March 3rd and March 19th. Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde*, 274, 285, 291 & 292.
[410] Samuels, *Command or Control?*, 222.
[411] A ground doctrine stymied by bad weather is deeply flawed in any case.

At least on paper, the British learned from their experiences in March and April. In May GHQ released a new manual for defensive operations, S.S. 210. The manual reminded commanders elastic defenses needed to have elasticity: "ground should not be held merely for the sake of its retention. The advantages to be gained by proper use of ground in defense must be tested by the prospects of economizing numbers, reducing casualties, increasing the power of the defender… rendering as costly as possible an attack by the enemy."[412] Defenses were still to be divided into three sectors, but the outpost zone was now only responsible for slowing a major attack.[413] The entire position was to be built with enough depth that German attackers would not be able to take the rearmost defenses under fire without stopping to shift their artillery forward.[414] Commanders had the authority to pull back if the situation and terrain required.[415] Firepower and counterattacks, not men and obstacles, were the system's anchor.[416]

With S.S. 210 British defensive doctrine was again as sophisticated and advanced as the German army's. This of course begs the question: was the British army's defensive doctrine beset by the same implementation challenges as its offensive doctrine? There is no clear answer, but logic suggests that they were. The major German offensives in the British were over by April (Third and Fifth armies were hit in March; Second army was attacked in April). Meanwhile, the army resumed the offensive in July. If British units had a problem

[412] General Staff, "The Division in the Defense," May 1918, 4, Z441, Joint Services Command and Staff College Archives, Shrivenham.
[413] Ibid., 12.
[414] Ibid., 8.
[415] For their part, ordinary soldiers were still to be told that "so far as they are concerned, there is only one degree of resistance, and that is to the last round and to the last man." Ibid., 4–5.
[416] Although the document continued to maintain that counterattacks were best when planned in advance and then adapted to the situation.

building a defense in depth between December and March when the Germans were not attacking it stands to reason they would not fare better while retreating. Of course, we cannot know this for sure - the British did not have another chance to pit their defenses against another major German offensive.

Defensive Doctrine as of November 1918
(Demonstration and Implementation in March 1918)
Table 6.33

Depth	Yes*
Elasticity	Yes*
Counterattack	Yes*

**Uneven implementation on the battlefield*

Independent Variables

By mid-1918 the British army had a moderately decentralized command culture, an assessment mechanism, and centralized training structure. Yet complete optimization did not occur. As the following section argues, this does not refute CAT theory. The war ended less than four months after the last critical piece – a centralized training structure – came into place. There simply was not enough time for the newly empowered training regime to standardize training. The fact that the war entered its most fluid phase since 1914 complicated the effort further.

The real puzzle is why the British army optimized its combined arms doctrine (which actually happened while the army's command culture was still moderately centralized), but not its assault tactics or elastic defense in depth. The short answer is that combined arms, as it evolved in the British army, had highly technical aspects. This was especially true vis-à-vis tank development and acquisition. If anything, this fact suggests that CAT theory's boundaries may be narrower than expected. Indeed, as chapter 1 and 3 have already

suggested, the more technical a problem, the more its solution may lay in the efforts of a small number of experts. Chapter 8 discusses this issue in greater detail.

Command culture

The army's command culture became moderately decentralized in the war's final year. Relatively junior officers and non-commissioned officers were routinely given the authority to make independent decisions on the battlefield. Official doctrine clearly endorsed delegated command. The aforementioned S.S. 135 directed that commanders at every level required and deserved latitude in executing their duties.[417] Orders were to specify what a commander needed to accomplish and not how the task was to be carried out. Again, battlefield realities, not a philosophical commitment to autonomy, drove delegation. To quote the S.S. 135: "The successful conduct of a battle depends upon the rapidity with which local successes are gained and exploited. As the advance proceeds and the enemy's organized defenses are overcome, the actual direction, and to a large extent the control, of the operations must necessarily devolve upon the commanders on the spot. It is absolutely essential, therefore, that commanders of all grades should be able quickly to grasp the salient features of a tactical situation and to act with boldness and decision."

For the most part it seems as though senior commanders really did give autonomy to their subordinates, especially as the front became more fluid and centralized command and control was no longer possible. Experimentation again became common on the front lines,

[417] General Staff, "S.S. 135," November 1918, 9.

especially at the division level and above.[418] As we will see, the problem was that the army's increasingly decentralized command was not immediately paired with a centralized training mechanism.

Command culture as of November 1918
Table 6.34

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

Assessment mechanism

The army's doctrinal assessment mechanisms hit full stride as the war drew to a close. The Training Directorate remained at the center of this activity. Manuals were updated regularly – the S.S. 135 twice between January and November. Impressively, GHQ addressed the major flaws in British defenses during Ludendorff's offensive within a month of the battle's conclusion. Nor was this simply an issue of quantity over quality. Substantively, the manuals were of much higher quality, reflecting sound analysis while balancing general principles against the need for concrete examples.[419]

Assessment mechanism as of November 1918
Table 6.35

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

[418] Boff, *Winning and Losing on the Western Front*, 155–157; Travers, *How the War Was Won*, 148–151.
[419] It is worth comparing the final S.S. 135 with its predecessors.

Training structure

Thus, it seems clear that generating new ideas and collecting them for analysis were not a problem for the British army by 1918. The issue was that the army still lacked a central authority to mandate and enforce uniform training. M.A. Ramsay frames the dilemma well, arguing that "the failure to institutionalize training with a central authority responsible for both tactics and training and for awareness of the conditions at the front was, ironically, a failure to concentrate authority in the one area that could have alleviated the consequences of excessive centralization elsewhere."[420] The norm that commanders – and commanders alone – had the authority to train their men undercut doctrinal optimization, because many commanders chose not to train their soldiers how to employ the army's progressive assault and defensive doctrines. Senior officers including Montgomery and Dawnay recognized the link between inconsistent training and battlefield performance and called on GHQ to do a better job of monitoring and enforcing training.[421]

The problem went unresolved until July 1918 when GHQ appointed General Ivor Maxse as the Inspector General for Training. Maxse's appointment marked the army's transition to a centralized training structure. He was "empowered to visit any formation, unit or training establishment at 24 hours notice." More importantly, Maxse had the authority to fire any instructor – to include school commanders – even over the objections of division, corps and army commanders.[422] Throughout his brief tenure he fought to eliminate all army and

[420] Ramsay, *Command and Cohesion*, 195.
[421] Robbins, *British Generalship on the Western Front 1914-18*, 96.
[422] Ibid.

corps schools in France and replace them with GHQ schools. However, the war ended before he was successful.

It is impossible to say with absolute certainty that the army's centralized approach to training would have helped the BEF do a better job of employing its new assault and defensive tactics had the war lasted into 1919. However, evidence from 1914 to 1917 suggests that this would have been the case. Throughout the war uniformity on the battlefield increased alongside control over the training field. The fact that training for artillerymen and tankers was more tightly controlled than it was for infantrymen; and that combined arms was the one doctrine which the army managed to consistently implement on a large scale; is also highly suggestive.

Training structure as of November 1918
Table 6.36

	General in charge of training	No general in charge of training
Many schools/ training sites	Jul to Nov	Jan to Jul
Few schools/training sites		

VIII. Concluding thoughts

The British army's experience on the Western Front was not straightforward. A small colonial force before the war, the British faced an unparalleled set of challenges in the war's first years. It had to learn how to grow before it could learn how to fight. Moreover, historians remain fiercely divided over the army's performance on the Western Front. This complicates our ability to use the British case to evaluate CAT theory.

However, complex problems are not impossible ones, and the British experience both lends support for CAT theory and suggests its conceptual boundaries. The army's command culture was associated with its ability to generate new ideas and its receptiveness to new ideas. The army started the war with a moderately centralized culture, and we saw that battalion and division commanders experimented with a number of sophisticated techniques, especially at Neuve Chapelle and Aubers Ridge. Yet the army of 1914 and 1915 did not have a central mechanism to thoroughly assess practices or to circulate them among officers.[423] Therefore, when innovative ideas did not yield immediate success there was nothing to stop the army from 'throwing the baby out with the bathwater.'

Eventually, the army's command culture began to centralize as Haig consolidated power and authority at GHQ. It is not entirely clear whether units stopped experimenting or GHQ stopped listening. In either case, the army's doctrine succeeded and failed on the talents of a small group of officers. Unfortunately, the problem of tactical stalemate was far too large for a small group of officers to solve, and so the British army spent much of 1915 through 1917 applying the same flawed concept on an ever-expanding scale. It took the Somme debacle to force reassessment, which included the earliest attempts at building a coherent doctrinal assessment mechanism.

By 1917 tactical necessity and battlefield failure began forcing decentralized command and control onto the British army. This time, however, a nascent assessment mechanism was in

[423] Kennedy, "Britain in the First World War," 69.

place to capture the resulting ideas and experiments. Within a year the pieces were in place for the army to implement an assault, combined arms, and elastic defense in depth doctrine as advanced and sophisticated as the German army's.

The problem was that the army still lacked a centralized training structure to rapidly and uniformly transmit these crucial ideas across the organization. GHQ redressed this deficiency by mid-1918, but the war ended before Maxse's reforms had time to play out.

Both the army's assault tactics and elastic defense in depth conform to CAT theory's expectations. The army was receptive to new ideas (from below and from the Germans) and the Training Directorate translated them into a coherent doctrine. It was the lack of a transmission mechanism that prevented their widespread application. Only combined arms doctrine defies CAT theory's prediction, since the army was able to demonstrate it at Cambrai and implement it during the Hundred Days offensive. Chapter 8 takes this issue up in detail.

Finally, as was the case in Chapter 5, there is no evidence to suggest that other factors were responsible for doctrinal optimization. Defeat (or prospective defeat) did not inspire change - 1915 and 1916 stand as a strong testament to that fact. Doctrinal change also represented the work of countless individuals, again suggesting that the system mattered more than the men. If there is a solitary individual who looms large over the story it is Douglas Haig. If there was ever a case of an army transforming in spite of its leader, it is the British army in the First World War. Finally, civilian leaders did not play a role in the

army's doctrinal evolution. British politicians definitely took a more active role in monitoring the war's progress in Britain than they did in Germany. The debates between 'Westerners' and 'Easterners' revolved around where, not how, the army should fight. Like their German counterparts, British civilians simply lacked the expertise and specialized knowledge to actively intervene on matters of tactical doctrine.[424]

[424] Tanks again stand out as an exception. See Chapter 8.

Chapter 7

The French Army on the Western Front

"The generation after 1918 confirmed the rather pessimistic verdict on the performance of French generals, condemning them first for their failure to foresee the nature of modern war and, second, when confronted with it, for having wasted more lives than France could afford in a war of attrition which lent to the word victory an empty and sinister ring. If this verdict has resisted rehabilitation in some quarters, it is equally true that historians have begun to challenge it. In the popular mind, the French generals of the Great War may still be seen as semi-competent at best or, at their worst, as men whose outlooks were so distorted by 'esprit militaire' that they placed outmoded professional values and ambition above the lives of their troops or the long term interests of France… Yet, French generals, once denounced as incompetent to the point of criminality, in recent years have begun to receive a more sympathetic hearing from historians."[1]

I. Overview

The French army lagged behind its British ally and German adversary in terms of doctrine. By war's end most French units did not use modern assault tactics or combine arms.[2] While the French army did build its defenses in depth, they refused to incorporate elasticity.[3] Put bluntly, the French army lost the race to adopt a optimal doctrine on the Western Front.

This outcome is puzzling. Popular myths about a 'cult of offensive' notwithstanding, the French army started the war with tactical doctrines that were perhaps the most advanced in Europe.[4] These doctrines clearly contained early traces of the techniques and practices

[1] Douglas Porch, "The Marne and After: A Reappraisal of French Strategy in the First World War," *Journal of Military History* 53 (1989): 363–364.

[2] Like their British allies, the French army did do a better job of developing and harnessing tanks than the German army. In a training pamphlet written for the American Expeditionary Force Rene Louis Jules Radiguet offers a most balanced explanation for why this was: "It is important to note that the Germans, who for a long time did not favour the adoption of tanks, probably because the management of these monsters require of their crews qualities not always found among the Boches, have recently constructed some. Of course they are of 'Kolossal' proportions. We do not know as yet exactly what results they have obtained." René Louis Jules Radiguet, *The Making of a Modern Army and Its Operations in the Field: A Study Based On the Experience of Three Years On the French Front (1914-1917)* (New York and London: G.P. Putnam's Sons, 1918), 85.

[3] This was one area in which political considerations clearly shaped tactical doctrine, as I will discuss.

[4] The term 'cult of the offensive' comes from international relations. Although it is often (crudely) used to describe the pre-war doctrines of all the major combatants, it is most strongly associated with French doctrine. This chapter attempts to cast some subtlety on this characterization. In any case, it is more accurate to say that French pre-war doctrine was based on *offensive a outrance* (offensive at all costs) than to use the pejorative term 'cult,' which

on which modern assault tactics and the elastic defense in depth were built. Moreover, the French were the first to experiment with many of these new concepts. A French company commander, Andre Laffargue, wrote a pamphlet outlining the core concepts behind modern assault tactics in August 1915. In fact, the Germans captured a copy of the pamphlet after General Joffre ordered his *Grand Quartier General* (GQG) its publication and circulation.[5] Similarly, French units experimented with elasticity in their defensive schemes as early as the battle of Verdun. At least in the first half of the war the French army seemed poised to optimize its doctrine first. Yet, despite a willingness to disseminate new ideas, GQG chose not to incorporate these innovative ideas in formal doctrine. Instead, it clung to a doctrine of methodical battle and a rigid defense in depth.

Analytically, the French army's experience on the Western Front is useful for several reasons. First, it offers yet more evidence to support CAT theory's core predictions. The army's command culture grew increasingly centralized as the war progressed. It was never able to organize a coherent doctrinal assessment mechanism. And its training structure was either decentralized or moderately decentralized for the war's duration.

Second, by tracing how the army's doctrine evolved (and then stagnated) we can see that the French failed to optimize for reasons that are consistent with CAT theory's internal

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unambiguously insinuates its adherents were unthinking followers. French generals can be accused of many things – but unintelligent, stupid and religiously devoted to a concept are not one of them. If anything, French officers were the least religious on the battlefield. French commanders were officially forbidden from including prayers in their pre-assault pep talks, although few could deny their men the opportunity to observe religious practices before a battle. Ian Sumner, *They Shall Not Pass: The French Army on the Western Front, 1914-1918* (Barnsley: Pen & Sword Military, 2012), 90–91.

[5] To be clear about the sequence of events, OHL obtained a copy of Laffargue's pamphlet *after* it had already begun systematically working on storm troop tactics.

logic. This is especially true with regards to command culture. Front line units experimented more, and GQG was more receptive to input from below, early in the war, when the army had a moderately decentralized command culture. In fact, this was the one point in the war when the French soldiers were ahead of their British peers and German adversaries. Then, as senior leaders centralized control, experimentation dropped off. So too did leaders' willingness to entertain ideas from the front lines.

Third, the French experience demonstrates that command culture is not simply a function of overarching social values. It may not come as a surprise to those who study the British army's officer corps that it was reluctant to grant conscripts and junior leaders autonomy. It was, after all, homogenous, isolated, and elitist.[6] The same cannot be said of the French officer corps, which was by far the most meritocratic officer corps in Europe. The overwhelming majority of officers – to include generals – came from the bourgeoisie.[7] In 1914 fully half its junior officers came from the enlisted ranks.[8] French society was far more liberal than British or German, and the French Left went to great lengths to infuse the army with civilian values in the years preceding the Great War. If anything, we should have expected the army's command culture to grow more decentralized as the war unfolded.

[6] Of course, the same can be said of the German officer corps, but it was far more willing to cede control on the battlefield.

[7] In a random sample of 488 French generals Walter Barge finds that only 5% had familial ties to nobility. Walter Shepherd Barge, "The Generals of the Republic: The Corporate Personality of High Military Rank in France, 1889-1914" (Ph.D., The University of North Carolina at Chapel Hill, 1982), 6.

[8] Douglas Porch, "The French Army in the First World War," in *Military Effectiveness*, vol. I (Boston: Allen & Unwin, 1988), 200.

Is this a good test of CAT?

These advantages notwithstanding, there may be at least one reason to approach the French case with caution (at least in terms of using it to test CAT theory). The fact is that for much of the war the French army deliberately chose not to develop a doctrine built around modern assault tactics, combined arms, and an elastic defense in depth. This reluctance might make the French experience look like poor test case for CAT theory. After all, CAT theory is about generating ideas, selecting and refining them, and transmitting them across the organization. If the French army intentionally opted to not move beyond experimentation, then it might seem like it is only suitable for testing the first 1/3rd of the theory.

There are two responses to this issue. First, nothing in CAT theory suggests that armies will always transition through all three steps of the optimization process (experimentation, selection, and implementation). Nor does it deny that stochastic factors can derail optimization (e.g. a hyper-conservative leader, political considerations, or rapid war termination). The expectation is simply that command culture, the presence or absence of an assessment mechanism, and training structure exert a systematic and predictable influence on an army's ability to optimize its warfighting doctrine. In fact, as this chapter demonstrates, the army's command culture – and the fact that it rapidly centralized as the war progressed – helps explain its doctrinal stagnation. Even had the French army never attempted to move beyond methodical battle this fact in and of itself would not disprove CAT theory.

Second, the army did try to move beyond methodical battle – twice. Both occurred in 1917 after General Joffre's dismissal (he was the army's commander in chief from August 1914 to December 1916).[9] The first was when Joffre's immediate successor, General Robert Nivelle tried to implement his *bataille de rupture* doctrine. The second occurred when General Philippe Petain, Nivelle's successor, attempted to incorporate elasticity into French defenses as part of a broader strategy to a*ttendre les chars et les Americans.*[10] Both transformations represented progress towards an optimal doctrine. Neither was successful for reasons consistent with CAT theory.[11]

There is another reason for approaching the French case with caution. French politicians intervened in military policy and doctrine to a much greater degree than their British and German counterparts. Georges 'the Tiger' Clemenceau eagerly intervened in military affairs.[12] Similarly, the civilian government had a long tradition of maintaining tight control over the army. In terms of doctrinal optimization, prewar policies that divided control over war planning and doctrine writing were probably more important than Clemenceau's forceful leadership late in the war.

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[9] Lest readers immediately argue that leadership change is therefore the key explanatory variable – I will deal with this potential counterargument in chapter 8.

[10] "Wait for the tanks and the Americans."

[11] Other factors mattered as well. Nivelle's *bataille de rupture* failed because army units were incompletely trained on it; because Nivelle himself applied to doctrine in a flawed way (selecting poor terrain for the assault; assaulting into the teeth of the new German elastic defense in depth; and failing to maintain even a modicum of operational security/surprise); and because elements of *bataille de rupture* were flawed. Most notably, the doctrine relied on surprise to achieve its maximum effect, but neither Hurricane barrages nor predictive fires were part of the doctrine. Therefore, even had Nivelle not allowed his plans to fall into German hands (they captured a copy of the order, but Nivelle himself spoke openly about his plans to the French press) surprise would have been eliminated by the six day preparatory bombardment. Petain's efforts were undercut in part by implementation problems, but also because his civilian leaders found the idea of trading space for time politically reprehensible. Chapter 8 deals with both sets of issues.

[12] See Eliot Cohen's case study on Clemenceau in E. A Cohen, *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (Free Press, 2002).

Thus, civilian intervention complicates causal analysis. After all, if civilians prevented centralized planning within the army; but this deliberate intervention unintentionally kept the army from developing a strong doctrinal assessment mechanism; then did civilian intervention or the lack of an assessment mechanism 'cause' (or prevent) the army from optimizing its doctrine? This issue is important and I attempt to resolve it at the end of the chapter.

A second look at French tactics

The literary and anthropological post-war narrative about the French army in the First World War has skewed the way most English language scholars think about French tactics on the Western Front. This bias is somewhat understandable given that there is a gap in the historiography when it comes to how the French army actually fought the war; the official French history is so overwhelming that it is inaccessible[13]; and very few primary source tactical documents have been translated into English.[14] Nevertheless, it is imperative that scholars interested in military change do a better job of scrutinizing the historical record, because the French were, at times, surprisingly innovative. More important, at least from an analytic experience, is the fact that they were the only army (among the three primary combatants) that ultimately failed to optimize in all areas. Important reasons for this

[13] It comprises 11 tomes and 102 volumes.

[14] In a study of the 1,110 articles and books written between 1983 and 1998 on the French in the First World War, Jean-Charles Jauffret finds that only 4% were written about the war's conduct, diplomacy, and intelligence. By comparison, 17% studied the war's impact on civilians and society; 13% war memories; 13% individual battles; 11% technological innovations; and so forth. Only the economics of the war was less scrutinized (2%). As cited in Elizabeth Greenhalgh, "Writing About France's Great War," *Journal of Contemporary History* 40, no. 3 (July 2005): 605–606. Greenhalgh also discusses the official war history's inaccessibility, quoting Cyril Falls' in calling it "one of the most inhuman documents that one can imagine." Finally, she points to the relative absence of empirical work on the French army and its battlefield activities and performance. Ibid., 609-611.

failure will go unnoticed if we continue to dismiss it on social, political, or individual grounds.[15]

II. Prewar

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Mod. Decentralized
Assessment mechanism	No
Training structure	Decentralized

Political, strategic, and operational situation

No army was more ill prepared for war in 1914 than the British. However, the French army also faced daunting political and strategic challenges. None fully explain why the French army failed to optimize by the end of the war. However, these factors complicate the causal story to a much greater degree than was the case in Britain or Germany. For this reason France's, and its army's, political, strategic and operational situation need to be explored in some detail.

External politics

Germany was France's primary security concern. After the Franco-Prussian war, the main question was how to contain, deter, and ultimately defeat a German opponent that possessed more wealth, more industry, more people, and whose advantages were growing

[15] i.e. Leftist France was incapable of waging war effectively; the army was too politicized; or Joffre and Nivelle were responsible for the army's failings / Petain and Clemenenceau the only reason it managed to avoid complete defeat.

with time? Allies were France's primary solution to this problem.[16] To this end France signed an alliance with Russia in 1891 and a military commitment from Britain in 1906.[17]

France's goal was to encircle Germany. French leaders hoped the threat of a two-front conflict would either deter German hostility or force Germany to divide its forces. Of course, the scheme meant *both* France and Russia needed to attack at the first sign of German aggression.[18] If one ally failed to respond – or adopted a defensive posture – then Germany would be free to concentrate its army against the other.[19] The crucial point is that France's alliance strategy required its army to assume an offensive posture. Whether its army possessed the operational capacity (it did) and the tactical ability (it did not) to translate this strategy into action is another matter. Nevertheless, it is worth remembering that top down politics, not a bottom up obsession with offensive warfare, drove French decision making before the war.[20]

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[16] This is what Jack Morrow calls external balancing. French leaders engaged in internal balancing as well. This included heavy investment in military modernization and railway expansion. Investment in the former was designed to gain parity on the battlefield. Investment in the latter was designed to gain parity during mobilization. For more on internal versus external balancing, see James D. Morrow, "Arms Versus Allies: Trade-offs in the Search for Security," *International Organization* (1993): 207–233. For more on French investment in its railways, see Hew Strachan, *The First World War: Volume I: To Arms (First World War*, New Ed (Oxford University Press, USA, 2003), 180–181.

[17] It is important to keep in mind that the Russians were by far the more important alliance partner. The French had serious doubts that the British would actually fulfill their commitment to send an expeditionary force (which, as chapter 6 pointed out, the British actively debated not sending). Moreover, the French army had active plans to preemptively violate Belgian neutrality. Nor was the promised British Expeditionary Force large enough to tip the scales in any case. Robert A. Doughty, "French Strategy in 1914: Joffre's Own," *The Journal of Military History* 67, no. 2 (2003): 435–440.

[18] For an in depth discussion about how this imperative drove the rush to war in 1914 see M. Trachtenberg, "The Meaning of Mobilization in 1914," *International Security* 15, no. 3 (1990): 120–150.

[19] Recall from chapter 6 that the so-called Schlieffen Plan was the German army's attempt to exploit France's proximity and Russia's vast size (and slow mobilization capacity) to achieve this concentration even if both lived up to their commitment to attack simultaneously.

[20] Strachan, *The First World War*, 191; Doughty, "French Strategy in 1914," 433–435. To be fair, although it is outside the scope of this dissertation to examine the relationship, the political and military leaders who created French security policy must have done so with at least passing reference to what their top generals were telling them about the army's tactical capabilities and limitations. For a dissenting view, see Porch, "The Marne and After," 372–373.

Internal politics

France's alliances may have convinced its leaders to adopt a strategic plan for which the army lacked the tactical means.[21] While tragic, these shortcomings did not necessarily undermine the army's long-term ability to adapt to the war once it had started. The same thing cannot be said of France's internal politics. Mistrust and maneuvering on both sides of the civil-military divide most assuredly impeded optimization. There were direct effects. Late-war political pressure to avoid adopting an elastic defense in depth was one example. However, the indirect effects of this clash between civilians and officers were more deleterious.

It is well beyond this dissertation's scope to explain the reasons for prewar France's civil-military gap. Put simply, the prewar army served a deeply divided nation and was itself a divisive force.[22] "The political left feared a professional army would be used against them, the right feared a conscript army as an instrument of revolution."[23] Both sides wanted a different kind of army.[24] Leftist politicians wanted a nation in arms. They believed short-term conscripts provided a bulwark against militarism. Right wing politicians dismissed mass national armies as a relic of Napoleonic battlefields. They wanted a smaller, long

[21] Porch, "The French Army in the First World War," 215.
[22] What follows is taken from Ibid., 193; Ian Sumner, "French Poilu," in *War on the Western Front*, ed. G. D. Sheffield (Oxford, U.K.: Osprey, 2007), 54; Ronald Harvey Cole, "'Forward with the Bayonet!': The French Army Prepares for Offensive Warfare, 1911-1914" (Ph.D., University of Maryland College Park, 1975), 8–9; Shelford Bidwell and Dominick Graham, *Fire-power: British Army Weapons and Theories of War, 1904-1945* (London: Allen & Unwin, 1982), 16.
[23] Anthony Clayton, *Paths of Glory: The French Army 1914-18* (Cassell, 2005), 28.
[24] The fear of German aggression was one of the few unifying issues in prewar France.

service army.[25] The two sides also fought over colonial policy, Catholicism's role within the army, and the army's role in breaking labor strikes.[26]

The divisive struggle between right and left had a toxic affect on the army's long-term ability to doctrinally optimize. First, senior leaders were selected based on patronage and political ideology.[27] For example, Robert Nivelle was chosen to succeed Joffre over d'Esperey, Fayolle, and Castelnau because the latter three were Catholic and therefore politically unacceptable.[28] A promotion system biased by personal connection and political appropriateness undoubtedly sapped the army's ability to engage in objective analysis, giving promotion to less competent officers and skewing incentives to agree with the 'company line.' Second, political competition for control over the military led the government to divide responsibility for planning among various agencies, directorates and bureaus. The French lacked a centralized general staff *by design.* To be sure, it had a general staff (called the Army Staff). But this staff had to compete with 13 other agencies for the War Minister's ear.[29] More important, even within the Army Staff doctrine and training functions were divided among various disparate bureaus. Splintering the army's ability to

[25] This issue fueled a multi-decade debate between two and three year conscription laws. The left backed two year conscription, assuming that it was not hard to teach a soldier to defend his country and that the right simply wanted the third year to inculcate conservative values. The right thought the third year necessary to achieve maximum competence. The 'long' service model dominated from 1870 to 1905, as all males were required to serve between three and five years. From 1905 to 1913 the obligation was shortened to two years. It was increased back to three years in 1913. The entire debate is somewhat misleading, since by 1914 Frenchmen were actually liable for 28 years of service: three years on active duty; 11 in the reserves; seven in the territorial army; and seven in the territorial reserves. General Staff, "Handbook of the French Army," August 1914, 15, Joint Services Command and Staff College Archives, Shrivenham.
[26] For its part, the officer corps sided with the right. It actively sought to discredit the two-year system, intentionally ensuring draftees during this period (1905 to 1913) received sub-par training. Cole, "Forward with the Bayonet!," chap. 3.
[27] Bidwell and Graham, *Fire-power*, 16; Barge, "The Generals of the Republic," 153.
[28] Clayton, *Paths of Glory*, 119.
[29] Strachan, *The First World War*, 189.

plan and coordinate may have made sense from a political control vantage point. However, as we will see, it made little sense in terms of of military efficacy.

Strategic and operational situation

Militarily, after the Franco-Prussian war the army developed a series of strategic and operational plans to repel a second German invasion.[30] Numbered sequentially, these plans evolved alongside French grand strategy. The first plans were reactive. Planners knew France could not mobilize as quickly as Germany. So the first war plans relied on France's expansive fortress network to slow the German army, buying time for units to mobilize and counterattack.[31]

Two late-19th century developments forced planners to adopt a more aggressive posture. First, high explosive shells were introduced in the mid-1880s, which meant German artillery could easily pound French forts out of existence. Second, the government invested heavily in modernizing France's rail network, which meant France could finally mobilize as quickly as Germany. Subsequent plans were updated accordingly, creating more offensive options. Plan XV (1903) substituted a flexible, active defense for a passive one.[32] Plan XVI (1909) called for an immediate attack into Germany.[33]

[30] Strictly speaking, these were mobilization plans designed to give the army a range of options in the event of a German invasion, not strategies. In other words, the various plans did not commit the French army to a particular course of action (e.g. a preemptive attack), but were instead designed to maximize operational flexibility given what French planners expected the Germans to do. For a deeper discussion of this issue, see Doughty, "French Strategy in 1914"; Porch, "The Marne and After"; Strachan, *The First World War*, 180–186 & 191–198.
[31] What follows is taken from Joseph Jacques Césaire Joffre, *The Personal Memoirs of Joffre: Field Marshal of the French Army*, vol. 1 (New York and London: Harper & Brothers, 1932), 26.
[32] Strachan, *The First World War*, 181.
[33] This was especially true after Joffre's modified it in 1911. Joffre rose to power in large part because his predecessor, General Victor Michel, attempted to modify Plan XVI, but failed to win political support for his

However, it was the oft-maligned Plan XVII that directed the army's mobilization and initial operations in August 1914. Plan XVII called for five armies to mobilize in northeastern France.[34] Meanwhile, a small blocking force deployed near the Belgian border.[35] The important point is that Plan XVII was a mobilization plan, not a strategic imperative. It allowed Joffre to lunge headfirst into Alsace-Lorraine. It did not 'force' him to do so.

Dependent Variable

Two sets of regulations dictated French tactics before the war. The first, issued in 1895, was not replaced until 1913.[36] Both doctrines emphasized offensive action, which should not come as a surprise. At the same time, neither doctrine was a product of collective delusion or an unquestioning faith in the mystical power of the attack. Both represented a genuine attempt to solve the same problem every other major power was wrestling with: firepower. French doctrine made many of the same mistakes we have already seen. It

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changes. Michel's plan was to concentrate part of the army at Lille and Sedan for a offensive strike into Belgium while the rest of the army established defensive positions in Lorraine.Porch, "The Marne and After," 378.

[34] This was not a preemptive strike and in August 1914 Joffre went to great lengths to ensure that his units were not the first to cross the border. What follows is from R. A Doughty, *Pyrrhic Victory*, 2005, 442–443.

[35] Early versions of Plan XVII sent no units toward Belgium. In any case, Joffre committed far too few units to defend the Belgian frontier. This flaw was not the result of a reflexive disdain for defensive operations. Rather, Joffre underestimated the number of troops the Germans would put into their advance (even after one of his staff officers obtained a copy of the German invasion plan – Joffre and others was convinced it was a deliberate attempt at deception). Joffre was convinced that the Germans would not use reserve units in the initial assault, mirroring the French army's own reluctance to use reserve formations for front line duty (it is worth pointing out that the French only labeled formations built around 'older' classes of reservists as reserve units. They had no qualms about filling out the ranks of their active duty units with younger reservists who had recently completed their mandatory service). In any case, Joffre was wrong. The Germans reinforced the right hook with reserve divisions. Cole, "Forward with the Bayonet!". According to Elizabeth Kier the French army did not learn from this experience and implemented a defensive doctrine during the interwar years largely because French officers questioned whether reservists could fight. See Elizabeth Kier, "Culture and Military Doctrine: France Between the Wars," *International Security* 19, no. 4 (April 1, 1995): 65–93. For a critique of Kier's thesis, see Douglas Porch, "Review: Military 'Culture' and the Fall of France in 1940: A Review Essay," *International Security* 24, no. 4 (April 1, 2000): 157–180. For an alternative explanation that ties back to the French experience in the First World War, see R. A Doughty, "The Seeds of Disaster: The Development of French Army Doctrine," *Hamden, Conn.: Archon Books* (1985).

[36] A final manual describing how this new doctrine was to be employed at the small unit level was not released until April 1914.

struck an untenable balance between acknowledging firepower's lethality and insisting on shock power's utility. It underestimated the individual soldier's ability to fight on his own.

At the same time, French doctrine was also more advanced then German and British doctrine before the war. It espoused remarkably advanced defensive tactics, many of which resembled nascent elements of a defense in depth. It also called for more flexible formations in the attack.

In sum, the French army's prewar doctrine was flawed, but it was not mindless. In many respects it was closer to the mark than German and British doctrine, suggesting path dependency was not the reason the French army struggled to optimize on the Western Front.

Offensive tactics

Firepower ascendant Much like the German army's 1888 *Exerzier-Reglement fur die Infanterie* (1888 ExRfdI) and the British army's 1902 *Infantry Training Manual*, the French army's 1895 regulations represented a high point in progressive tactical thinking.[37] More than the regulations that replaced them in 1913, the 1895 regulations acknowledged that

[37] At least from the perspective of the optimal doctrine in World War. One of the enduring puzzles of the prewar era is why all three armies flirted with relatively advanced tactical doctrines in the late 1880s through the early 1900s, only to revert to more traditional shock power concepts immediately before the war. This phenomenon is especially baffling because all three armies went back to shock power *after* the Boer and Russo-Japanese wars – conflicts that post-war historians and analysts point to as the harbinger of firepower's ascendency. Certainly, military leaders on all three sides (at least those in power) did not agree with this assessment and, in fact, cited both wars as reasons for reverting to shock power tactics. At a minimum this issue should highlight the challenges and implicit pitfalls that come with using the last war to predict the next. Ironically, if the First World War is any guide, in periods of significant technological change armies would do well to fight the last war.

firepower complicated the assault. Many of the doctrine's tactics were an attempt to mitigate firepower's worst effects. Flexibility, initiative, and suppression were key.

The 1895 regulations outlined a four-phase attack.[38] First came the approach. To conceal their movement commanders used scouts to lead them towards their objective. Although dense formations made easy targets, the regulations suggested that commanders keep their men packed tightly together to move as fast as possible from covered position to covered position.[39]

Next came the deployment. When deploying units needed to change formations. This transition could be unwieldy and time consuming, especially for larger units or units under fire. Owing to the enemy's defensive firepower, the regulations instructed commanders to only deploy when they were close enough to return fire. The key point is that the regulations did not mandate a particular deployment or assault formation. Commanders were told to be flexible in the formation they adopted and to make sure that it conformed to the terrain, the mission, and the enemy situation.

At 600 meters out the infantry deployed into a firing line and began firing individually.[40] Once formed, the firing line moved bounds. The regulations encouraged commanders to position skirmishers in front of the firing line as needed.

[38] What follows is taken from General Staff, "Handbook of the French Army," 1906, 166–169, Joint Services Command and Staff College Archives, Shrivenham.
[39] Ostensibly, the idea was that at long distance fast movement, even in dense formations, made it hard for enemy gunners to range them.
[40] Before this point commanders relied on artillery and machine guns to take the objective under fire.

The attack culminated in the assault, which started at around 200 meters from the objective. The regulations were clear on this point: whether or not defenders were effectively suppressed dictated when commanders should signal the bayonet charge.[41] Instead of assaulting the entire enemy position, commanders were also instructed to identify weak points in the defensive line; shift reserves to achieve superior numbers; and to launch the final assault in depth against one of the pre-identified decisive points.

The 1895 regulations had a lot in common with the 1888 ExRfdI and the 1902 *Infantry Training Manual*. As with the German and British doctrines, the 1895 regulations were surprisingly progressive. Fire superiority was a prerequisite for maneuver. Formations were flexible. Fire and movement were essential. Attacks were to be mounted only after suppression and decisive numbers were in place. Surprise was key.

There were also differences between the three doctrines.[42] One difference was that French doctrine advocated for attacks to be carried out in depth and on a narrow front.[43] In other words, French commanders were supposed to maintain a large reserve force. Held behind the firing line, this reserve gave a commander the flexibility to shift and attack with overwhelming superiority at a single point. In contrast, German regulations called for very small reserve. Most German soldiers were to be kept in the firing line. This made it harder

[41] "The final assault is to be made by masses which have been accumulated at a convenient distance from the defense. Very great importance is attached to artillery fire, both preparatory to the attack and in supporting it." General Staff, "Handbook of the French Army," 1906, 168.
[42] This is another way of saying that the three armies were not simply copying one another wholesale.
[43] "Report of a Conference of General Staff Officers at the Staff College 17th to 19th January, 1910" (The War Office, 1910), 23, Joint Services Command and Staff College Archives, Shrivenham.

for German units to shift men to attack at a single point. Broad attacks against the entire position were therefore the norm.

In hindsight, the 1895 regulations were advanced for their time, but nevertheless incomplete. They included no provision for small unit action. Although they recognized that attacks could take time to unfold under modern firepower conditions, they in no way suggested that 'time' might mean days or even weeks. Most critically, these regulations made no concrete provision for infantry-artillery coordination. Nevertheless, the French army almost certainly would have been better prepared for the First World War with this set of regulations than with those that replaced it starting in 1913.

1913 – 1914: *Offensive a outrance* Three documents replaced the 1895 regulations: *The Conduct of Large Units* (October 1913), *The Decree on the Service of Armies in the Field* (December 1913), and the *Regulations for Infantry Maneuver* (April 1914).[44] Collectively, these regulations supposedly embodied *offense a outrance* (the offensive at all costs). To quote General Joffre directly, the 1913 doctrine,

> Affirmed as sort of dogma, that success in war could come only to him who sought to bring the opponent to battle and was capable of delivering the offensive with all his power; the idea of security rested upon the requirement that commanders maintain their freedom of action in the face of an enemy's efforts to impose his will.[45]

It is not surprising that the prewar French army earned a reputation for worshipping at the alter of the offensive. After all, the first page of *The Conduct of Large Units* stated that "the

[44] Pascal Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, trans. P. Kieffer (Paris: Berger - Leorault, 1923), 4.
[45] Joffre, *The Personal Memoirs of Joffre*, 1932, 1:34.

purpose of military operations is the annihilation of the organized forces of the enemy;" argued that "a decisions should be sought within the shortest possible time so as to promptly end the fighting;" and claimed that "the offensive alone leads to positive results by seizing the initiative in operations we take control of circumstances instead of submitting to them."[46] In short, these regulations used provocative rhetoric, outlined outsized goals, and encouraged aggressive means. Post-war historians can be forgiven for assuming that the doctrine "called for attacking the enemy everywhere, anytime, with all available forces, even without regard for traditional security precautions of the effects of enemy firepower."[47]

Revisiting the Cult Nonetheless, rhetoric should not be mistaken for substance. A closer look at the 1913 and 1914 regulations suggests that their postwar reputation is undeserved. First, the doctrine neither ignored firepower nor substituted morale and élan for good tactical sense. A report issued by the high command before the regulations were published reminded officers that

> The experience of the most recent [wars] were given abundant proof that the continued increase in the rate of fire and of the flatness of the trajectory of the infantry projectile, and the continued increase of the rate of fire and the power of artillery fire expose troops to destructive effects which are becoming more and more redoubtable, which requires them to use very supply formations which may be rigorously adapted to the terrain. Experience equally proves the greatest importance of fire for the support of movement, which alone is decisive and irresistible, and which alone is capable of producing victory.[48]

This last sentence is especially important because it emphasizes the inescapable link between fire and maneuver. Somehow, the first half of this crucial sentence was forgotten

[46] As quoted in Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 4.
[47] Cole, "Forward with the Bayonet!," 67.
[48] As quoted in Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 9. Underlined text is in the original.

in the postwar race to assign blame. Morale and élan were important because they gave soldiers psychological support. And psychological support was needed to help them press through the storm of steel. Thus, morale and élan were important *because* modern firepower was lethal and terrifying. They were not a substitute for firepower. On this point the French were no different than the Germans and British, Generals on all sides worried about how to get their citizen-soldiers to keep moving through a storm of steel, even if French generals were more effusive in the language they used to make the point.

Second, the prewar doctrine recognized that modern firepower rendered traditional formations obsolete.[49] To be sure, the bayonet charge was seen as the critical moment in any battle. The idea that a battle turned on a single, relentless bayonet charge was clearly a step backwards and meant shock power advocates regained control over firepower advocates in the French army as they had done in the German and British armies. Yet the doctrine also reiterated the 1895 regulations in calling for commanders to let the terrain and the situation dictate their formation. Cover and concealment, and night attacks were likewise encouraged. For the same reasons these regulations forbade dense formations were forbidden (except during the final charge) and skirmishers were recommended instead.[50]

Third, the doctrine did not encourage units to attack with reckless abandon. Methodical planning, meticulous reconnaissance, and detailed liaison with the supporting arms were

[49] Much of what follows is from Cole, "Forward with the Bayonet!," 229–231 & 285–286.
[50] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 9.

essential.[51] Regulations encouraged officers to think and to rely on their judgment, instead of blindly deferring to regulations.[52]

Finally, the army's prewar doctrine was remarkably progressive in certain respects. To deny the enemy time to shift his reserves, attacking units were told to press forward without worrying about maintaining contact with friendly units on their flanks.[53] Surprise, mass, and economy of force – concepts at the core of most 21st century military doctrines – were likewise emphasized.[54] Articles 13 and 82 in *The Conduct of Large Units* furthermore recognized future battles were unlikely to play out in a single, frenzied act. Rather, they could unfold in stages, taking days to resolve.[55]

The house that Foch built Of course, the foregoing discussion begs the question: why did the prewar French army earn such an enduring reputation for attacking at all costs? The most likely answer is that the victors write history. France's most vocal proponents of offensive action before the war also happened to be its most celebrated generals after its conclusion. To be sure, Field Marshal Foch, the highest-ranking French officer in November 1918 was also the most powerful advocate for offensive action at the turn of the century.[56]

[51] Article 119, *The Conduct of Large Units* as quoted in Ibid.
[52] Cole, "Forward with the Bayonet!," 232–234.
[53] Ibid., 212.
[54] For brief summaries of the core principles behind modern combined arms doctrines, see John L. Romjue, *From Active Defense to Airland Battle: The Development of Army Doctrine, 1973-1982* (Historical Office, US Army Training and Doctrine Command Fort Monroe, VA, 1984); Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton University Press, 2004), chap. 3; Walter E. Kretchik, *U.S. Army Doctrine: From the American Revolution to the War on Terror*, Modern War Studies (Lawrence: University Press of Kansas, 2011), chap. 4.
[55] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 12.
[56] For his part, after the war Foch seems to have distanced himself from the more extreme versions of his prewar ideas. "During the years when our officers were thus absorbed in the study of the offensive, indeed, were getting overexcited about it, and convincing themselves that it dominated every other consideration, forgetting for the

In contrast, General Henri Philippe Benomi Petain, one of *offense a outrance*'s leading critics, has largely been relegated to history's dustbin for colluding with the Nazis during the Second World War.

Equally important is the fact that the 'cult of the offensive' was largely confined to a few well-connected and outspoken officers before the war. These included the aforementioned, Colonel (later Field Marshal) Ferdinand Foch, Colonel Charles Ardant du Picq, and Colonel Louis de Grandmaison. Even though the ideas these men espoused were more extreme than what we find in official doctrine, they were not irrational or incomprehensible.[57] In some respects, their ideas were predicated on a set of assumptions widely held throughout Europe at the time – that future wars had to be kept short, otherwise its economic and social costs might trigger the state's collapse.[58] Strategic assumptions drove tactical imperatives.[59]

There is also the not inconsequential point that Foch's ideas were not official doctrine. None of Foch's acolytes were involved in writing three manuals released in 1913 and 1914. Although he was receptive to their ideas, General Joffre was far from an unabashed adherent.[60] Nor did their ideas go unchallenged. Many officers vehemently criticized Foch,

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moment the prodigious power which fire action had recently developed, they were giving too little attention to the matter of armament…". Ferdinand Foch, *The Memoirs of Marshal Foch* (Garden City, N.Y: Doubleday, Doran and Company, incorporated, 1931), lix.

[57] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 9; Strachan, *The First World War*, 188; Porch, "The Marne and After," 376.

[58] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 4.

[59] Douglas Porch argues that *offense a outrance* also served a political function in that it was a unifying concept virtually everyone in France could agree with. It also helped the army and government obscure deeper structural issues with France's national security apparatus. Porch, "The Marne and After," 376–377.

[60] Cole, "Forward with the Bayonet!," 226–227. Joffre himself says that"however, if I was fully persuaded of the superiority of the offensive, I was equally convinced that we should not apply it inconsiderately, and before the

Grandmaison and others. Leading critics included General Charles Lanzerac, Colonel Maud'huy, Lieutenant Colonel Marie Eugene Debeny, and, as mentioned, Colonel Philippe Petain. These officers were just as powerful as Foch and his companions.[61]

In reality, the 1913 regulations contained ideas from both sides of the firepower debate.[62] Thus, if anything, the prewar doctrine's greatest flaw was that it was too ambivalent and contradictory. This shortcoming mirrored similar problems with British and German doctrines immediately before the war. It also helps to explain why French officers fought in a way that corresponded more with their doctrine's rhetoric, not its substance, in August 1914.

Offense a outrance: The balance sheet Although interesting in its own right, from the perspective of doctrinal optimization, France's prewar doctrine (as well as all the baggage that comes along with it) matters only insofar as it helps us one question: was France's doctrine so far off the mark that it created an insurmountable obstacle to optimization? In other words, did French doctrine lag behind German and British doctrine at war's end because it was so misguided at the beginning?

Army had been prepared intellectually and morally for it, or until we possessed war material answering to this highest form of military action." Joffre, *The Personal Memoirs of Joffre*, 1932, 1:30. It is important to point out that Joffre wrote his memoirs after the war and so must be viewed accordingly. Hew Strachan even suggests that Joffre did not even write his own memoirs. Strachan, *The First World War*, 190.

[61] Petain and Maud'huy were professors at the War College. Lanzerac was the former Director of Studies at the War College. Foch had been both a professor and commandant of the War College. Grandmaison was one of his students and a member of the 3rd Bureau within the 1st Group of the Chief of the General Staff's office (roughly the equivalent to the German Great General Staff's operations section.) Colonel du Picq was influential in memory only, as he had been killed near Metz in 1870. Cole, "Forward with the Bayonet!," chap. V & VI.

[62] Ibid., 287.

The answer is an unequivocal no. Rhetoric notwithstanding, the 1913 and 1914 regulations for the attack were similar in substance to those found in the British and German armies. They reflected the same ambivalent conclusions about how to press the attack in the face of modern firepower. If anything, by emphasizing the decisive use of reserves, breaching along a narrow front, and aggressively pursuing deep objectives, even at the expense of flank security, contained important elements of a truly modern assault doctrine. Thus, the French army started the war *closer* to the optimal answer than any other army.

Offensive Doctrine as of July 1914
Table 7.1

Irregular & dispersed formations	Yes (crude)
Independent small unit action	No
Fire and movement (small unit level)	Yes (crude)
Organic firepower	No
Bypass resistance	Yes

Combined arms

Combined arms are the one area in which the French army clearly regressed between 1895 and 1914. According to the 1895 regulations, artillery fired both a pre-assault bombardment and suppressed defenders as infantrymen closed with the objective.[63] The 1913 doctrine eliminated the preliminary bombardment. From this point on French artillerymen did not open fire until after the infantry deployed and closed with its objective.[64] To be fair, the 1913 doctrine continued to emphasize close coordination between infantry and artillery commanders; reminded infantry leaders that they could not move without the support of artillery fire; and recognized that France's main artillery

[63] General Staff, "Handbook of the French Army," 1906, 168; 173–177.
[64] Cole, "Forward with the Bayonet!," 279–280.

cannon – the quick firing 75mm – was not effective against fieldworks.[65] Nevertheless, by doing away with the preliminary bombardment, French doctrine robbed commanders of an important opportunity to even the odds and ensured that French gunners would lag behind their British and German counterparts in their ability to use indirect fire.[66] Because of this undue focus on direct fire, French artillerymen did not wrestle with predicted fire or flexible command and control in the years before the war.

Some of the blame for the army's combined arms deficiencies also rests with the army's decision to adopt the quick firing 75 mm as its main artillery gun. Light, maneuverable, accurate, and devastating at close ranges, the army was in many ways a victim of its own success. Because their 75 mm was so effective at providing infantrymen with close, accurate fire support, French planners began to "focus on speed and direct fire at high rates from close distances."[67] Doctrine adapted to capability. Such a relationship would not have been a problem had the gun's capabilities not been at odds with what war on the Western Front demanded.

Combined Arms Doctrine as of July 1914
Table 7.2

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	Yes (Crude)

[65] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 10.
[66] Bradley John Meyer, "Operational Art and the German Command System in World War I" (Ph.D., The Ohio State University, 1988). The point here is that French gunners fired suppression over open sights, staying as close to their infantry as possible. This technique required much in the way of bravery, but not in the way of skill with indirect fire.
[67] Bidwell and Graham, *Fire-power*, 15.

Defensive tactics

The French army arguably entered the First World War having thought more about the defense than any other army.[68] Three sets of regulations outlined the army's defensive doctrine: *The Decree on the Service of the Armies in the Field*, the *Practical Instructions on Field Fortifications* (issued in 1906 and updated in 1911) and the *Handbook for Engineer Officers.*[69] Collectively, these regulations described what we would now consider a basic defense in depth.

Specifically, defenses were to consist of three successive positions: an advance position to slow attackers and buy time for defenders further back; a main position where the bulk of the fighting was to occur; and a secondary position to stop any attackers that managed to penetrate the first two lines. The principle position was further broken into two defensive lines, a forward line for infantry units and a rear line for 75mm guns. Trenches and fieldworks were to be incorporated in all three positions. Presaging late-war shell hole defenses, French doctrine recommended against continuous trench lines. Instead, positions were to consist of a series of strong points and centers of resistance. Strong points were to be positioned roughly 1,000 meters apart. Infantry units assigned to the strong points covered the ground in front of them with rifle and machine gun fire, while artillery covered the ground between them. Although there was no room for elasticity in these defenses

[68] This observation should be puzzling to those who still argue that the French army was wracked with offense-fever.

[69] This and what follows in the next paragraph are from Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 4–13.

("the division must hold till the end, if it is completely sacrificed"[70]) counterattacks, organized around the various strong points, were an essential component to the system.

Defensive Doctrine as of July 1914
Table 7.3

Depth	Yes
Elasticity	No
Counterattack	Yes

Independent Variables

Command culture

France's prewar army had a moderately decentralized command culture. This fact meant the French army granted more autonomy and authority to its junior officers than either the British or the German armies. As the British army's 1906 Handbook of the French Army described, "initiative on the part of all unit commanders has been much encouraged and has now become a noticeable factor in all operations."[71] The 1913 regulations encouraged commanders to give their junior officers even more discretion. For their part, junior leaders were told to exhibit boundless initiative. Writing after the war, Pascal Lucas, a former French officer, argues that excessive decentralization and the absence of a coherent tactical doctrine led to failure on the battlefield in 1914. In his view, the army was possessed by a cult of *initiative*, leading front line officers to 'make it up as they went along.'[72]

[70] Article 112, *The Decree on the Service of Armies in the Field*. The *Regulations for Infantry* added that "an infantry unit whose mission it is to hold a point of terrain must never abandon it without an order. It will resist to the end." As quoted in Ibid., 8.
[71] General Staff, "Handbook of the French Army," 1906, 166.
[72] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 14–16.

Other indicators also suggest the French army had moderately decentralized command culture. As mentioned, the French officer corps was fairly meritocratic. As early as the 1870s nearly 30% of all French officers were commissioned directly from the ranks; a decade later the army organized training schools to help non-commissioned officers earn a commission. In comparison, the German and British armies were reluctant to make officers out of their enlisted soldiers – less than 5% of British officers came up through the ranks on the eve of the First World War.[73] Comparing the French and Prussian officer corps, Steven Errol Clemente argues, "as the antithesis of the Prussian military, the French army believed that the well-being of democracy required the bridging of all classes within an officer corps based on merit."[74] Similarly, France conscripted and conscription was actually universal.[75]

These characteristics allow us to make an interesting - if somewhat tangential - comparison between the French, German, and British armies.[76] As chapter 5 demonstrated, the German army drew its manpower from a relatively conservative and hierarchical society. Nevertheless, its command culture was not as centralized as its national culture because of

[73] Steven Errol Clemente, "'Mit Gott! Fuer Koenig Und Kaiser!': A Critical Analysis of the Making of the Prussian Army Officer, 1860--1914" (Ph.D., The University of Oklahoma, 1989), 45&107.
[74] Ibid., 107.
[75] In 1911 314,369 men were eligible for conscription. Of those only 9,330 were completely exempted from service (or about 97%) 220,958 were found fit for duty and inducted immediately (recall that all men owed 28 years of service by this point – three active and 25 in various contingents of the reserve and Territorial forces); 3,758 had already volunteered for service; 3,758 were allowed to postpone their service commitment; and the rest were mustered into auxiliary service due to physical restrictions. General Staff, "Handbook of the French Army," August 1914, 63.
[76] Actually, this discussion may not be that far removed from the task at hand. After all, if there is a consistent reason behind the relative levels of centralization/decentralization in the British, French and German armies' command cultures, then CAT theory's insights become both less significant and less interesting (since we can and should look at those underlying causes instead). However, as this paragraph concludes, no such consistent relationship appears to exist. German and French command cultures were more decentralized than British command culture for unrelated reasons. The comparison between French and British command cultures may be more interesting simply because the same factor (manpower systems) does seem to be at play – at least superficially. Exploring this relationship further is, however, beyond this dissertation's scope.

how German officers perceived and planned for war.[77] In contrast, both the British and French armies drew from democratic societies that were either relatively liberal (in the cultural sense) or at least in the process of liberalizing. Yet the British army's command culture was far more centralized than the French army's. The reason for this difference may have to do with how the two armies sourced officers and soldiers. In Britain, officers were narrowly drawn from the aristocracy. Similarly, because Britain did not adopt conscription, the army was free to recruit heavily from the parts of the population that mirrored its hierarchical values. In contrast, the French army was moderately decentralized because it drew its officers from a much wider swath of the population (mainly non-aristocratic and middle class). Moreover, it conscripted such a large percentage of the total male population that its officers had no control over the liberal/democratic values many of its soldiers brought with them (even if it had wanted to which was, of course, precisely what the political left feared).[78]

Command culture as of July 1914
Table 7.4

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

[77] To reiterate, German officers thought of war as inherently chaotic and uncontrollable. This assumption led them to adopt a relatively decentralized approach to command and control.
[78] Indeed, a much larger percentage of French recruits hailed from urban areas than their counterparts in the British army.

Assessment mechanism

The French army did not have a functioning doctrinal assessment mechanism before the First World War. This claim may seem surprising since the French army had a general staff; and the general staff existed for four decades before war broke out.[79] Moreover, training and education for staff officers was rigorous and competition for a seat at the *Ecole Superieure de Guerre* (War College) fierce.[80] Graduates rotated between staff and command tours, thereby maintaining open lines of communication between the army's brain trust and its front line units. The prestige associated with staff work and analysis, already high in the technically oriented French army, grew even more when the army created the *Centre des Hautes Etudes Militaires* (Center of Higher Military Studies, or CHMS) in 1910. Organized on the War College campus, CHMS was a ten-month course designed to pair the army's brightest field grade officers with its most accomplished instructors.[81] As Ronald Cole notes in his dissertation on the prewar French army, CHMS's rosters "read like a who's who in the French army general staff system."[82] Finally, both CHMS and the War College

[79] The government organized an army staff in 1874. Recall that the British general staff was created only a decade before the First World War. Porch, "The French Army in the First World War," 211. The term "French General Staff" is technically incorrect. The staff was actually called the *etat-major de l'armee*, or army staff. The title for the head of the army staff, *chef d'etat-major general de l'armee* does translate to Chief of the General Staff, however. For the purposes of historical accuracy this dissertation refers to the French general staff as the Army Staff, but its titular head as the Chief of the General Staff. See General Staff, "Handbook of the French Army," August 1914, 127 Footnote.

[80]General Staff, "Handbook of the French Army," August 1914, 161. For a description of the selection process and curriculum, seeIbid., 161–165.. The War College was founded in 1875. Cole, "Forward with the Bayonet!," 7.

[81] 20-25 majors and lieutenant colonels were selected by the War Minister to attend each year. Originally, the idea was to select the top graduates of the War College (who were typically captains), but this idea was abandoned in 1909 over fears of creating a rift within the staff corps. The CHMS curriculum included courses taught by War College professors, lectures given by bureau heads from the Army Staff, and staff rides led by members of the *Conseil superieur de la guerre* (Superior War Council).General Staff, "Handbook of the French Army," August 1914, 163.. The top 5% CHMS graduates from each class were invited to stay as instructors. Cole, "Forward with the Bayonet!," 67.

[82] Cole, "Forward with the Bayonet!," 67.

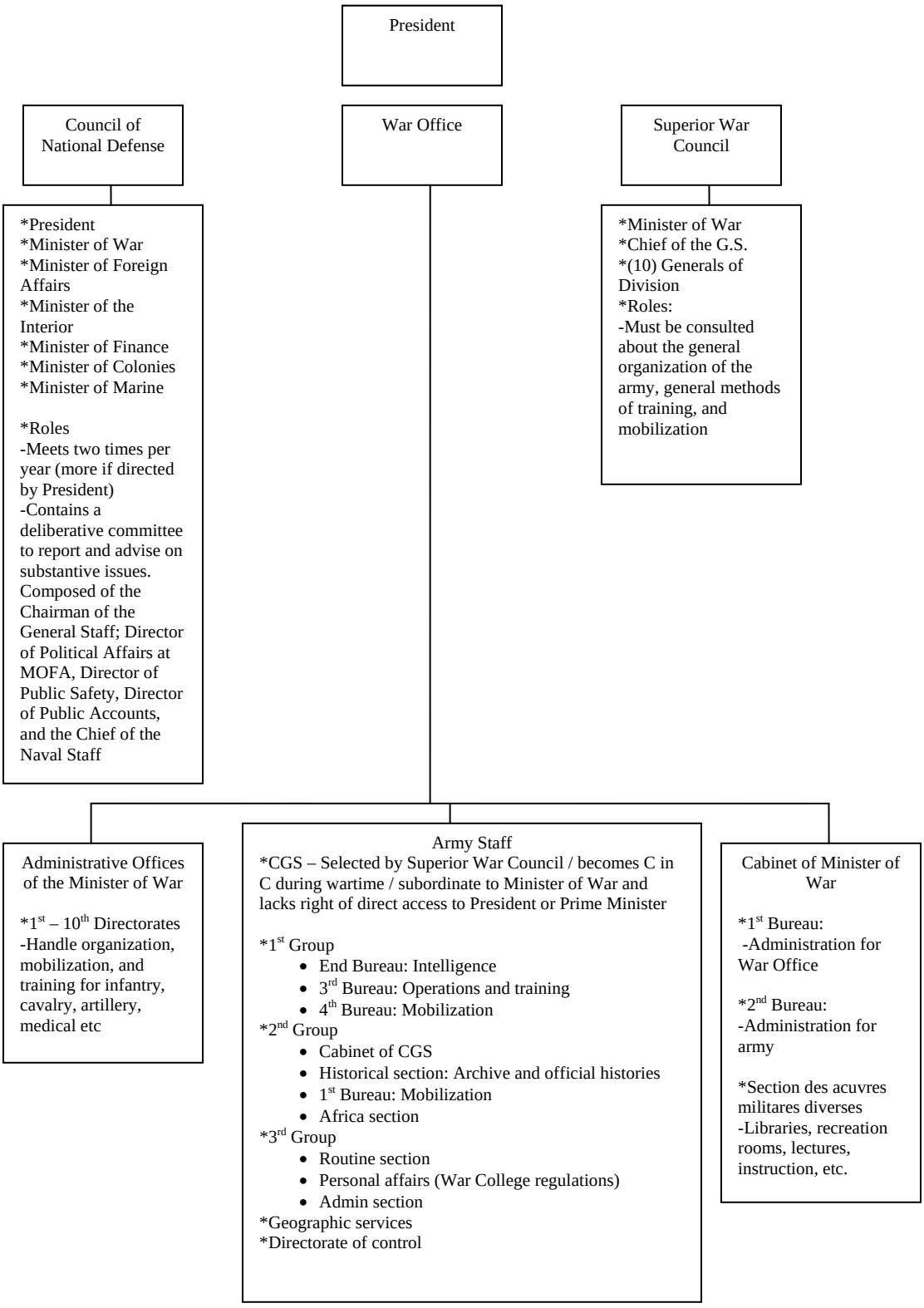
were actively involved in writing the army's doctrine, especially the 1913 and 1914 regulations.[83]

Given all of these characteristics, why should we not consider the Army Staff a doctrinal assessment mechanism? The reason is that control over doctrine was highly fractured. Although the Army Staff had a lot in common with the German General Staff (and is therefore usually called a 'general staff' despite the fact that the moniker 'general' was never in its name) it was neither as coherent nor as unified as the German General Staff.[84] This division was deliberate. French politicians feared what a centralized staff might grow too powerful, presenting a threat to the already fragile Third Republic.[85]

Therefore, where Germany consolidated doctrine, mobilization, training, and operations as part of a general staff, France spread these functions across a number of different agencies and bureaus. In some cases this resulted in duplication. For example, no fewer than 11 agencies had control over training and education. These included the 1st through 10th Directorates within the Administrative Offices of the Minister of War; the *section des acuvres militares diverses* within the Cabinet of the Minister of War, the 3rd Bureau of the 1st Group within the Army Staff, and the Personal Administration section of the 3rd Group within the Army Staff. Furthermore, by law all changes to training and doctrine had to be approved by the Superior War Council (see diagram 7.1).[86]

[83] Ibid. Foch was the commandant of the War College while the 1913 regulations were being written.
[84] For an in depth discussion of the French High Command, especially as it pertained to the French staff system and how it evolved in the late 19th and early 20th centuries, see Ibid., 3–30.
[85] Strachan, *The First World War*, 189.
[86] The foregoing discussion as well as figure 7.1are based on the General Staff, "Handbook of the French Army," August 1914, 130–135. See also Joffre, *The Personal Memoirs of Joffre*, 1932, 1:13.

Army Staff Table of Organization
Diagram 7.1



Thus, the French Army Staff functioned more like a bureaucratic machine than a source of creative doctrinal thinking.[87] An excessive division of labor undermined its analytic capacity. It is telling that the War College curriculum spent a lot of time teaching students about bureaucratic routines.[88]

Worse yet, the army's politicized promotion system worked against the army staff's analytic capacity and its autonomy. War College students knew that finding a powerful mentor or advocate was perhaps the most important part of the two-year program.[89]

Assessment mechanism as of July 1914
Table 7.5

Conduits	Yes
Capacity (prestige and education)	Mixed
Autonomy	No

Training structure

The French army had a decentralized training structure throughout the prewar period. While the Army Staff ostensibly dictated training, the aforementioned duplication of effort meant that no single officer, bureau or agency was "capable of handing down a final verdict on [doctrinal or training] disputes which would be accepted throughout the army."[90] Nor did the army give a single officer total authority over training issues or the power to inspect training schools and/or relieve commanders for training failures.[91]

[87] Porch, "The French Army in the First World War," 211.
[88] Barge, "The Generals of the Republic," 118–122.
[89] Ibid.
[90] Porch, "The French Army in the First World War," 215.
[91] Other than the Chief of the General Staff of course. As chapter 3 points out, the officer with the authority to direct training and take remedial/disciplinary action must be of high enough rank to overcome resistance, but must also not have a portfolio that encompasses so many issues beyond training that he or she cannot possibly make training management the top priority. Obviously, the Chief of the General Staff lacked the time to focus exclusively – or even near-exclusively – on training issues.

At the same time, the French army delegated training to the regimental level.[92] As each new year-group, or class, of conscripts mustered into the army they were assigned to a regiment for training.[93] Like the German army, French regiments followed a standard training schedule.[94] Basic training ran from October to December. December, January and February were spent training as squads. Company exercises ran from March until summer. Large-scale exercises (brigade, corps and army) capped the training year.[95]

However, while a standard training schedule (driven by large scale exercises) directed *when* soldiers trained, the army made no attempt to centrally manage *what* they were taught. The sheer size of the training effort – 164 regiments in the active army alone – inevitably meant diversity, especially in the absence of a high ranking officer with the power to mandate standard training practices. [96]

Ultimately, we have to wonder the degree to which the combination of a new doctrine (recall that the small unit manual was only released in April 1914, after most unit-level training was done for the year) and a highly decentralized training scheme was responsible

[92] Sumner, "French Poilu," 57; Sumner, *They Shall Not Pass*, 15.
[93] By law conscripts were liable for service anywhere in France. However, in most cases the army tried to assign soldiers to a regiment close to home. This practice eased logistical burdens. It also made command and control easier since many regions had unique dialects that were virtually unintelligible to outsiders. About 90% of each class stayed within their local district. After leaving active service all recruits were assigned to the reserve component of the regiment closes to their home.
[94] This discussion of the French army's peacetime training schedule is from Sumner, "French Poilu," 57–59.
[95] These large scale exercises followed a four year cycle. Brigade exercises were held in years one and two; division exercises in year three; and corps exercises in year four. In practical terms this meant even three-year conscripts never participated in the full spectrum of large-scale exercises. At the same time, for a lowly rifleman the marginal difference between digging a trench for a brigade exercise and digging a trench for a corps exercise was probably minimal.
[96] France had 41 active divisions in 1914. Each division had two brigades. Each brigade had two regiments. General Staff, "Handbook of the French Army," August 1914, 108.

for the army's horrific battlefield casualties in 1914. Perhaps thousands of young and inexperienced officers dashed headlong into German machine guns and artillery because they *had not* been trained on the new regulations. The absence of training in a doctrine that already exuded a rhetorical preference for aggressive action may have been what sealed the army's fate during the war's earliest months.

Training structure as of July 1914
Table 7.6

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

III. 1914

Assault tactics	Exp
Combined arms	No
Elastic defense in depth	No

Command culture	Mod Centralized
Assessment mechanism	No
Training structure	Decentralized

Like everyone else on the Western Front, France went to war in August 1914 with the army it had, not the army it wished it had. While a few units began experimenting with rudimentary assault tactics after the front stabilized in the late fall, for the most part there was not enough time for learning. After all, the army had more pressing issues. It faced a

shell crisis of its own. Manpower constraints were making themselves felt, since many of France's three million reservists held critical jobs in industry and agriculture.[97] There was also the issue of the horrifyingly long casualty lists. French generals expected the war to be bloody, but the Battle of the Frontiers and the Battle of the Marne exceeded even their grim expectations. The army suffered nearly 500,000 casualties between August and December.[98] This factor was one of many that drove the army away towards a centralized command culture. At least with respect to doctrinal optimization, this shift proved to be one of the most important ways the army changed in 1914.

Political, strategic, and operational situation[99]

Politically, war came with a temporary reprieve from the partisan infighting between the right and left.[100] The so-called Sacred Union also signaled the end of effective political control over the army. Despite General Joffre's near-fatal mistakes during the Battle of the Frontiers, the newly anointed Commander in Chief of the French army emerged from the Miracle of the Marne an unassailable hero.[101] Although France's elected leaders eventually found a way to reassert a modicum of control over Joffre, no civilian government effectively

[97] Two-thirds of France's industrial workforce was under arms by December 1914. Sumner, *They Shall Not Pass*, 51.
[98] Ibid., 53. The army suffered nearly 300,000 of these casualties in August. B. I Gudmundsson, *Stormtroop Tactics: Innovation in the German Army 1914-18* (Westport, CT: Praeger, 1989), 1–2. Doughty claims that by the end of the Battle of Ypres in early November the French lost 400,000 *killed.* Doughty, *Pyrrhic Victory*, 104.
[99] For a detailed discussion of French war aims during the First World War, see H. E. Goemans, *War and Punishment: The Causes of War Termination and the First World War*, Princeton Studies in International History and Politics (Princeton, N.J.: Princeton University Press, 2000), chap. 6.
[100] The *L'union sacree* involved a promise by left wing parties to support the government and to not call for a workers strike (as many socialists wanted) in the name of the war effort.
[101] Joffre had been the Chief of the General Staff since 1911. However, according to French law, the Chief of the General Staff did not become the Commander in Chief of the army until the start of hostilities. The two roles were not synonymous, complicating an already chaotic situation in August 1914.

managed the army or its chief until Georges Clemenceau tenure as Prime Minister.[102] Therefore, from August 1914 until the end of the war, political factors exerted very little influence over the army's tactics or doctrine.

Strategically, August 1914 marked the only point in the war when all three Western Front combatants went on the offensive. For Joffre this meant sending the bulk of his army directly into Alsace and Lorraine. His overarching goals were to recapture these critical provinces and to deliver a knockout blow to Germany before Moltke could execute his 'right hook.'[103] Unfortunately, Joffre underestimated the degree to which Alsace and Lorraine's terrain benefited its German defenders; the speed with which the 'right hook' would unfold; and the degree to which German forces would push northward through Belgium before descending across the French border.

Joffre therefore deserves a lot of the blame for the army's failures in August 1914. However, there are at least two mitigating factors. First, Joffre could not have possibly foreseen the degree to which his soldiers – especially his battalion and company commanders – would ignore the army's new tactical doctrine. As has already been discussed, far too many ignored the 1913 regulations, mounting futile charge after futile charge without bothering to coordinate artillery support.[104] Better artillery-infantry coordination would not have

[102] Porch, "The French Army in the First World War," 193.Clemenceau led a coalition government starting in November 1917. It did not help matters that the civilian government collapsed as the German army approached Paris (literally and figuratively – it was forced to flee Paris; the cabinet and prime minister were also sacked). Doughty, *Pyrrhic Victory*, 83.Political instability complicated efforts to maintain control over the military throughout the war.
[103] Moltke left only two armies – the Sixth and Seventh – in Alsace Lorraine. These units were more bait than a genuine attempt to guard a vulnerable center of gravity. Moltke and his war planners knew that the terrain benefited defensive operations.
[104] Porch, "The Marne and After," 377.

changed the overall outcome, but it may have reduced casualties. Second, and more important, Joffre's failure in Alsace Lorraine probably saved France.[105] Had his forces successfully pushed deeper into Germany they would not have had enough time to pull back to the river Marne. Nor is it likely that a successful attack would have made it to Berlin – or to any German center of gravity – before Motkle's forces descended on Paris.

Deadlock and trench warfare in no way undermined Joffre's commitment to offensive operations. The army continued to hammer at German defenses for the rest of 1914. These early attempts to penetrate the Western Front may seem callously futile. After all, by late 1914 Joffre and his staff knew they needed new tactics and more artillery to break the stalemate.[106] Nevertheless, there was a cold, strategic logic to 'nibbling away' at the German lines:[107] it kept German units pinned down and otherwise unable to reinforce operations against France's indispensable ally, Russia.[108]

Dependent Variable

Offensive tactics

In 1914 French officers followed their doctrine in spirit. More of their men would have survived these opening battles had the followed it in letter. To be sure, not everything went wrong at the tactical level. Units tended to keep their men spread out and adopt flexible

[105] Ibid., 379.
[106] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 34.
[107] To quote Ian Sumner: "Unable to mount any large-scale ation, all he could do over the next few months was set in train a number of 'partial' offensives, designed to show 'an aggressive attitude,' while preventing the enemy from disengaging and making lateral moves from one part of the front to another… 'I'm nibbling at them,' said that old potbelly Joffre, a phrase the servile pres fell upon like a rare pearl." Sumner, *They Shall Not Pass*, 47.
[108] Foch, *The Memoirs of Marshal Foch*, 191–192.

formations while closing with German positions.[109] Once in contact, commanders deployed skirmishers to their way forward, keeping the rest of their units under cover.[110] Next, the rest of the unit reinforced the skirmishers until a firing line was formed and the commander had identified a flank to turn or a weak point in the line to strike. Timothy Lupfer even suggests that some units employed fire and maneuver to advance.[111]

However, for most units this was generally the point at which commanders ignored regulations. In their haste to attack, many did not wait for the artillery to move into position.[112] As a result, their soldiers charged across open ground while German gunners fired into them without fear of being hit by French artillery.

GQG quickly realized these unsupported attacks were unsustainable. In mid-August it published a doctrinal update to staunch the manpower hemorrhage. GQG directed officers to increase their dispersion even more; to conduct detailed planning before an attack; to wait for the artillery to get into position before mounting an assault; to fire a pre-assault bombardment if possible; and to dig in as soon as possible after taking a new position.[113] Nevertheless, as Pascal Lucas aptly framed the problem "by means of a simple note, could deep rooted habits and the general trend of established ideas be instantly modified? If such were the case there would no longer be any argument for peace time instruction…"[114]

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[109] Wilhelm Balck, *Development of Tactics: World War I* (Fort Leavenworth, Kan: The General Service Schools Press, 1922), 40.
[110] Sumner, "French Poilu," 82–83.
[111] Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Diane Publishing, 1981), 7.
[112] Sumner, "French Poilu," 82–83.
[113] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 29.
[114] Ibid.

Offensive Doctrine as of December 1914
Table 7.7

Irregular & dispersed formations	Yes
Independent small unit action	No
Fire and movement (small unit level)	No
Organic firepower	No
Bypass resistance	Yes

Combined arms

Again, infantry officers completely failed to coordinate with their supporting artillery, especially in the war's opening months.[115] Identifying the problem was one thing. GQG was aware of the problem within weeks. Solving it was another matter. At least three problems delayed a solution. First, the 1913 regulations did away with the requirement that units achieve fire superiority attacking.[116] As a result, infantry and artillery officers had to re-learn older regulations (which should not have been too difficult, since they had been in effect for 18 years).

Second, and far more important, the French army had the wrong artillery piece for trench warfare. Nothing rivaled the 75 mm when it came to rapid, close-in fire support over open sights. The problem was that almost everything could beat it when it came to long-range fire. "The 75 mm was an easy mark for the German howitzers when the latter were more than 8,500 meters away."[117] It took time for French industry to produce longer-range howitzers and shorter-range mortars. The French army needed something in the interim,

[115] Sumner, "French Poilu," 32.
[116] Balck, *Development of Tactics: World War I*, 16–17.
[117] Cole, "Forward with the Bayonet!," 119.

forcing Joffre to pull what few antiquated siege cannon he had left in his fortresses for use in the field.[118]

Finally, the French army also suffered from a shell shortage. [119] While the situation was not as desperate as it was for the British army, French gunners were still at a disadvantage compared to the German army. France stockpiled 5,244,000 shells *in total* before the war. In contrast, the German army had nearly 12,000,000 shells for its 77mm guns alone.[120]

All three factors made it harder for the French army to modernize its combined arms doctrine. None were insurmountable. More to the point, French deficiencies in doctrine and material paled in comparison to those facing the British. Considering that the British army wrestled with all of these problems and still managed to optimize its combined arms doctrine by war's end, we cannot consider these obstacles the reason for doctrinal stagnation.

Combined Arms Doctrine as of December 1914
Table 7.8

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

[118] He was heavily criticized for this decision when Falkenhayn attacked at Verdun in February 1916. Sumner, *They Shall Not Pass*, 97.
[119] Before the war the army planned on needing 13,600 75mm shells per day. By August 1916 French industry was producing 210,000 shells *per day* just to keep up with demand. Doughty, *Pyrrhic Victory*, 117.
[120] Cole, "Forward with the Bayonet!," 119.

Defensive tactics

The French army's defensive tactics were the sole bright spot in an otherwise disastrous first year of war. In most sectors, British and German units managed to build a single, continuous trench line by year's end. By comparison, the standard French defense at the end of 1914 had at least two successive trench lines.[121]

At the same time, French units quickly abandoned strong points and centers of resistance, digging continuous trenches instead. The practice evolved as a natural way to eliminate any risk of being flanked. Certainly, there is no evidence that GQG or any other high-ranking commander explicitly endorsed this practice, which directly contradicted prewar doctrine.[122] Nevertheless, for perhaps the last time in the war, French defenses were superior to everyone else's.

Defensive Doctrine as of December 1914
Table 7.9

Depth	Relatively
Elasticity	No
Counterattack	Yes

Independent Variables

Command culture

The French army may have started the war with a moderately decentralized command culture, but senior leaders quickly abandoned their prewar emphasis on initiative and autonomy. The early war's chaotic nature makes it hard to identify the precise moment the army began centralizing authority. We simply know senior commanders were quick to

[121] Balck, *Development of Tactics: World War I*, 29.
[122] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 33.

assert control over battlefield operations, and that the army ultimately adopted a rigid system of command and control.[123]

We also know that the army's disciplinary system developed a reputation for being draconian and arbitrary. The army executed at least 216 soldiers in 1914 alone. This number is almost certainly underestimates the number of summary death sentences, since commanders sometimes selected men at random for execution when their unit fought poorly.[124] Given that 1914 was a year of transition, I therefore consider the army's command culture to have been moderately centralized.[125]

It is hard to pinpoint why the army turned away from decentralized command and control. Political pressure does not seem to have been responsible. While the French did not embrace the war – it is probably more accurate to describe them as wearily resigned – neither politicians nor civilians intervened in how the army fought.[126] This abdication of authority was especially pronounced after the Battle of the Marne. Nor was this a function of tactics driving culture. Methodical battle and timetables did not emerge until 1915.

[123] Porch, "The French Army in the First World War," 211.

[124] In January 1915 Joffre tried to put an end to this practice by requiring all proposed death sentences be reviewed by the President. Nevertheless, another 442 were executed in 1915. Figures and facts related to the use of the death penalty in the French army from Clayton, *Paths of Glory*, 96. It is worth pointing out that Ian Sumner cites different numbers: 100 in 1914; 73 in 1915; 29 in 1916; 33 in 1917 and 1 in 1918. Sumner, *They Shall Not Pass*, 66–68. It is not clear which historian is right, nor where the consensus among experts lay. Given the army's well established record for draconian discipline (see G. D. Sheffield, *Leadership in the Trenches: Officer-man Relations, Morale and Discipline in the British Army in the Era of the First World War*, Studies in Military and Strategic History (New York: St. Martin's Press in association with King's College, London, 2000), 165–166.) I rely on Clayton's statistics. Even if Sumner's lower numbers are correct, that the army executed more of its soldiers between August and December 1914 than it did in 1915 and 1916 combined (or nearly so) says something about the army's command culture in the war's earliest months.

[125] It would not be a stretch to consider it centralized by year's end.

[126] Doughty, *Pyrrhic Victory*, 54–55.For a brief yet telling discussion of popular responses to war in August 1914 in all European countries see Strachan, *The First World War*, 142–162.

A mix of at least three factors seems to have driven centralization. First, the army's senior leaders, including Joffre, believed that flawed execution – not flawed doctrine – caused the shocking casualty rates in 1914.[127] Given the army's fragmented approach to prewar training, he may not have been wrong.[128] Joffre's ire was not limited to his junior leaders either. By September he had fired half of his corps and divisional commanders.[129] Second, Joffre and other senior leaders hardly trusted French conscripts and definitely did not see reservists, most of whom trained 40 days a year or less, as competent and trustworthy soldiers.[130] His perception must have been exacerbated as the class of 1914 was hurriedly pressed into action, without training much training at all. Thus, expansion seems to have undermined trust almost as much in the French army as it did in the British. Third, Joffre lost many of his best junior officers at Frontiers, the Marne, and the Race to the Sea. Prewar doctrine called on captains and lieutenants to lead their men from the front, a practice that proved noble and costly.[131] In a perverse way, the army's prewar meritocracy made a bad situation worse. The army commissioned so many of its best non-commissioned officers before the war – young leaders who then became casualties in the early fighting – that the

[127] Joffre, *The Personal Memoirs of Joffre*, 1932, 1:185.
[128] Porch, "The French Army in the First World War," 215. Of course, one then wonders why GQG exerted control over how its units fought, instead of how they were trained.
[129] Sumner, *They Shall Not Pass*, 27. He became so concerned that these relieved generals might form a cabal in Paris that he had them all sent to Limoges. Doughty, *Pyrrhic Victory*, 59.
[130] We must presume that Joffre and other senior officers were especially critical of reserve officers. We should not automatically blame GQG for harboring these views. The German army is often praised for its willingness to use reserve units as front line formations. German reservists were practically slaughtered at Ypres, where 60,000 became casualties largely because their leaders lacked the training and fought according to wildly outdated doctrine. Clayton, *Paths of Glory*, 56; Gudmundsson, *Stormtroop Tactics*, 1–7. At least some French reserve officers agreed with Joffre's assessment. Ian Sumner relates the story of one reserve officer who "took the desperate step of committing suicide on the outbreak of war, 'fearful of the responsibility of commanding, at a time of mobilization, a regiment which in his opinion was inadequately prepared.'" Sumner, *They Shall Not Pass*, 15–16.
[131] Cole, "Forward with the Bayonet!," 232–234.

remaining non-commissioned officers were not of high enough quality to assume command of their decimated units.[132]

Command culture as of December 1914
Table 7.10

Senior generals only	
Battalion commanders and above	X
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

GQG was not completely idle when it came to doctrine in 1914. As mentioned, it issued a number of memos and updates to units in the field during the war's earliest months. Nonetheless, these doctrinal amendments were still not the work of a coherent, centralized assessment mechanism. It was simply impossible for Joffre or any other high-ranking officers to consolidate control over the army's far flung assessment assets in 1914. The fighting was too chaotic and the task of mobilizing for war too onerous. Complicating matters, Joffre had to transition from one role - the peacetime Chief of the General Staff – to another – the wartime Commander in Chief. To exert control over his forces in the field and their doctrine he relied on an initial GQG staff consisting of 50 officers who were working out of a high school near Notre Dame.[133] Even the prewar conduits between the Army Staff and the divisions were disrupted as three new levels of bureaucracy – the army-corps, army and GQG staffs – were created.[134]

[132] Sumner, "French Poilu," 77.
[133] Joffre, *The Personal Memoirs of Joffre*, 1932, 1:137.
[134] Corps, army, and GQG staffs did not exist in peacetime. The quadrennial corps and army exercises were run by ad hoc staffs that existed only for the purposes of the exercise. Porch, "The French Army in the First World War," 223.

Assessment mechanism as of December 1914
Table 7.11

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

As ad hoc and reactive as the army's doctrinal analysis may have been in 1914, it paled in comparison to how the army managed training during the same period. To be blunt, when it occurred at all, training was chaotic. Casualty rates were so severe that the class of 1914 was called to service one month early (September vice October) while the class of 1915 was called up ten months prematurely (in December 1914 vice October 1915).[135] The class of 1892 was recalled to arms in December 1914 as well (these were men who were in the last few years of their 25-28 years of obligated service and were therefore only required to train one day a year).

The regimental depots were incapable of absorbing and training so many soldiers in such a short period of time. Many recruits received no training at all and were sent to the front with a rifle they had never fired. At best it was inconsistent and crude; although after the front stabilized men were sent to training areas behind the trenches for further training. Yet for the most part, most of a new recruit's training happened on the job and under fire.

[135] This and what follows are from Sumner, *They Shall Not Pass*, 53–54.

Training structure as of July 1914
Table 7.12

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

IV. 1915

Assault tactics	No
Combined arms	No
Elastic defense in depth	No

Command culture	Centralized
Assessment mechanism	No
Training structure	Decentralized

Doctrinally, 1915 was an important year for the French army. It marked the point at which Joffre came to grips with the full scope of the tactical problem and the decided upon methodical battle as his preferred solution. As was the case with the British Expeditionary Force (BEF), 1915 also represented a missed opportunity. The BEF started the year experimenting with fire and movement and rudimentary Hurricane barrages, but ended it with assault waves and timetable barrages. The French were quicker to use their artillery to conquer and their infantry to occupy. Yet in the summer of 1915 GQG received an innovative essay from a young company commander, calling for the army to adopt modern assault tactics. We know that Foch personally tried to deliver the essay to Joffre, but was

turned away by Joffre's staff for having a dirty uniform.[136] We know that GQG eventually disseminated the memo without actually endorsing the ideas it espoused.[137] And we know the Germans captured a copy and willingly incorporated its ideas into their early work with storm troop tactics.[138] Given that the German army eventually adopted modern assault tactics while the French did not we can even surmise that the Germans were better at learning from the French than the French were at learning from themselves.

1915 is also useful in terms of evaluating CAT theory. Confounding factors were minimal throughout the year. While Joffre began to lose some of his luster, especially after his failed Champagne and Artois offensives, the government still refused to interject into tactical and doctrinal issues.[139] The army's manpower constraints were as relaxed as they would be at any point in the war. By year's end the classes of 1914, 1915, 1916, were under arms, and the classes of 1892, 1891, 1890, and 1889 reactivated.[140] The army's material situation improved as French industry aligned to wartime needs and conscripted workers were

[136] Williamson Murray, *Military Adaptation in War: With Fear of Change* (New York: Cambridge University Press, 2011), 92.
[137] Ibid.
[138] Ibid.
[139] In fact, French politicians promoted him in December 1915. Before this point Joffre only exercised command over French units in the Western theater of operations. Despite his multiple failed offensives and mounting criticism, the government put him in charge of all French forces around the globe in December. Doughty, "The Seeds of Disaster," 232.There was, of course, still the overarching political imperative to maintain offensive pressure on the German army. Sumner, *They Shall Not Pass*, 47.
[140] Sumner, *They Shall Not Pass*, 53–54. This is not to say that 1915 saw a decrease in casualties (or 'wastage' as the First World War's euphemism went). Pascal Lucas suggests that nearly half a million French soldiers were killed or wounded in 1915. Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 61. Doughty points out that breakthrough operations in late 1914 through March 1915 cost the French 268,000 soldiers. Doughty, *Pyrrhic Victory*, 107.The argument is not that the French high command did a better job of conserving manpower in 1915 than it did in any other year. Rather, the point is simply that the army had access to new sources of manpower (young and old men alike) that would be unavailable in later years precisely because French generals were politically unable to stay on the defensive (not that the defensive would have necessarily proven less costly as events in 1918 would prove) and did not find a way to adopt the optimal doctrine.

returned to their factories.[141] 1915 also affords us the best opportunity to observe the French army in isolation. In other words, doctrinal learning became 'messier' after 1915 as the French and British armies got better at fighting together. Thankfully (from the perspective of theory testing) tactical, operational, strategic and doctrinal coordination remained poor throughout the year.[142] Finally, although the army spent most of the year on the offensive, it ended 1915 on the defensive as it prepared for even larger attacks in 1916.[143] This means that it had an opportunity to develop its doctrine in both areas.

Political, strategic, and operational situation

The French army's political, strategic and operational situation was as clear as it was unsolvable. Politically, Joffre faced immense pressure to maintain pressure on the German army. Domestic audiences and elites demanded that Joffre expel the Germans from French territory. Russia similarly pressured the French to keep the Germans preoccupied.[144] Strategically, Joffre worked with his allies to achieve these goals by keeping the German army committed on three fronts so that a decisive blow could be launched on one of the three.[145] Operationally, Joffre started the year seeking a major breakthrough, and the French army would have to do most of the heavy lifting.[146] When this proved tactically

[141] Sumner, *They Shall Not Pass*, 53. Although the army was hardly free of material constraints, France was able to tap into America's nearly unlimited resources. Porch, "The Marne and After," 382.
[142] Joseph Jacques Césaire Joffre, *The Personal Memoirs of Joffre: Field Marshal of the French Army*, vol. 2 (New York and London: Harper & Brothers, 1932), 365.
[143] Ibid., 2:417.
[144] Porch, "The French Army in the First World War," 204–205.
[145] Doughty, *Pyrrhic Victory*, 107. Some French politicians, like Churchill and Lloyd Georges in Britain, called for the Entente to open another front in 1915. Obviously, Joffre, French and Haig all preferred that this blow land on the Western Front. Ibid., 109. See also Douglas Haig, *The Private Papers of Douglas Haig, 1914-1919; Being Selections from the Private Diary and Correspondence of Field-Marshal the Earl Haig of Bemersyde* (London: Eyre & Spottiswoode, 1952); Joffre, *The Personal Memoirs of Joffre*, 1932.
[146] At the start of 1915 the French army held approximately 88% of the Western Front; the British army 8%; and the Belgian army 4%. These percentages are based on figures provided by Doughty, *Pyrrhic Victory*, 108.

impossible, he satisfied himself with 'nibbling away' at the German lines for the rest of the year.[147]

Dependent Variables

Offensive tactics

The army modified its tactics incrementally throughout the year. If there was a major change, it was Joffre's decision to abandon deep objectives and breakthrough operations in the fall of 1915.[148] Cumulatively, these changes moved the army farther away from modern assault tactics and closer to methodical battle. Two were particularly important.[149]

What changed GQG issued its first doctrinal update on January 2nd.[150] Although brief – it was about two and a half pages long – this memorandum introduced three major changes. First, although commanders were still encouraged to select 'deep' objectives, attacks were no longer to be made in a single push. Instead, units needed to plan for a series of successive attacks, seizing interim objectives en route to the final one. It was important to shift from a single, deep thrust to multiple shallow ones to allow the artillery to displace

[147] Sumner, *They Shall Not Pass*, chap. 2. While Joffre can and has been criticized for not assuming a defensive posture to wait for the British to arrive in force and for French industry to hit full strike (see Porch, "The Marne and After," 382. Such a critique of Joffre's operational plan ignores his strategic constraints: the Russians clearly needed help and assuming a defensive posture would have given the German army even more freedom to knock them out of the war; as we will see French politicians were horrified at the idea of implementing an elastic defense in depth, so we must assume that waiting a full year for the British to arrive was a true non-starter; most clearly, it is hard to argue that sitting on the defense actually conserved manpower better than maintaining the offensive – especially under the conditions of trench warfare since attackers were free to pound defenders with massive artillery bombardments.

[148] Foch, *The Memoirs of Marshal Foch*, 209–210.

[149] There is no evidence suggesting a widespread failure to conform among front line units. Again, these changes were all incremental modifications to existing practices, and all were created and implemented in a top down fashion by an increasingly centralized army. Chapter 8 wrestles with the potential argument that training structures cannot possibly matter if centralized command and control can function as a substitute.

[150] This and what follows are from Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 35–36.

forward. Second, breaking large attacks into multiple smaller ones meant planning had to be far more meticulous. Commanders needed to assign objectives, conduct reconnaissance, and perform liaison before an attack. They could not wait until the battle was underway to develop or adjust their plans. Third, the new instructions directed corps and division commanders to launch multiple, simultaneous attacks across a large front. Joffre's goal was to keep German reserves from coalescing to block a single attack.[151]

While GQG's concepts made sense in theory, they had several important flaws in practice.[152] Successive attacks made sense, because it gave infantry time for French artillery to move into place. The problem was that French gunners could not manhandle their 75 mm guns forward fast enough. Surprise and momentum were usually lost, giving German reserves time to deploy. Thus, the first attack often ended up being the last.

GQG moved away from successive attacks in its second doctrinal update, issued in mid-April.[153] Thus, the April update directed units to revert back to single attacks for deep objectives and to ensure that their assault waves were "imbued with the idea of piercing, of getting beyond the first trenches which may be conquered and of pushing the attack without interruption, without respite, day and night, to a final conclusion."[154] Depth came at a price in terms of breadth. GQG knew commanders needed to continually reinforce their

[151] Joffre, *The Personal Memoirs of Joffre*, 1932, 2:355.Doughty, *Pyrrhic Victory*, 127.
[152] Doughty, *Pyrrhic Victory*, 170.
[153] This and what follows are from Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 36–40; Balck, *Development of Tactics: World War I*, 36–37.
[154] Ibid.

lead units in this type of attack, and so narrow fronts (1 – 1.5 kilometers) replaced broad attacks.

Joffre simply traded one set of problems for another. With successive attacks on a wide front the Germans had time to reinforce, but at least they were forced to divide their attention. With a single, deep attack the Germans no longer had as much time to reinforce (although by this point the preparatory bombardments had grown long enough that it was hard to genuinely catch defenders off guard), but they could concentrate all of their forces on a single point. After mid-1915, Joffre's preference for deep objectives faced another obstacle: the German army started arraying its defenses in depth.[155] Suddenly, distant objectives that already seemed out of reach were no longer deep enough to puncture German lines. Joffre conceded the point after his army's failures at Artois and Champagne.[156]

What did not change Most of GQG's changes pertained to division, corps and army level planning. Battalion (and even brigade) commanders had very little latitude over frontage and depth, especially in large set-piece battles. At the front line tactics were virtually unchanged. Assault units still crossed No Man's Land in waves of skirmishers, with one man per meter. The company was the main unit of action, and only the battalion had enough firepower to operate as an all-arms team. Despite sporadic experiments with fire

[155] Doughty, "The Seeds of Disaster," 189; Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 50. See also chapter 5.
[156] A third attempt to mount an offensive in Champagne failed after one day (October 6th) Sumner, *They Shall Not Pass*, 46.

and movement GQG increasingly believed that it was the artillery, which set the conditions for movement.[157]

Offensive Doctrine as of December 1915
Table 7.13

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	No
Organic firepower	No
Bypass resistance	No

Combined arms

The French army made no progress in terms of predicted fires, Hurricane barrages, and flexible command and control in 1915. The fact was that the army had to focus on getting units to conform to basic practices, like firing any kind of pre-assault bombardment, before it could worry about advanced techniques. Both the January and April doctrinal updates reinforced this point.[158]

By year's end the army had transitioned to the same 'fire then move' concept as the British.[159] Martin Samuels suggests that the die was cast as early as the Battle of Soissons (January) when GQG "impressed by the effectiveness of the preparatory bombardment, concluded that the artillery was the main army and that the infantry should be subordinated to it. From here it was but a short step to '*l'artillerie conquier, l'infanterie occupe*.'"[160] The April doctrinal update called for multi-day pre-assault bombardments. As Wilhelm Balck, a German officer described French artillery doctrine: "surprise was neither

[157] Sumner, "French Poilu," 83.
[158] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 33–40.
[159] It is probably more accurate to say that the British conformed to the French practice.
[160] Martin Samuels, *Command or Control?: Command, Training, and Tactics in the British and German Armies, 1888-1918* (London ; Portland, OR: Frank Cass, 1995), 232.

sought nor achieved."[161]By May infantry-artillery coordination improved to the point that assault waves could leap into the first German trenches moments after the artillery barrage lifted.[162] At Champagne, in late September, French guns registered for six days, and then fired a pre-assault barrage for another three.[163]

Tanks were the one area in which the French made some progress toward a combined arms doctrine. Civilians were the first to show interest in 'landships.' The French War Office established a joint committee with the British admiralty in June.[164] GQG followed suit when Joffre ordered a French artillery officer, JBF Estienne, to begin designing a prototype in December.[165] While British tanks saw action less than ten months later, the French army would not field its first tanks until April 1917.

Combined Arms Doctrine as of December 1915
Table 7.14

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

Defensive tactics

Although the French army lost its lead in defensive depth in 1915, it at least maintained parity with the German army. By early spring positions along most of the front included

[161] Balck, *Development of Tactics: World War I*, 36–37.
[162] Murray, *Military Adaptation in War*, 90–91.
[163] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 51.
[164] The British navy showed interest in tanks before the army. It thought that they might be useful for protecting naval bases. Elizabeth Greenhalgh, "Technology Development in Coalition: The Case of the First World War Tank," *The International History Review* 22, no. 4 (2000): 807–808.
[165] The lack of British – French coordination in tank development remains a major puzzle. Ibid.

three trench lines extending up to a kilometer in depth.[166] All three trenches were continuous – the first was lightly held and only for local security and advanced warning; the second served as the main line of resistance and was manned accordingly; and the third held local reserves. Units added strong points between the second and third trenches in some sectors.

In July GQG issued its first official memorandum on defensive operations. It called on commanders to stop positioning large numbers of men in the front trench, since this left them vulnerable to German artillery.[167] Unfortunately, GQG simultaneously demanded that units not yield an inch of ground.[168] These requirements were incompatible, and despite suggestions from some historians that Joffre was the first to think in elastic terms, demonstrates that French defenses were fundamentally rigid. Moreover, given Joffre's penchant for firing generals (see below), most senior commanders preferred to lose men in a densely packed trench to losing the trench altogether.

French defenses grew in depth even further late in the year.[169] By December three defensive *positions* replaced the three trenches in many areas. Each position was spaced up to a kilometer behind the one in front of it, and had a protective obstacle belt. Furthermore, each position was made up of three separate trenches, positioned 200-500 meters apart.[170]

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[166] Balck, *Development of Tactics: World War I*, 32; Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 40–41.
[167] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 47; Meyer, "Operational Art and the German Command System in World War I," 346.
[168] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 46.
[169] This and what follows are from Clayton, *Paths of Glory*, 71–72.
[170] The rearmost position often consisted only of strong points and shelters for reserves.

Communications trenches linked the positions together. Organized in this fashion, French defenses now extended three to six kilometers from front to rear.

Defensive Doctrine as of December 1915
Table 7.15

Depth	Yes
Elasticity	No
Counterattack	Yes

Independent Variables

Command culture

In 1915 the army completed the transition towards centralized command and control that it began in 1914. Most of this power lay in GQG and Joffre's hands. Unlike the British army, where Haig and (Sir John) French at least allowed senior commanders latitude, Joffre intervened in every aspect of his generals' operations. In his memoirs, one of Joffre's top commanders, General de Langle, "complained bitterly about Joffre's interfering in operational planning and decisions. According to de Langle, Joffre controlled the most minute details of operations and 'paralyzed the initiative of army commanders.'"[171] He insisted on personally reviewing and approving virtually every memorandum issued by GQG.[172] Joffre's preferred mechanism of control was simple: he fired generals who disobeyed. By July 1915 Joffre had relieved 138 of them.[173] Foch similarly complained that Joffre ignored the advice of senior officers, including calls to stop trying for a decisive breakthrough.[174]

[171] As related in Doughty, *Pyrrhic Victory*, 167.
[172] Ibid., 123.
[173] Doughty, *Pyrrhic Victory*, 186.
[174] Foch, *The Memoirs of Marshal Foch*, 209–210.

Unfortunately, this approach to command and control was not limited to Joffre or GQG. It extended down the entire chain of command. In the course of a year Europe's most decentralized army became its most hierarchical. Anthony Clayton argues that many French officers approached leadership as an exercise in imposing authority.[175] Ian Sumner contends that a large gap existed between officers and men, even though the French army was the most egalitarian before the war.[176] Sheffield reinforces this view, pointing out that French soldiers complained about "haughty treatment at the hands of officers – many of whom were mere boys" during interviews conducted after the 1917 mutinies.[177] And as Douglas Porch suggests, "initiative, mobility and surprise were absent from French training methods," leading to battles which were "administered rather than fought."[178]

It is not clear why Europe's most decentralized army before the war transformed into its most hierarchical in less than a year. Causality seems to run in multiple directions. Certainly, Joffre's preference for methodical battle led to tactics that exacerbated the need for centralized control.[179] Over time these methods were deeply ingrained in habit and practice.[180] At the same time, the British adopted a similar set of offensive and combined arms tactics without implementing the same degree of centralization. Moreover, the French were extreme even in how they employed 'time table tactics.' Where British battalions

[175] Clayton, *Paths of Glory*, 79.
[176] Sumner, *They Shall Not Pass*, 66–68.
[177] Sheffield, *Leadership in the Trenches*, 165–166.
[178] Porch, "The Marne and After," 382–383.
[179] As Wilhelm Balck described it "Joffre's procedure changed the division into a single unwieldy phalanx which, once started moving could only advance straight ahead or turn back in complete disorder. This illogical scheme no opportunity for leadership or exercise of initiative was allowed." Balck, *Development of Tactics: World War I*, 36–37. See also Porch, "The French Army in the First World War," 215.
[180] Petain's staff officers resisted his attempts to delegate more autonomy and authority after taking command in 1917. Porch, "The French Army in the First World War," 211.

typically formed waves out of individual platoon, French units used entire companies as waves. The resulting formations were even more unwieldy and inflexible than their British counterparts. Finally, it is hard to imagine a relatively decentralized army giving itself fully over to hierarchical control simply because it adopted a tactical system that required more meticulous planning and coordination.

Whatever its cause, centralized command and control robbed front line leaders (and indeed, most senior ones) of the initiative and autonomy they needed to experiment on the battlefield. For this reason, 1915 stands out as a particularly stark example of the inverse relationship between organizational learning and a highly centralized command culture. Anecdotally, French units seem to have experimented less than their German and British counterparts.

There is, of course, an important exception: Andre Laffargue's groundbreaking memo on assault tactics. Laffargue wrote the piece while recovering from wounds he received as a company commander during the spring offensives. It described a number of forward thinking tactics, many of which contained the basic ideas behind modern assault tactics.[181]

[181] Andre Laffargue, "Impressions and Reflections of a French Company Commander Regarding the Attack" (Harrison and Sons, 1916), Imperial War Museum. It is worth pointing out that many historians seem to overstate how advanced Laffargue's thinking on modern assault tactics was. To be sure Laffargue was ahead of his time in terms of advocating for mobile and organic firepower (12 &24), specially trained assault troops (4), the use of surprise artillery bombardments (9), and rapid movement to deep objectives (12-14). At the same time, many of his ideas had more in common with traditional shock tactics than modern assault tactics. For example, he still thought in terms of centralized control ("the will of each soldier must, to a great extent, be so moulded as to respond automatically to commands") and in terms of using non-commissioned officers to relay orders from officers instead of acting as leaders in their own right (17-19); he still advocated the use of waves of skirmishers instead of irregular and flexible formations (12-14); and he admonished against the assault waves using fire and movement unless they found it absolutely necessary.

General Foch read a copy and took it directly to General Joffre in GQG.[182] Unlike Generals Falkenhayn and Ludendorff, Joffre did not invest men or money into developing Laffargue's ideas. He did not assign a staff officer to study the issue in depth, nor did he bring Laffargue onto the staff. Clearly, Joffre saw something of use in the memo, because he ordered its publication. However, he did not officially endorse it or incorporate precepts into official doctrinal updates.[183] Without top-level sanction, Laffargue's ideas went nowhere. Actually, it would have been better if they went nowhere, since a wayward copy ultimately ended up in German hands.

Command culture as of December 1914
Table 7.16

Senior generals only	X
Battalion commanders and above	
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

The army did not augment, enhance, or otherwise improve its doctrinal assessment mechanisms in 1915. For its part, GQG recognized that it needed a new tactical system to break the stalemate. Yet Joffre and his staff seemed content to find the solution themselves, rather than to seriously consider the ideas and suggestions circulating around the army at the time. GQG's response to Captain Laffargue's pamphlet is indicative of this failure. "For many months Captain's Laffargue's work remained one of the many ideas floating about in

[182] Although a staff officer initially turned Foch away for wearing a dirty uniform, Joffre did eventually read its contents.
[183] GQG issued at least one more, in December 1915.

1915 on the same subject, waiting for someone with responsibility to embody them."[184] By 1915 even senior officers felt that Joffre and GQG ignored their advice and observations.

Assessment mechanism as of December 1915
Table 7.17

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

Training became less chaotic in 1915, although it still remained decentralized.[185] As new classes were called up, conscripts still reported to the regimental depot in their army-corps district for basic training. Because the front had stabilized, basic training was less rushed, although the quality of training remained poor.[186] After a month or so, the regimental depots sent recruits to a series of Divisional Deports behind the front.[187] One battalion from each division ran its division's depot. Most Division Depot training focused on acclimatizing new troops by putting them on working parties to repair obstacles and dig trenches. Divisional Depots also handled all specialist training (e.g. pioneers, machine gunners, and signalers).

Despite this modest consolidation, training remained decentralized. Control over, and responsibility for, curricula was still highly fractured. No single officer had authority over

[184] G.C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber and Faber, 1940), 57.
[185] As was the case in the British army, it does not seem to have occurred to GQG to also consolidate and centralize control over the training pipeline. It is puzzling that two centralizing generals – Haig and Joffre – were content to leave their army's second most important activity relatively unsupervised.
[186] Porch, "The French Army in the First World War," 223.
[187] This and what follows are from Sumner, "French Poilu," 60–61.

the entire apparatus. And given that the army had well over 100 divisions on the Western Front by late 1915, training remained geographically dispersed as well.

Training structure as of December 1915
Table 7.18

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

V. 1916

Assault tactics	No
Combined arms	No
Elastic Defense in Depth	No

Command culture	Centralized
Assessment mechanism	No
Training structure	Mod. Decentralized

For the French army, 1916 was a year of epic battles, change in leadership, and advances in technology. It was not, however, a year of major doctrinal change. If anything, 1916 saw the army move further away from the optimal doctrine. Offensively, Joffre reverted back to his 'nibbling' attacks of early 1915, albeit on a larger scale. Defensively, despite spending most of the year fighting off German attackers at Verdun, the army made little progress towards an elastic defense in depth. And despite early experiments with combined arms, French infantry-artillery cooperation remained poor.

Based on several of the dominant theories of military change, French stagnation should come as a surprise. Defeat, change, and technology are usually seen as important reasons armies innovate, emulate, or adapt. The French, however, stagnated with respect to the optimal doctrine. It is worth taking a moment to discuss this puzzling outcome.

Prospective defeat According to Barry Posen, Theo Farrell and others, prospective defeat should have triggered the search for new ideas. Such a quest did not take place, in the army's highest echelons.[188] The Verdun cauldron did inspired new thinking, at among some officers commanding units in that sector. Both Petain and Nivelle tested new operational and tactical concepts. Yet GQG made no attempt to harness these ideas - at least not until Nivelle assumed command. [189]

Certainly, one might counter that the French saw Verdun as a victory, not a failure. Were this the case, it makes sense that no one bothered to search for new ideas. However, this argument has several flaws. First, it adopts a popular and 'hindsight' view of the battle. The high command and the government may have portrayed Verdun as a victory, insofar as it was not a loss and/or the glory of the effort offset the magnitude of the defeat. States and their armies tend to do this after a major setback – Khe Sahn and Chosin Reservoir are just

[188] Factions within the government continued to press the army to seek victory on other fronts. However, these ideas were not new. They also focused on *where* the army was fighting without trying to fundamentally change *how* it fought.

[189] Nor did civilians harness Nivelle and/or Petain as internal advocates, as Posen might suggest. It is true that Nivelle replaced Joffre. But there is no evidence that a cohort of civilian leaders advocated for him to replace Joffre on the basis of his doctrinal ideas. In fact, the government passed over senior candidates because they were devout Catholics (d'Esperey, Fayolle and Castelnau). Instead, as Anthony Clayton describes it, this was a case of a general who "exuded the confidence in victory that war-weary political leaders so desperately wanted to hear." It did not hurt that Nivelle also promised that French forces would lead the way to victory. Clayton, *Paths of Glory*, 119 & 134.

two recent examples from American military history. Yet popular opinion had no bearing on tactical development (not that GQG would have listened even if it did). More to the point - soldiers, generals, or politicians did not see Verdun as victory. The ten-month battle cost the army, already pressed for manpower, another 500,000 soldiers.[190] Verdun created such a drain on French resources that Joffre could not longer launch his long-planned Somme offensive.[191] And the battle triggered what Anthony Clayton calls a "collective decline in morale," as insubordination and desertion started to become a widespread problem.[192]

Second, for at least the first half of 1916 the outcome at Verdun was very much in doubt. Joffre would not have effectively scuttled his long-awaited joint offensive on the Somme had he truly believed victory was in hand all along. Nevertheless, his flexibility at the strategic level did not translate into flexibility at the tactical level.

Leadership change It is true that Nivelle replaced Joffre at the end of 1916, and that he brought a new set of tactical and operational ideas with him. Therefore, superficially, leadership change did engender doctrinal change. However, change for change's sake is neither interesting nor helpful. The question is whether the army can change *in the right*

[190] "The battle of Verdun and the opening days of the fighting on the Somme resulted in losses which, added to those of the first eighteen months of the war, when the chief part of the burden on the Western Front had fallen on us, brought about a disquieting situation in our effectives; on July 19th I sent the Minister of War a letter inviting his attention to this matter. I pointed out that on July 1, 1916, the units on the front were 92,000 men under strength. These units already included 78,000 men of the 1916 class. What remained of this class was insufficient to fill the gaps existing and those which the continuation of the struggle would certainly cause…" Joffre, *The Personal Memoirs of Joffre*, 1932, 2:472. Churchill claims the French suffered 442,000 casualties, but Doughty argues that this was an overestimate because Churchill included casualties from other sectors. Doughty cites 377,231 casualties, of which 44% were killed. Doughty, *Pyrrhic Victory*, 309. Clayton presents similar figures (351,000 casualties, of which 42% were killed). Clayton, *Paths of Glory*, 115–116.

[191] 75% of French divisions fought at Verdun. Clayton, *Paths of Glory*, 127.The Somme offensive still took place, but it became a British-dominated effort and its main focus shifted from breaking through German lines to diverting German pressure on Verdun.

[192] Ibid., 129; Doughty, *Pyrrhic Victory*, 317.

way, not whether it can simply trot out something new.[193] Nivelle's *battaille de rupture* was certainly innovative. It was also untested. Nivelle insisted that because his concepts worked on a small scale at Verdun they would therefore work on a large scale on the Aisne. No one tested or challenged this logically flawed assumption. In fact, Nivelle's offensive is a prime example of unadulterated, top-down innovation. Nivelle had an idea. It worked once (he assumed). It would work again (he also assumed). It did not, and the French army never fully recovered.

Technological change The army invested heavily in two new technologies in 1916: the tank and the light machine gun. Neither significantly changed how the army fought. To be fair, French tanks did not see action until 1917 because of delays in development.[194] However, the Chauchat light machine gun saw action fielded in large numbers. The army did reorganize its platoons around this new weapon. One half of each platoon now consisted of light machine gunners and bombers, while all of the riflemen were placed in the second half. However, the platoons themselves continued to maneuver in stereotyped waves.

Did manpower constraints and battlefield requirements impede change? It is true that the French army faced enormous constraints in 1916. Yet limitations cannot explain why French tactics stood still, because the German army faced even larger challenges, yet

[193] The military change literature implicitly makes this same point. Most case studies fall into one of two categories: successful change that works; and unsuccessful change (regardless of whether it would have worked or not). Far less attention is paid to the more complex question of successful change that does not work.
[194] A lot of the blame for this failure falls on the British and French high commands for failing to work closely with one another on tank development. Greenhalgh, "Technology Development in Coalition."

1916 marked the beginning of its shift to modern assault tactics, combined arms, and an elastic defense in depth. As this section argues, the army's culture, its lack of an assessment mechanism, and its approach to training were the real reasons behind its tactical stagnation

Political, strategic, and operational situation

Politically, General Joffre enjoyed President Poincare's support through most of 1916. Neither Poincare's new Prime Minister (Briand), nor his new Minister of War (Gallini), shared their president's confidence. Nevertheless, Joffre's still fought the war as he saw fit.[195] Public and political dissatisfaction with his performance, and with the army's ever-growing casualty list, did not lead to his ouster until December.

Free from serious political scrutiny, Joffre was free to adopt the strategic and operational plans of his choice.[196] In practical terms, he continued to focus on the Western Front while ignoring calls to reinforce other theaters.[197] Strategically, Joffre outlined his plan for 1916 at the Chantilly conference.[198] He planned to mount three near-simultaneous offensives on the Western, Eastern, and Italian fronts. Joffre's goal was to exhaust the German army.[199] Of course, Germany's surprise offensive at Verdun derailed these plans and cost Joffre his job.

[195] Vivani's government fell in late October 1915. Clearly, Poincare prevailed, since he expanded Joffre's role to include command over all French forces world wide in December 1915.see Doughty, *Pyrrhic Victory*, 228–232.
[196] Manpower constraints still limited Joffre's options, but industrial shortfalls were no longer a problem. Joffre, *The Personal Memoirs of Joffre*, 1932, 2:442.
[197] Most notably, Salonika, where the Entente launched a combined offensive in late 1915.
[198] The Chantilly conference was held in December 1915.
[199] Doughty, *Pyrrhic Victory*, 251–252.

Dependent Variable

While the French army stagnated in terms of making progress towards the optimal doctrine, its tactics did not completely stand still. GQG directed several modifications to existing practice. The problem was that most of these changes represented a step back. Thus, in many ways the French army was further away from the optimal doctrine at the end of 1916 than it was at the beginning. This trend was especially pronounced with regards to the army's offensive tactics.

Offensive tactics

Official doctrine French tactics changed twice in 1916. GQG directed the first shift in a series of doctrinal updates, issued in January (on the 8th, 16th and 26th) and April (on the 16th). Collectively, these updates signaled a definitive return to the successive attacks of early 1915 (see offensive tactics, 1915). The concept had certainly grown more sophisticated in the interim. Therefore, his 'new' approach to nibbling away at the German army was to systematically wear down German reserves at the tactical level (hopefully resulting in a penetration) while facilitating attrition at strategic level.[200] In practical terms, this approach meant abandoning deep objectives in favor of meticulously planned and coordinated attacks against shallow objectives.[201] Following a massive artillery bombardment, units were to assault in three waves (behind a creeping barrage), instead of the single, unwieldy wave used in 1915. Despite the fact that infantry platoons now had light machine guns, there was still no expectation that the assault waves would need to

[200] Sumner, *They Shall Not Pass*, 132–133.
[201] This and what follows are from Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 55–67.

generate their own firepower. The artillery would destroy obstacles and suppress defenders. The infantry only needed to concern itself with clearing and consolidating around captured trenches. As was the case in early 1915, the entire attack would halt and reorganize after seizing the first set of shallow objectives. The fight for the next line of shallow objectives would happen only after another round of deliberate planning and a second pre-assault barrage.

Unsurprisingly, the army faced the exact same problems that prompted it to abandon successive attacks in the first place.[202] Shallow attacks gave German defenders time to shift reserves into place. Although this was ostensibly Joffre's goal, since it put more Germans in the path of French guns, the fact was that attackers and defenders suffered similar casualty rates. This meant France was wearing itself out just as fast as it was the Germans.

Joffre also returned to methodical, successive attacks he assumed units could attack, consolidate, and re-attack faster than the Germans could respond. The problem was that no technologies or techniques existed to make this true. As chapter 4 discussed, the increasingly powerful artillery bombardments rendered the landscape impassible. Even if tanks had been available in large numbers, they still would not have completely substituted for the artillery that had to move forward by foot and horse. Finally, there was the issue of surprise. Deliberate, methodical attacks meant the Germans had ample warning that an attack was about to take place, giving them even more time to shift reserves and reposition their most vulnerable front line units.

[202] This and what follows are from Ibid., 67–84.

Many of these problems became apparent during the Somme offensive.[203] GQG issued another update in September. While the overarching concept remained in place, the waves were modified. Skirmish lines were to decrease in density to a dispersion ratio of one man per 4-5 meters.[204] More importantly, the waves themselves were now based on the reorganized platoon (in which one half section contained bombers and light machine gunners and the other riflemen). The first wave consisted of engineers, to assist with breaching obstacles that survived the bombardment, bombers and light machine gunners. The second wave contained all of the riflemen and was designed to leapfrog past the first wave in order to take the objective. The third wave held so-called 'moppers' to help clear pockets of resistance and consolidate around the objective.[205] These were sound improvements, but none represented genuine progress toward modern assault tactics.[206]

Nivelle's 'Verdun Method' No discussion of 1916 would be complete without referencing Nivelle's work on *bataille de rupture.* While serving as Second Army's commanding general at Verdun, Nivelle planned and led large-scale counterattacks in October and December. These attacks were organized around massive pre-assault bombardments followed by a broad assault for objectives deep behind German lines. The key difference between Nivelle's approach at Verdun and the army's earlier attempts to pursue distant objectives was that Nivelle deliberately told commanders not to worry about their flanks. By freeing

[203] Ibid., 84.
[204] This and what follows is from Balck, *Development of Tactics: World War I*, 22–23; Sumner, "French Poilu," 83–84; Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 93.
[205] According to Balck, the waves were 15 meters apart. According to Sumner they were 30 meters apart. In either case, they were very close together.
[206] Even the use of light machine guns in the first wave was not a true attempt to use the infantry to provide is own suppression.

commanders from trying to maintain alignment, the entire attack unfolded more quickly and the Germans did not have enough time to move reserves into place.

Nivelle's method was highly successful at Verdun. They were based on an important innovation – namely, a willingness to trade flank security for speed and an emphasis on reinforcing success, not failure. It is important to point out that they did not entail increased dispersion, irregular formations, independent small unit action, or fire and movement. Infantrymen still attacked in waves, and the waves still relied on the artillery to cover their movement.

Even more important, Nivelle's attacks may have succeeded for reasons unique to Verdun. As Joffre noted after the war

> These attacks, to a great extent, had succeeded because, on the ground where they took place, the enemy's defensive organizations had virtually disappeared, as a result of the almost incessant bombardment which had pulverized this area during nine months of struggle…. There was no barbed wire…bomb proofs were few… the trenches caved in.[207]

Joffre was no unbiased observer. He did, after all, lose his job to Nivelle. Nevertheless, Joffre's criticism had merit. Neither Nivelle nor GQG seemed to put much thought into why the Second Army's attacks worked so well at Verdun, especially when they were not remarkably different from the ones Joffre tried to use in late 1915. Similarly, there is no evidence that anyone in the high command seriously questioned whether a technique that worked in a single sector would generalize well to another.[208] Nivelle's ill-fated offensive at

[207] Joffre, *The Personal Memoirs of Joffre*, 1932, 2:564–565.

[208] Williamson Murray argues that Nivelle's approach failed at Chemin des Dames because it was an adaptation to German defenses as they existed in 1916 – not as they would exist in 1917 (aka the elastic defense in depth). There is insufficient evidence to back this claim. We do not know if Nivelle's approach would have even worked against an stronger German defense in depth as it existed in 1916 (before elasticity was fully introduced), because it was

Chemin des Dames proved that they would not. In either case, his new method was not official doctrine by the end of 1916.

Offensive Doctrine as of December 1916
Table 7.19

Irregular & dispersed formations	No
Independent small unit action	No
Fire and movement (small unit level)	No
Organic firepower	Yes
Bypass resistance	No

Combined arms

The French army's artillery doctrine also changed incrementally, although at least these changes were in the 'right' direction. The army's most important advances were in tank tactics. French tanks would not see action until April 1917. However, even in their absence the army thought hard about how they should be used.[209]

Conceptually, the army wanted to use tanks to provide mobile fire support for the infantry.[210] Unlike the British army, the French do not seem to have considered an independent role for tanks. In large part, this was because French tanks were significantly smaller and lighter than British tanks (around seven tons as compared with 30 tons). The idea was to attach small groups of tanks to the assault waves (about 160 tanks per

never tried in any sector other than Verdun. Moreover, Nivelle's approach was really a modification of Joffre's late-1915 offensive doctrine – and that did not work even against relatively shallow German positions in 1915. My contention is that because Nivelle did not include anything approximating modern assault tactics or true combined arms, his attack would have failed even if the Germans had not implemented an elastic defense in depth across much of the Western Front. I, of course, cannot prove this either. But I believe that these aforementioned points make my case stronger than Murray's.

[209] There is an argument that this might count as experimentation. At present, because I do not give the British or German armies credit for work that was only done on paper, I will continue to consider French combined arms doctrine static.

[210] This and what follows is taken from Greenhalgh, "Technology Development in Coalition," 815–816.

regiment) to provide mobile firepower for suppressing enemy machine guns and bunkers. French industry was never able to supply enough tanks to make this aspiration a reality. Nevertheless, such planning suggests that the French understood the best way to use tanks to restore battlefield mobility.

French artillery incrementally improved its tactics in two other ways. First, GQG called on artillery units to organize and attach a liaison and observation section to each infantry unit during an assault.[211] When combined with improvements in aerial spotting, these liaison sections significantly improved infantry-artillery coordination.[212] Second, control over the artillery was delegated to division commanders in order to make it more responsive to the infantry's immediate needs.[213] Although not truly flexible command and control, delegating control over the artillery was probably an improvement over the older, highly centralized approach. Finally, the rolling barrage, or 'creeper' became standard practice across the army by mid-1916.[214]

Combined Arms Doctrine as of December 1916
Table 7.20

Hurricane barrage	No
Predicted fire	No
Flexible C2	No
All arms integration (fire and movement)	No

[211] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 64.
[212] Balck, *Development of Tactics: World War I*, 44.
[213] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 66.
[214] Ibid., 67.

Defensive tactics

French defensive doctrine remained unchanged in 1916. This stagnation is surprising given that the French army spent the entire first half of 1916 (on top of the last few months of 1915) on the defensive. In any case, although the army continued to organize its trenches in depth, GQG continued to insist, "ground be held to the last man."[215] Elasticity was impossible as long as the fight was still for the first line of trenches.[216] The army would have to wait for Petain before it could begin exploring an alternative method of defense.

Defensive Doctrine as of December 1916
Table 7.21

Depth	Yes
Elasticity	No
Counterattack	Yes

Independent Variables

Command culture

If anything, the army's command culture grew even more centralized during 1916. Again, it is unclear whether Joffre's growing influence or the army's methodical doctrine led commanders to retain as much authority as possible. Whatever its source, its implications were clear. As Pascal Lucas recalls, "the command, which could quickly get information on everything which was going on, tended towards excessive centralization; nothing could no longer be done excepting upon its orders; it took over all initiative and all responsibility."[217] And it was not just battalion commanders and below who had their

[215] Clayton, *Paths of Glory*, 122.
[216] Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 89.
[217] Ibid., 68.

autonomy taken away. In many cases, even division and corps commanders lacked the autonomy to deviate from GQG's instructions.[218]

These restrictive conditions did not mean that no one experimented in the French army without GQG authorization. The key is that only very high-ranking officers had the authority to plan attacks that did not conform with existing doctrine. Recall that Nivelle commanded an army. Petain, a longtime proponent of defensive warfare, commanded all French forces around Verdun. Cumulatively, the French army generated far less information by relying on an exceedingly small number of generals to experiment. It was certainly less than the amount generated if divisions, brigades, regiments, or battalions were given the same latitude.

By late 1916 GQG recognized that its excessive control over the rest of the army was less than ideal. On December 16th it released a training note calling on senior commanders to delegate more authority and autonomy to their subordinates.[219] Nevertheless, this edict did not represent a major change to the army's command culture for two reasons. First, it was issued 15 days before the end of the year, meaning nothing about how the army fought would change until 1917 at the earliest. Second, GQG intended for regimental commanders and above to demonstrate initiative.[220] Therefore, even if the army had been able to change its command culture the moment a new pamphlet was published, it would have adopted a moderately centralized command culture.

[218] Ibid.
[219] Ibid., 96.
[220] Ibid.

It is also worth pointing out that deep reflection, analysis, or debate did not lead to GQG's change of heart. Rather, it was the product of GQG's change in command. Nivelle replaced Joffre on December 13th, three days before the new memorandum's publication.

Command culture as of December 1916
Table 7.22

Senior generals only	X
Battalion commanders and above	
NCOs and company grade officers and above	
All ranks	

Assessment mechanism

There is no evidence suggesting that the army's doctrinal assessment mechanism evolved in 1916. The fact that General Joffre's maintained tight, personal control over GQG until the end of his tenure offers one likely explanation. The fact that Nivelle rose to power in large part because he promised that his new doctrine would work similarly suggests why he made no effort to enhance GQG's analytic capacity after assuming command.

Assessment mechanism as of December 1916
Table 7.23

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

The French army made a few minor changes to its training program in 1916. The Division Depots were renamed Division Instruction Centers.[221] To increase throughput, each

[221] This and what follows is from Sumner, "French Poilu," 60–61 & 75.

infantry battalion sent one of its four companies to assist with training at its respective center. The centers also began teaching courses for specialists, including machine gunners, bombers, and engineers.

The changes were modest and not significant enough to shift the army's training structure from decentralized to moderately decentralized. No single officer had control over how the various Division Instruction Centers trained, or what they taught. The centers themselves were still not geographically consolidated. Nor were there courses for field grade or general officers. Nevertheless, incremental though they were, these changes at least suggest that the army wanted to exert more control over how its soldiers prepared for battle.

Training structure as of December 1916
Table 7.24

	General in charge of training	No general in charge of training
Many schools/ training sites		X
Few schools/training sites		

VI. 1917

Assault tactics	Exp.
Combined arms	Exp./Dev.
Elastic defense in depth	Exp./Dev.

Command culture	Mod. Centralized
Assessment mechanism	No
Training structure	Mod. Decentralized

The French army suffered from doctrinal and strategic whiplash in 1917. The army started the year on the offensive, believing Nivelle's promise to achieve "nothing less than the destruction of the major part of the enemy's forces on the Western Front."[222] It ended the year on the defensive, with General Petain doing everything in his power to nurse it back to health.

The irony is that Nivelle's disastrous tenure set the conditions for the army to start learning again. For all of its faults, Nivelle's *bataille de rupture* required commanders (at least at the regimental level and above) to fight autonomously and make decisions without consulting higher headquarters. General Petain's tactical reforms continued to push the army away from its former pathological rigidity. Equally important, both Nivelle and Petain went to great lengths to standardize training. By year's end Petain even managed to organize training centers for his generals, although he did not appoint a single general officer to supervise the entire training process. Only the net assessment mechanism remained completely unchanged. Its absence meant the army would continue to have problems systematically capturing, assessing, and disseminating new ideas, unless they came from

[222] Sumner, *They Shall Not Pass*, 144–145.

the Commander in Chief himself. The fact that the army's doctrine could swing so rapidly over such a short period of time suggests that there were no mechanisms in place augment, or at least buffer, the Commander in Chief's intuition.

Political, strategic, and operational situation

France's overarching political imperatives and strategic situation changed dramatically during 1917. For this reason, political, strategic and operational factors are best discussed in two phases: those that existed during Nivelle's tenure (January until May) and those that existed during Petain's (May until December).[223]

January to May

Politically, Nivelle operated with a blank check. Although France's civilian leaders intervened in the army's affairs long enough to remove Joffre in late 1916, they did little to question Nivelle's strategy, operational concepts, or tactics. In fact, alongside the fact that he was not a devout Catholic, his *bataille de rupture* was the reason they selected him for command in the first place. The fact that the government endorsed a decisive offensive in early 1917 eludes explanation. France's situation was dire: Verdun and the Somme proved costly stalemates; Romania was effectively out of the war; manpower constraints were again severe; and the stalemate continued to stymie every new tactical scheme.[224] So the politicians decided the best course of action was to attack, and they promoted a commander in chief who promised them the victory they sought without seriously

[223] This section only looks at 1917. Obviously, Nivelle was appointed the commander in chief on December 13, 1916, and Petain remained the commander in chief of the French army on the Western Front until the end of the war (although he was both subordinate to, and marginalized by, Foch).
[224] Doughty, *Pyrrhic Victory*, 318–321.

considering whether his ideas had any basis in reality. It was irrational exuberance decades before anyone would know what that term meant.[225]

Strategically, Nivelle sought victory by destroying the German army on the Western Front. Operationally, he was convinced that it was both possible and desirable to launch an immediate, decisive attack near the Chemin des Dames road on the far side of the river Aisne. Nivelle convinced the British army to launch a diversionary assault near Arras a week before to draw off German reserves. The offensive was a failure, and the army lost 134,000 soldiers (30,000 dead, 100,000 wounded and 4,000 missing) in nine days.[226]

May to December

Statistically, although they were costly, the failed offensive did not exactly push France over the manpower precipice. Politically, Nivelle's botched offensive threw the government and the army into chaos. It is unclear why this was, but it probably had a lot to do with the gap between the irrational exuberance that propelled Nivelle to power in the first place, and the sobering reality of what the army was actually capable of achieving.[227] Whatever the

[225] I use the term 'irrational' deliberately. Given French war aims and its obvious manpower constraints, it is hard to argue that their decision to double down on a doctrine – a doctrine that was already doubling down on an older, disproven approach – represented a rational gamble. To drive the point home I quote directly from Robert Doughty: "By late 1916, formal reports on morale indicated a 'crisis' stemming from the Romanian defeat, German willingness to continue the war, political turbulence in paris, and concerns about families." Moreover, manpower shortages had grown so severe that the army had to reorganize its structure, taking one regiment out of every division. Ibid., 317.I make this argument while acknowledging Barret Bradstreet's apt point that in poker, doubling down represents a rational risk, not an irrational 'Hail Mary.' The flaw was not that the French decided to double down on something. The flaw was that they doubled down on a plan that had no reasonable chance of working, and that they failed to vet or analyze in any rigorous way. At best it represented a negligent abdication of responsibility.
[226] Sumner, *They Shall Not Pass*, 156.
[227] Again, despite post-hoc claims that units did a poor job of implementing Nivelle's plan (which they most certainly did, owing to the army's decentralized training system Murray, *Military Adaptation in War*, 102–103.) it is unlikely that even perfect implementation would have saved the offensive. It was conceptually flawed from the outset.

cause, Nivelle was sacked in May and successive civilian governments fell in September and November. The government's instability ultimately thrust Georges Clemenceau into the prime minister's seat, a development that would have important implications for the army and its doctrine in 1918. However, the more immediate issue was the mutinies that broke out in late April. By the end of the year nearly 40,000 soldiers across 68 divisions participated in at least one of 250 acts of disobedience.[228]

Therefore, Petain had little choice but to shift to the strategic defensive. His first priority was to address the mutinies, which he did with an exceedingly soft hand.[229] Towards the end of the year he did authorize a number of small-scale offensives to get his army back into fighting shape.[230] Petain made it clear that the army would not attempt a major breakthrough operation in 1917. In fact, his preferred course of action was to remain on the defensive, waiting for the Americans to arrive in force and French industry to build a decisive tank force. Georges Clemenceau had other plans.

Dependent Variable

Offensive tactics

January to May Nivelle's *bataille de rupture* has been discussed in great detail and so this section only briefly revisits its core tenets. Developed while Nivelle commanded the Second Army at Verdun, and articulated in doctrinal updates released in December 1916 and

[228] Sumner, *They Shall Not Pass*, 161–169.
[229] Petain was heavily criticized for not dealing with the mutineers more harshly. Instead, Petain tried to address his soldiers' primary complaints: pointless offensives, harsh discipline at the hands of inexperienced officers, and the lack of enough leave to go home, which both German and British soldiers received.
[230] Sumner, *They Shall Not Pass*, 169. He called these the *batailles de redressement.* Greenhalgh, "Technology Development in Coalition," 823.

January 1917, *bataille de rupture* was in many ways a variation on Joffre's earlier continuous battle concept.[231] The doctrine called on units to attack in depth, pursuing deep objectives on a relatively narrow front to allow them to mass overwhelming firepower against German defenses. Following a multi-day pre-assault bombardment, assault waves would attack as rapidly as possible toward deep objectives (at least as deep as the first line of German artillery).[232] The initial assault waves would follow a rapid creeping barrage for protection, bypassing pockets of resistance and making no attempt to stay aligned with adjacent units. No organic firepower was attached to the assault units beyond their light machine guns. Units below the company level did not train for independent maneuver. Senior commanders devolved authority to their regimental and brigade commanders, but not below. Irregular formations were not prescribed.

As has also already been discussed at great length, the problem with Nivelle's plan was that it did not work. It did not work because it was fundamentally unsound and because he attacked into the teeth of the new German elastic defense in depth.[233] Assault troops still advanced in skirmisher waves. They could not keep up with the creeping barrage's blistering pace of 100 meters every four minutes.[234] This shortcoming may not have mattered had the doctrine included provisions for the infantry to generate its own

[231] This and what follows are from Lupfer, *The Dynamics of Doctrine*, 33; Balck, *Development of Tactics: World War I*, 47–53; Lucas, *The Evolution of Tactical Ideas in France and Germany During the War of 1914 - 1918*, 66–67.
[232] Each assault division would designate a single assault regiment to lead the attack. This regiment would advance with all three battalions forward. The battalions would have two companies in the first wave and two more companies in a second wave, about 80 meters in trace. Thus, in a division sector, six companies would advance in line in the first wave, with six more behind. The division's other two regiments would form reserve waves that would follow several hundred meters behind the assault force.
[233] Nivelle knew about the new German defenses. He simply believed that they were no obstacle to his *bataille de rupture*. .Balck, *Development of Tactics: World War I*, 57.
[234] Lupfer, *The Dynamics of Doctrine*, 33–34.

suppressive fires. It did not – infantry maneuver depended on artillery fire just as it had since 1915. Compounding matters, Nivelle's attack surprised absolutely no one; and the Germans had air superiority in the Aisne sector.[235]

May to December Although Petain adopted a defensive posture, he nonetheless implemented a number of changes to the army's offensive tactics. Several of these were highly progressive, moving the army closer towards modern assault tactics than ever before. In September GQG released another doctrinal update. It called on platoons to adopt a true 'combined arms' organization.[236] Previously, platoons were divided in half. One half of the platoon carried machine guns and bombs while the other half carried only rifles. Now the half-platoons (renamed combat groups) were to carry an equal mix of both. The combat groups were further divided into two fire teams, with a light machine gun assigned to each. These changes gave small units flexibility for the first time in the war.

On the other hand, Petain's strategic imperative (to conserve manpower) meant that he had to insist on shallow objectives.[237] He believed that the army lacked the artillery firepower to effectively penetrate deeply into German defenses, and that units risked over-extending themselves in any case. Petain does not seem to have considered allowing small units to fight their way forward using fire and movement and flexible formations that his organizational changes made possible for the first time. This neglect is interesting for two

[235] As has been mentioned, he liked to tell the press about his plans. In any case, the Germans captured a copy of his orders. Nivelle knew this as well. Balck, *Development of Tactics: World War I*, 56.
[236] This and what follows are from Ibid., 22–23 & 59; Sumner, "French Poilu," 76; Sumner, *They Shall Not Pass*, 196.
[237] Radiguet, *The Making of a Modern Army and Its Operations in the Field*, 139.

reasons. First, some units in the French army began experimenting with *grenadiers d'elite* as early as January 1917.[238] Second, we know that Petain was aware of the German army's work with storm troops. Unfortunately, we also know that he dismissed them as an act of desperation.[239]

Offensive Doctrine as of December 1917
Table 7.25

Irregular & dispersed formations	Exp*
Independent small unit action	Exp*
Fire and movement (small unit level)	Exp*
Organic firepower	Yes
Bypass resistance	Yes then no

*Only in units that formed *grenadiers d'elite* – no attempt to experiment or develop these for use by regular infantrymen

Combined arms

For all of their strategic and doctrinal differences, Joffre, Nivelle and Petain shared a commitment to conquering with the artillery and occupying with the infantry. Nivelle's offensive was preceded by an eight-day pre-assault bombardment, concentrated in depth throughout a relatively narrow front.[240] He did not train his infantrymen to generate their own firepower; he simply expected them to follow the creeping barrage to victory.

Petain's view was similar. Petain would only launch his limited objective assaults where he could mass sufficient artillery. At Verdun (1917) artillery units were so densely packed that there were two artillery gunners for every soldier in the assault wave; a field gun every 24

[238] Balck, *Development of Tactics: World War I*, 50; Gudmundsson, *Stormtroop Tactics*, 87–88.
[239] Radiguet, *The Making of a Modern Army and Its Operations in the Field*, 129–131; 140–141.
[240] Sumner, *They Shall Not Pass*, 148–149.

meters; and a medium gun every 18.[241] Petain's efforts endeared him to his men.[242] Given that the army's morale crisis was its greatest strategic vulnerability at the time, this fact alone may have justified Petain's aversion to experimenting with other ways to employ artillery.

The French army did make important progress towards a combined arms doctrine under Petain. Command and control became more flexible, especially after the French learned from the British that a lot of the pre-assault bombardment's power was lost when division commanders developed independent plans.[243] From this point forward the corps would direct pre-assault bombardments. The divisions would regain control over their organic artillery after the assault had begun.

Tank doctrine also improved. By early 1917 the army had 136 tanks, with another 953 on order with French industry.[244] Most saw action for the first time at Chemin des Dames. Their impact was less than decisive (57 were knocked out and 19 broke down in the initial assault)[245] although this shortcoming may have had more to do with Nivelle's flawed operation than inherent shortcomings in French tank doctrine. Far from abandoning the tank concept, Petain continued to invest in their development and refinement.[246] He also continued to use them in his limited offensives and they proved their worth helping the

[241] Clayton, *Paths of Glory*, 149.
[242] Doughty, *Pyrrhic Victory*, 361.
[243] Radiguet, *The Making of a Modern Army and Its Operations in the Field*, 81–82.
[244] Greenhalgh, "Technology Development in Coalition," 821.
[245] Sumner, *They Shall Not Pass*, 150–151.
[246] Ibid., 170.

infantry finally the long sought after Chemin des Dames in late 1917.[247] Technology, not tactics, was the biggest limiting factor – 43 of the 63 tanks used at the second Chemin des Dames broke down.[248] Regardless, the French were on to the right concept of employment as they preferred to use their tanks in close conjunction with the infantry.[249] It is telling that the army started referring to its infantry divisions all-arms teams in 1917.[250]

Nevertheless, the fact that both Nivelle and Petain insisted on using enormous bombardments to precede their attacks meant that the French would never catch up to the British and German armies in two critical areas: predicted fire and the Hurricane barrage. For these reasons, despite the army's remarkable progress with flexible command and control and all arms integration, its combined arms capability remained under development by year's end.[251]

Combined Arms Doctrine as of December 1917
Table 7.26

Hurricane barrage	No
Predicted fire	No
Flexible C2	Yes
All arms integration (fire and movement)	Yes

Defensive tactics

Nivelle's offensive preparations consumed his attention and energy as commander in chief. It is therefore unsurprising that the army's defensive doctrine remained unchanged through May 1917.

[247] Greenhalgh, "Technology Development in Coalition," 823.
[248] Ibid.
[249] Radiguet, *The Making of a Modern Army and Its Operations in the Field*, 86.
[250] Ibid., 24.
[251] In fact, the French seem to have dismissed British success with the hurricane barrage at Cambrai a fluke that would be hard to repeat against German defenses. Ibid., 141.

It was Petain who finally pushed the French army to take the final step towards an elastic defense in depth. In July GQG directed that units on the Western Front adopt a defense in depth.[252] From this point forward, defenses were arrayed in three positions.[253] The first position consisted of an obstacle belt and three trenches – an advanced trench, which only housed a few sentries and machine gun positions; and two support trenches. Soldiers occupied shell holes in front of the advanced trench (and in front of the obstacle belt) to listen for patrols and to warn in case of a surprise attack. The second position was organized similarly (an obstacle belt and three trenches). It was positioned far enough away to be out of range of German field guns (although not its heavy artillery), but was close enough to cover at least part of the first position by machine gun fire. The second position also contained deep shelters to house troops during heavy artillery attacks. Finally, a third position was built as far away as possible from the second position while still being close enough to take the second position under fire. Crucially, bunkers, scattered throughout all three positions, served as centers of resistance. Each bunker had is own obstacles and was situated so that its machine gun could cover as much ground in front of it as possible. They served as rally points for counterattacks and as hold outs of last resort to buy time for reserve units to move into place.

In many ways, Petain was simply updating and indoctrinating a practice that traced back to the prewar army. Even Joffre encouraged commanders to add depth to their positions (albeit on a smaller scale). The real break from the past occurred when Petain issued two

[252] Clayton, *Paths of Glory*, 152.
[253] This and what follows is from Radiguet, *The Making of a Modern Army and Its Operations in the Field*, 58–72.

directives in December 1917: the *Defensive Actions of Large Units in Battle* and *Directive Number 4.*[254] Without explicitly calling for commanders to trade space for time, these documents emphasized that forward most trenches were to slow – not stop – the Germans. Therefore, they instructed commanders to place as few men as possible in the first position.

Since Petain issued these directives less than two weeks before the end of the year, the army did not have time to fully comply. Nor was Petain's concept a true, full-fledged elastic defense in depth. It was, however, progress toward this end.

Defensive Doctrine as of December 1917
Table 7.27

Depth	Yes
Elasticity	Dev
Counterattack	Yes

Independent Variables

Command culture

The army's command culture shifted from highly centralized to moderately centralized in 1917. During Nivelle's tenure, this shift seems to have been an unintentional byproduct of his tactical doctrine. Nivelle certainly did not abide criticism. As Douglas Porch describes it, even if Nivelle's concepts were originally based on battlefield experience,

> They quickly degenerated into deductive formulas handed down from on high. Like a pastoral letter read from the pulpit, meant to apply in any situation… objections by field commanders that tactics might not work were treated in much the same way as the medieval church dealt with heresy.[255]

[254] This and what follows is from Doughty, *Pyrrhic Victory*, 425–426; Clayton, *Paths of Glory*, 153.
[255] Porch, "The French Army in the First World War," 219–220.

At the same time, *bataille de rupture* only worked if regimental, brigade, and division commanders seized initiative and exploited opportunities as they arose. Thus, tactics, not an intrinsic commitment to autonomy, drove decentralization under Nivelle.

In contrast, Petain seems to have genuinely believed that the French army had grown too hierarchical. Remember that Petain restored confidence and order within the army by listening to his soldiers, not by cracking down on them.[256] Tactical realities drove his thinking as well. Even within the overarching construct of his highly choreographed battles he felt that flexibility reduced casualties and made units more effective. His changes to the platoon organizational structure suggest as much. Moreover, in his final directive of 1917 Petain asked commanders to encourage flexibility and initiative, even down to the small unit level.[257] There was no time to implement this radical call for autonomy in 1917. At the very least Petain reinforced what the German army had proven as early as 1915: that methodical battle and decentralized command and control were not mutually exclusive.

Command culture as of December 1917
Table 7.28

Senior generals only	
Battalion commanders and above	X*
NCOs and company grade officers and above	
All ranks	

*There was an emerging emphasis on decentralizing authority further

[256] At least one French general claimed that Petain should have executed two thousand soldiers to set an example. Sumner, *They Shall Not Pass*, 183.
[257] Porch, "The French Army in the First World War," 220.

Assessment mechanism

There is no evidence suggesting that the army improved its doctrinal assessment mechanism in 1917. Nivelle was definitely uninterested in creating an autonomous unit that might critique his doctrine. As a result, GQG continued to discourage dissent and ignore data that failed to conform to the theory.[258] Although Petain may have supported the idea, he was almost certainly preoccupied with more pressing tasks to make it a priority.

Assessment mechanism as of December 1917
Table 7.29

Conduits	No
Capacity (prestige and education)	No
Autonomy	No

Training structure

Nivelle did try to impose some order on the army's decentralized training, creating an army reserve group to help retrain the entire army on his new doctrine. However, his tenure was too short to significantly restructure the army's training mechanism. In fact, uneven application of his concepts is one of the many factors historians use to explain his failure.[259]

It was Petain who sought to centralize training. Long renowned for his skill as an instructor and mentor, Petain continued Nivelle's practice of relying on the army reserve group to run training.[260] Although the lines of authority are not clear, ostensibly because the reserve group had a commanding general we can assume that a relatively high ranking officer

[258] Ibid., 216; Lupfer, *The Dynamics of Doctrine*, 33–34. As evidence, Nivelle ignored warnings and calls to modify his plan from his own operations officer and the general he handpicked to lead his newly formed Reserve Army Group. Doughty, *Pyrrhic Victory*, 338.
[259] Murray, *Military Adaptation in War*, 103–105.
[260] Sumner, *They Shall Not Pass*, 170.

finally had at least limited control over how training was handled (at least for divisions at the front. Conscripted recruits continued to receive initial training in the same way as before). Petain directed all divisions rotating out of the front lines to pass through the army reserve group for instruction on all arms combat operations and the defense in depth.[261] Even more important, Petain established schools for generals and staff officers to ensure that they fully understood how to orchestrate the tactics their soldiers were learning to execute.[262]

The degree to which the army's shift to a more centralized training structure actually translated into uniform training remains unclear. Douglas Porch suggests that it was uneven at best.[263] To be sure, Petain's new training system defies easy categorization.[264] Recruit training still occurred at the Divisional Instruction Centers and was therefore highly decentralized. The army reserve group only had control over retraining for divisions coming out of the line. There is no evidence that anyone at GQG possessed even as much authority over army-wide as Brigadier General Solly-Flood, let alone General Ivor Maxse. Nevertheless, the army's training was clearly more centralized at the end of 1917 than it had been at the beginning. Therefore, at a minimum it is safe to conclude that it as least qualified as moderately decentralized.

[261] Clayton, *Paths of Glory*, 152.
[262] Ibid.; Porch, "The French Army in the First World War," 224.
[263] Porch, "The French Army in the First World War," 224.
[264] Especially because CAT theory only considers geographic consolidation and the presence of a single, overarching authority. Nothing in Petain's reforms necessarily affected those two variables. Yet his efforts unambiguously centralized training more than it had been up to that point.

Training structure as of December 1917*
Table 7.30

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites		

*The French army's training structure defies categorization according to these variables.

VII. 1918

Assault tactics	Exp.
Combined arms	Dev.
Elastic defense in depth	Dev. / No

Command culture	Mod. Centralized
Assessment mechanism	No
Training structure	Mod. Decentralized

1918 brought victory to the French army. It did not, however, bring an optimal doctrine. Their battlefield achievements notwithstanding, by the armistice French soldiers still lagged behind their British and German counterparts in their offensive, defensive, and combined arms tactics.

On the face of it, this outcome confirms CAT theory's prediction. The army's command culture was still moderately centralized (and some historians argue that it may have been

more hierarchical than that).[265] At the same time, there are at least two confounding factors that make it impossible to claim causation with complete confidence. First, France's civilian leaders finally asserted themselves into how their generals waged war. Georges 'the Tiger' Clemenceau was renowned for his aggressive leadership and willingness to challenge – and overrule – his senior generals.[266] Clemenceau was almost certainly a galvanizing force whose efforts to correct French civil-military relations helped lead the French to victory. At the same time, his efforts complicate theory testing because he disliked Petain's conservative strategy and operational concepts.[267]

As a result, Clemenceau appointed Foch over Petain, effectively forcing the French army back on the offensive after the Second Battle of the Marne.[268] By actively pressing the army and his generals on their strategic and operational concepts the Tiger pushed the war to a rapid conclusion. A shorter war may have saved lives, but it also kept Petain's reforms from fully maturing.[269] Clemenceau intervened in French tactics and doctrine in a more direct way as well – he (and Foch) rejected the elastic defense in depth.[270]

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[265] There is certainly an argument to be made that one of the dominant lessons the French army took from the First World War was the importance of methodical planning and centralized command and control. See Doughty, "The Seeds of Disaster"; Jonathan M. House, *Combined Arms Warfare in the Twentieth Century*, Modern War Studies (Lawrence, Kan: University Press of Kansas, 2001), 37.

[266] Clayton, *Paths of Glory*, 161–162 & 172.

[267] Petain wanted to stay on the defensive until 1919, mounting limited offensives only where the army could mass an overwhelming artillery advantage.

[268] Petain remained the Commander in Chief of French forces on the Western Front. Foch became the Supreme Allied Commander, overseeing French, British, and American forces. Foch set the broad outlines of Allied strategy, but the individual commanders in chief retained the freedom to achieve their overarching objectives how they saw fit.

[269] This point can be argued both ways, since the French army suffered fully 20% of its total casualties in 1918, as opposed to 10% in 1917 (and this includes the casualties suffered under Nivelle). Petain's methods may have been conservative, but they definitely saved French lives.

[270] Never one to let facts get in the way of a good theory, Foch adamantly believed in fighting for every inch of ground. There are clearly political justifications for this view. Nonetheless, by this point in the war manpower was the army's greatest strength – and casualties were a major source of political friction – yet units that followed Foch's

Second, France had a manpower and material crisis in 1918. A GQG study in late 1917 concluded that the army would have 100,000 fewer soldiers than it needed by September 1918 – a gap that would grow to 200,000 by November.[271] Between July 1916 and October 1918 the army's end strength fell from 2.2 million soldiers to 1.6 million.[272] In terms of material, the French army bore the brunt of equipping the American army for action.[273] Fully three-quarters of French war output went directly to the American Expeditionary Force.[274] At a minimum, this large-scale diversion of resources slowed French tank construction (and therefore employment).[275] Therefore, it is also likely that it impeded French tactical and doctrinal development in other areas as well.

Political, strategic, and operational situation

The French army's political milieu has already been covered and does not require further discussion. Strategically, no one in the French high command thought the war would end before the year was out. Russia was out of the war and the Americans were not yet in, allowing Germany to achieve numeric superiority on the Western Front for the first time since 1914. The aforementioned manpower and material shortages even led Clemenceau

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defensive scheme suffered far higher casualties than those that adopted a defense in depth. Clayton, *Paths of Glory*, 161–162; 172 & 179.

[271] Doughty, *Pyrrhic Victory*, 416.

[272] Clayton, *Paths of Glory*, 181.

[273] As a side note: one of the great ironies of the war is that American units went into action with Chauchat light machine guns. These French designed and produced weapons were vastly inferior to the Lewis gun (in large part because of their open sided magazines) and were much despised by American soldiers. The irony is that the superior Lewis gun was designed by an American army colonel years before the First World War. The U.S. army refused to buy the design, so the colonel sold it to the British instead.

[274] Sumner, *They Shall Not Pass*, 204.

[275] Greenhalgh, "Technology Development in Coalition," 829–832.

and Petain to shrink their lines, giving the British army more to defend. By early 1918 the British army had 55 divisions defending 200 kilometers of very active frontage, while the French army had 99 divisions defending roughly 450 kilometers, much of which was inactive.[276]

Petain's strategic objective in 1918 was to conserve French manpower against the impending German onslaught.[277] He made no pretense to victory in 1918, preferring to wait for more tanks and more Americans.[278] Operationally, Petain sought to achieve these goals by increasing the depth of his defenses across the Western Front, and by launching limited offensives where and when it could be achieved without unnecessary risk.

Herein lay the friction between Petain, Foch and Clemenceau. Foch and Clemenceau both disagreed with keeping the French army on the defensive, and with turning even more of France into a battlefield, as elastic defenses in depth necessitated. Strategically, Foch and Clemenceau wanted the army to assume a more aggressive posture. Although both agreed that victory was unlikely in 1918, they felt that it would be easier to win in 1919 by keeping pressure on the German army. Operationally, Foch sought to keep pressure on the German

[276] Clayton, *Paths of Glory*, 179. Ludendorff selected the new line between the French and British armies for his March offensives. After the battle, Haig and other senior British officers defended their failure to stop the German assaults by arguing that British units had only recently taken over French lines; that the French had not bothered to build their defenses in depth; and that there was insufficient time to fully implement one before the Germans attacks.
[277] Petain also had alliance and political objectives. In terms of allies, he wanted to ensure that France was not dominated by an English speaking coalition when the AEF finally arrived in force. To this end he fought to placed the French army between the British and the Americans. Politically, he wanted to make sure that any future offensives that the Entente undertook pushed towards Alsace-Lorraine, since occupying these territories before the war ended would ensure they would not subsequently be lost in the post-war negotiations. Porch, "The French Army in the First World War," 201.
[278] Sumner, *They Shall Not Pass*, 184.

army through his concept of a *bataille generale.*[279] The idea was to mount a series of attacks for limited objectives up and down the entire front. "To use a boxing metaphor, of which Foch himself was fond, instead of winding up a giant haymaker in an attempt at a knockout, the Allies would sap the strength of the German army with repeated jabs to the body until it threw in the towel."[280] No single attack would seek a decisive result, thereby conserving manpower. Instead, the effect was collective. Through coordinated and consistent pressure on German lines the French army would wear their adversary down, setting the conditions for a breakthrough in 1919.

Dependent Variable

The French army did not have time to completely master the tactics and techniques endorsed by Petain's GQG. The friction between Foch and Petain, combined with the officer corps' long history of privileging patronage over efficacy, also meant that some generals adhered to Petain's concepts while others followed Foch's. These facts notwithstanding, it is still worth briefly looking at how French tactics evolved in the war's final months.

Offensive tactics

The army's offensive tactics did not change significantly in 1918. Some units continued to experiment with *grenadiers d'elite.* However, Petain rejected storm troop-like units on the grounds that he thought they robbed regular units of their best men.[281] As training manuals

[279] This and what follows are from Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012), 23–24; Sumner, *They Shall Not Pass*, 201.
[280] Boff, *Winning and Losing on the Western Front*, 23.
[281] Sumner, *They Shall Not Pass*, 196.

for small unit leaders from 1918 make clear, the army did not endorse irregular and dispersed formations, independent small unit action, and fire and movement.[282] Soldiers continued to assault in skirmisher lines with men standing 4-5 meters apart. Platoons – not squads (or combat groups as the French called them by this point in the war – were the smallest unit considered capable of independent maneuver.[283] And every assault still ended with the proverbial bayonet charge:

> When a group has succeeded in reaching a cover situated at a small distance from the enemy, the leader gives the command to fix bayonet (without disclosing it); every one makes ready to rush altogether. A volley of grenades is thrown on the enemy; and as soon as they have exploded, the group rises and rushes forward at charge bayonet.[284]

Finally, the fact that Petain and Foch both agreed in fighting for limited objectives meant units were no longer given deep objectives with the permission to bypass points of resistance.

Offensive Doctrine as of November 1918
Table 7.31

Irregular & dispersed formations	Exp*
Independent small unit action	Exp*
Fire and movement (small unit level)	Exp*
Organic firepower	Yes
Bypass resistance	No

*Only in units with *grenadiers d'elite.* See 1917

Combined arms

Unlike its offensive doctrine, the army's combined arms doctrine continued to evolve and develop in 1918. The army still relied on a flexible system of command and control, and

[282] General Staff, *French Trench Warfare* (Imperial War Museum Department of Published Books, 1918), 27–49.
[283] Sumner argues that late in the war GQG tried to reorganize infantry squads (combat groups) one final time such that every combat group contained an identical 'all arms' team of 13 riflemen/grenadiers and a light machine gun. However, few units actually implemented this change before the war ended. Sumner, "French Poilu," 76.
[284] General Staff, *French Trench Warfare*, 37.

infantry units went into action with close support from attached artillery.[285] Aside from extensive coordination before the battle, by 1918 it was also standard practice to attach 37 mm cannon to the assault waves.[286] These field guns were lightweight, effective against fortified positions out to 2,000 meters, and (relatively) maneuverable. As a result, they could follow assault units into action, radically increasing the firepower immediately available to support an attack.[287]

Even more important, the French army finally started using Hurricane barrages in mid-1918. On July 12th GQG issued one of Petain's final directives. This doctrinal update called on attacking units to use sudden, violent pre-assault bombardments in place of multi-day artillery strikes.[288] Surprise and tanks would compensate for the loss in destructive power. It is unclear whether French gunners mastered predicted fire techniques, although we can presume that the Entente must have been sharing techniques and technology on some level. At the same time, the fact that Petain issued this directive four months before the end of the war suggests it would have been hard for French gunners to master a set of techniques that it took British and German gunners years to develop.[289] It is also not clear how many French commanders actually used hurricane barrages to precede their attacks.[290]

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[285] "Troops must never be launched to the attack, when such attack is not **prepared and supported by an effective artillery action. It is impossible to fight with men against material.**" (Bold in the original) Ibid., 149.
[286] Ibid., 171–172.
[287] Not that French infantry units moved beyond their artillery's protective range in the first place. The 37mm cannon were still very useful in reducing strong points and centers of resistance.
[288] Clayton, *Paths of Glory*, 186–187.
[289] And for French gunners to accomplish this feat in the midst of the war's most chaotic phase since late summer 1914.
[290] For example, French-American attacks near Saint-Mihiel (September 12 1918) and the Argonne Forest (September 26th) were preceded by four and three hour bombardments, respectively. Anthony Clayton, *The British Officer: Leading the Army from 1660 to the Present*, 1st ed (Harlow, England ; New York: Pearson Longman,

Combined Arms Doctrine as of November 1918
Table 7.32

Hurricane barrage	Dev
Predicted fire	Unclear
Flexible C2	Yes
All arms integration (fire and movement)	Yes

Defensive tactics

French defensive tactics do not appear to have changed significantly after 1917. Clemenceau's rise to power meant elasticity – trading space for time – never became official doctrine. To quote directly from a 1918 training manual:

> **Troops entrusted with the defense of an area of ground never under any circumstances abandon it.** It is important not to have any doubt on this matter in the mind of troops. The existence of stronger lines of defense to the rear, the moving of the company into **advance posts**… or keeping **main bodies** more to the rear, **never** imply that advanced elements can take the initiative in falling back on the main body, even if they judge their position is exposed. (bold emphasis in the original) [291]

Defenses retained their depth. In fact, by 1918 training manuals called for the second position to be built as far as much as three to five miles behind the first position.[292] Centers of resistance still anchored each position and gave defenders time for reinforcements to arrive, and commanders were still expected to mount counterattacks to retake any lost terrain.

Implementation of the defense in depth remained haphazard. Some units eagerly followed Petain's mandate, including his instructions to echelon men in depth as well. Other units built their trenches more closely together, and continued to keep most of their soldiers in

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2006), 174. The subject certainly needs to be studied in greater detail, in much the same way that Jonathan Boff sheds light on the British army's accomplishments during the final Hundred days.
[291] General Staff, *French Trench Warfare*, 287.
[292] Ibid., 178.

the foremost positions. The fact that the British army took over dilapidated trenches that were not well arrayed in depth in early 1918 provides even more evidence that implementation remained uneven. [293]

Defensive Doctrine as of November 1918
Table 7.33

Depth	Yes
Elasticity	Dev
Counterattack	Yes

Independent Variables

The French army's command culture, doctrinal assessment mechanism (or lack thereof), and training structure do not appear to have changed significantly in the war's final year. For this reason, plus the fact that political, manpower and material constraints make it hard to assess any one variable's individual effect, a discussion is omitted.

VIII. Concluding thoughts

French tactical doctrine during the First World War remains underexplored.[294] Nevertheless, insofar as the historical record allows us to reconstruct their tactics, the French army's experiences on the Western Front largely conform to CAT theory's predictions. Despite its prewar reputation for relatively decentralized command and control, the army's command culture rapidly centralized after August 1914. Centralization seems to have impeded experimentation and decreased GQG's interest in soliciting ideas from below. The army never developed a coherent and autonomous assessment

[293] Some commanders refused to adhere to the directive, preferring to keep their men crammed in the foremost trenches. Sumner, "French Poilu," 84; Porch, "The French Army in the First World War," 219–220.
[294] At least in the English language.

mechanism. As a result, we do not see GQG, the General Staff, or any other high level organization scouring the battlefield for ideas, subjecting them to rigorous analysis, and testing for generalizability. Finally, the fact that the French army's training structure never fully centralized undercut the army's ability to train, retrain, and transmit new ideas. Both Nivelle and Petain had problems implementing their new tactical concepts (flawed or otherwise) for this reason. It is also worth pointing out that the French army moved *closer* to the optimal doctrine *after* it began to loosen control over operations while tightening its grip over training.

At the same time, this case has its limitations. First and foremost, we cannot know the counterfactual. Unlike the German and British armies, the French did not manage to optimize in any area (offensive, defensive or combined arms).[295] This dissertation uses a controlled comparison of all three armies to help offset this weakness. A bigger limitation comes from the fact that politics, manpower, and material intervened to shape French tactics in 1918. There is simply no way to know if the army would have optimized in the absence of these confounding factors. If it had, this outcome would offer strong proof *against* CAT theory (since it means an army can optimize despite the absence of all three independent variables). If it had not, it would offer stronger proof that CAT theory is valid. In the final analysis, the fact is that the army's doctrine evolved in ways that were consistent with CAT theory's predictions for most of the war.

[295] In many respects this makes the British case the strongest, since it provides its own counterfactual.

Chapter 8

CAT Theory and the Western Front: A Review

"In looking back at the war and all its lessons we must not overlook the most important lesson of all, viz., all wars produce new methods and fresh problems. The last was full of surprises – the next one is likely to be no less prolific in unexpected developments. Hence we must study the past in the light of the probabilities of the future, which is what really matters. No matter how prophetic we may be, the next war will probably take a shape far different to our peace-time conceptions."[1]

I. The balance sheet

The First World War presents an important puzzle to those who want to know how, when, and why military organizations change. On the war's Western Front, three armies struggled to solve the same tactical dilemma. All three started the war with remarkably similar doctrines, weapons, structures, and political objectives. By mid-war, all three were even similar in size.

By war's end only one of the three possessed a tactical doctrine we now know to have been optimal. Another army managed to implement significant portions of this doctrine. The third lagged behind despite having started the war with a doctrine that was more advanced than those of the other two armies.

The preceding three chapters have tried to persuade you that Command, Assessment, and Training (CAT) theory sheds light on this puzzling outcome. The German army was the first to develop a moderately decentralized command culture, an autonomous and coherent assessment mechanism, and a centralized training structure. It was also the first and only army to adopt modern assault tactics, combined arms, and an elastic defense in depth. The

[1] Major-General A.E. McNamara's summary of what the British Army could, and could not, learn from its operations in the Great War. TNA/WO 32/3116 "Kirke Report" 1932 Pg 37

British army, hamstrung by its colonial legacy and small size, was not far behind. By the war's final Hundred Days it too possessed a moderately decentralized command culture, an assessment mechanism, and a centralized training structure (although just barely). British combined arms doctrine was at least as advanced as the German army's and perhaps more so. Had the war continued into 1919 it is likely that the British would have caught up in terms of modern assault tactics and an elastic defense in depth as well. The French army failed to catch up with its ally and adversary by November 1918. Its command culture remained moderately centralized, its training structure moderately decentralized, and its assessment mechanism too fractured and politicized to function properly.

Of course correlation is not causation. For this reason, chapters 5, 6, and 7 went to great lengths to lay out the causal relationship between CAT theory's independent and dependent variables. At a minimum, these chapters established that changes in command culture, assessment mechanisms and training structures *preceded* corresponding movement towards – and away from – the optimal doctrine. Moreover, the variables appear to have functioned in the ways chapter 3 laid out. The more centralized each army's command culture, the less its front line units experimented and the less its high-ranking commanders listened to input from below. The less centralized each army's command culture, the more front line units experimented and the more high ranking commanders paid attention to their subordinates' ideas.[2] This relationship held true across armies at the same point in time (i.e. 1916 when the German army had a moderately decentralized command culture and the British army had a centralized one). It also held true within an

[2] The fact that no army in the First World War had a truly decentralized command culture means we cannot test the hypothesis that moderate decentralization is better than full decentralization.

army over time (i.e. between 1916 and 1918 when the British army's command culture shifted from centralized to moderately centralized to moderately decentralized).

The same holds true for assessment mechanisms. When they were in place (as they were in OHL for the entire war) they helped scour the battlefield for new tactics; analyze why – and if – they were effective for the reasons assumed; and refine them for eventual dissemination and implementation. GQG lacked such a mechanism throughout the war and it consistently had problems identifying best practices and determining whether battlefield success was genuine or spurious. In essence, GQG had a single point of analytic failure. Its doctrine was only as effective as its commander-in-chief who insisted on its implementation was brilliant. While this approach worked well under Petain, it was less effective under Joffre and proved utterly disastrous under Nivelle. GHQ developed an effective assessment mechanism part way though the war and seemed to benefit from its presence for the reasons already stated.

Training was the one area in which the historical record did not fully conform to CAT theory's expectations. As CAT theory predicts, all three armies transmitted new doctrines and practices more quickly and efficiently when they created a single command to manage army-wide training. In contrast, the more decentralized training remained, the harder it was for the armies to ensure uniformity in preparation and implementation. This logic played out most clearly in the British case study, since the British army was the only one to alternatively adopt decentralized, moderately decentralized, moderately centralized, and centralized training structures during the war. In fact, as chapter 6 recounts, a number of

senior British officers explicitly called for GHQ to consolidate control over the army's training to impose greater uniformity in its tactical methods and battlefield performance.

However, CAT theory also predicts that geographic consolidation will have an effect on doctrinal implementation. The First World War did not present an opportunity to test this theoretical expectation to its fullest extent. The simple fact was that all three armies were far too large, and far too geographically distributed, to train millions of soldiers in a few locations. Geographic consolidation was achieved only in a relevant sense, as armies shifted away from regimental depots. In any case, the presence of a single, overarching training authority seems to have mattered the most.

While the case for CAT theory is strong, history is messy and lends itself to multiple perspectives. The First World War may be the closest thing to a natural experiment in modern military history. Nevertheless, there are still a lot of confounding factors and alternative ways to interpret events. Since this dissertation has had ample opportunity to present evidence in support of CAT theory, the next section wrestles with alternative viewpoints. Section three identifies several lingering causal issues and section four concludes.

II. Alternative explanations

But the Germans lost

One potential counter to CAT theory is that the theory is right yet irrelevant. In other words, CAT theory may do a good job of explaining wartime optimization, but the optimal

doctrine has little bearing on the outcome we care about most: victory. After all, the German army optimized more effectively and efficiently than both the British and French armies and it still lost.

Chapter 4 deals with this counterargument, arguing that no tactical innovation could save Germany from its strategic mistakes. But there is a theoretical counter as well: CAT theory does not assume that an optimal doctrine leads to victory. To reiterate a point introduced in chapter 1: combat outcomes are complex. Random events often mean the difference between winning and losing.[3]

Moreover, combat outcomes are only one of many factors that determine victory in war. As chapter 9 describes, the United States learned this lesson the hard way in Vietnam. Conversely, powerful states can win wars against small, weak states simply by outlasting them, regardless of how poorly their soldiers perform on the battlefield. This point is important: war is a political phenomenon.[4] As a result no single factor is likely to yield a consistent impact on victory and defeat. War's political essence means states, leaders, and citizens can redefine victory and defeat in first place.

Thus, the optimal doctrine does not determine victory. Nor is it always the most important variable. However, it still matters because it, by definition, allows a state to pursue its

[3] Stephen Biddle's work on modern force employment (essentially modern assault tactics, combined arms, and the elastic defense in depth) comes as close to capturing a consistent reason some armies win on the battlefield as any theory. Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton University Press, 2004); Stephen Biddle, "Rebuilding the Foundations of Offense-Defense Theory," *The Journal of Politics* 63, no. 03 (2001): 741–774.
[4] C. Clausewitz, "On War, Edited and Translated by Michael Howard and Peter Paret," *New York: Everyman's Library* (1976): bk. 1.

military objectives as efficiently and effectively as possible. This characteristic matters because it feeds back into political willpower. States that fight more efficiently can also fight longer, because they will not waste resources as quickly, all things equal. In states where domestic audiences matter, the optimal doctrine similarly reduces casualties and therefore increase the length of time citizens are willing to bear a war's costs. Nothing can prevent a leader (like Ludendorff) from using the right tactical doctrine to pursue the wrong strategic ends (or, in his case, launch a large scale offensive without a strategic goal in mind), just as nothing can eliminate the risk of any number of random events that can change a war's course.

Probabilistically, an optimal doctrine gives an army the best chance possible. That is the most an army can realistically strive for as it prepares and fights its nation's wars. From this perspective, just because the optimal doctrine cannot predict who will win or lose a war does not mean it is unimportant. Insofar as CAT theory captures an important reason some armies are better at optimizing than others means it has something to contribute as well.

Modern assault tactics, combined arms and the elastic defense in depth were not the optimal doctrine for all three armies

Chapter four makes the case that the First World War was unique in that all three major combatants faced the same tactical challenge, shared similar political and military objectives, had access to the same basic technologies and therefore should have converged on the same optimal doctrine. However, this interpretation could be wrong if there were

actually multiple optimal doctrines. Although there are multiple potential versions of this argument, it is particularly useful to look at two.

Britain and France were committed to attrition warfare The strongest version of this alternative explanation is that Britain and France adopted a different strategy than Germany. Therefore, modern assault tactics, combined arms, and the elastic defense in depth were not necessarily optimal for them.

There are two problems with such view. The first is that it conflates an operational concept (attrition warfare) with a tactical doctrine (linear formations, methodical fire support and rigid defenses). In a campaign of attrition one side attempts to destroy the opponent's resources while conserving its own. Assault tactics, combined arms and the elastic defense in depth would have still been a better way to achieve this goal.[5] Modern assault tactics reduced exposure to the 'storm of steel.' Combined arms disrupted enemy defenders without giving them time to shift reserves into place, which increase casualties regardless of whether attackers are trying to nibble at the enemy or eat their way through the entire defensive network. And, by definition, the elastic defense in depth shifts soldiers out of vulnerable front line trenches, while increasing the distance attackers have to travel (and are therefore exposed to the storm of steel). Thus, even if Haig, Joffre, and Petain sought to attrite the German army, modern assault tactics, combined arms, and an elastic defense in depth were still the best possible way to fight. The British recognized this fact, and by war's

[5] And all three armies faced significant manpower constraints.

end they had adopted combined arms and were well on their way to mastering modern assault tactics and elastic defenses in depth.

Second, it is unclear that Haig and Joffre really believed in attrition warfare. Certainly, after the war they had every incentive to make it look like the four-year slaughter served a deliberate and necessary strategic purpose. However, their major offensives suggest that they never stopped hoping for a decisive breakthrough. As originally conceived, the planned Somme offensive was not designed to wear down the German army. It was designed to punch through German lines. At Passchendaele Haig clearly sought objectives that suggested he could not decide between wearing down German reserves (i.e. seeking to seize limited objectives like the high ground outside Ypres) and breaking through the entire zone (i.e. seizing Ostend, which would have required a complete penetration of German defenses).[6] In reality, Haig and Joffre fought a war of attrition because they had to; and they had to because they lacked a tactical doctrine that would allow them to penetrate German defenses faster than Germans could plug the holes.

Tanks Another version of this argument is that tanks, not modern assault tactics, combined arms, and elastic defenses in depth, were the key to victory. According to this line of reasoning, the Germans lagged behind the French and the British, failing to adopt a tank until late in the war. The problem with this argument is that it is wrong. As Tim Travers and Jonathan Boff convincingly demonstrate, tanks were not an essential part of the British

[6] Shelford Bidwell and Dominick Graham, *Fire-power: British Army Weapons and Theories of War, 1904-1945* (London ; Boston: Allen & Unwin, 1982); Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916-18* (New Haven: Yale University Press, 1994), 87–89; Paddy Griffith, *The Great War on the Western Front: a Short History* (Barnsley: Pen & Sword Military, 2008), 73–74.

army's success in 1918.[7] Given that French tanks were even less reliable than their British counterparts, and that French industry had problems producing enough of them, it is even less likely the French army relied more heavily on their presence.

In reality, tanks were one piece of combined arms doctrine – and not a necessary one at that. Their value lay in their mobile firepower, which helped substitute for artillery fire, reducing both the need for a long pre-assault bombardment and mobile artillery to follow the infantry into the fight. Yet there were other ways to achieve the same ends, as the German army demonstrated during Ludendorff's spring offensives.

Desperation explains change – the Germans, French and British optimized when defeat loomed

A third alternative explanation is that the threat of defeat caused the three armies to optimize. Put another way, this argument suggests that innovation, adaptation, and emulation are strategies of desperation – a doctrinal Hail Mary pass when nothing else works.

There are a number of obvious problems with this perspective. First, it is also empirically wrong. The Germans may have adopted the elastic defense in depth after suffering particularly brutal casualties during the Verdun and Somme offensives. Yet there is nothing in the historical record to suggest that OHL, Ludendorff, Hindenburg, or the civilian

[7] Jonathan Boff, *Winning and Losing on the Western Front: The British Third Army and the Defeat of Germany in 1918*, Cambridge Military Histories (Cambridge, UK ; New York: Cambridge University Press, 2012); Timothy Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917-1918* (London ; New York: Routledge, 1992).

government seriously thought the German army might collapse in 1917 were it not for the new defensive concept. In fact, many generals opposed the idea of willingly giving up ground. The Germans developed the Hurricane barrage on the Eastern Front against an adversary they eventually knocked out of the war. Even modern assault tactics were not a bid for redemption. Ludendorff launched his March offensive for two reasons: he finally had a viable set of offensive tactics; and he knew he had a small window to exploit his numeric advantage on the Western Front. Neither the offensives nor the tactics on which they were based were a desperate, last minute bid for victory. Ludendorff did not think he would lose the war if he did not mount the attack. Rather, the offensives were a strategic risk, which, ironically, he undertook without thinking about a strategic objective.

British optimization followed a similar pattern. It took the army years to master combined arms and there was no obvious crisis (or crises) which explains all of their disparate origins. The army adopted the elastic defense in depth in late 1917 because Haig knew the German army would launch an offensive in early 1918. Yet the ever-unflappable Haig did not worry that the Germans might penetrate his lines and end the war if he did not implement the new defensive scheme.

In a superficial sense, the French experience at least correlates with the 'desperation' thesis. After all, the army made most of its progress towards the optimal doctrine after the failed Nivelle offensive.[8] Yet even this superficial link falls apart under scrutiny. Petain implemented tactical concepts in which he had long believed. He may have used the army's

[8] If anything, the Nivelle debacle suggests that crisis leads armies to rush into suboptimal doctrines.

desperate situation to press for reforms he had long supported, but the army's desperation did not cause him to seek new solutions.

There is a second problem with the crisis hypothesis: even if it is correct, it only explains the part of the organizational change process. Theoretically, while catastrophes, crises, and defeat might plausibly make an army more receptive to new ideas, it does not explain why the ideas it seizes upon in desperation will be the right ones. Nor does it explain how the army will manage to efficiently translate the idea into practice and transmit it across the entire organization in a coherent way. If anything, the very crisis that engendered innovative thinking ought to also complicate its realization.

Historic encirclement meant Germany – or at least its army – was more receptive to new ideas (or the Germans were naturally innovative)

There are both realist and constructivist versions of this alternative explanation. To briefly explore each in turn:

German strategic culture The constructivist version of this argument posits that Germany's geo-political situation forged a uniquely innovative national strategic culture. There is something superficially attractive about this argument. After all, the German army has a long tradition of innovation. Prussia organized the first general staff. The German army adopted modern assault tactics, combined arms, and the elastic defense in depth before its adversaries. The Wermacht used cardboard tanks to develop many of the operational concepts behind the so-called Blitzkrieg.

As chapter 5 demonstrated, it is also true that the German officer corps thought about war in a fundamentally different way than British and French officers. The latter thought of war as something to be regulated, controlled, and ultimately mastered. In contrast, German officers followed in the Clausewitzian tradition and saw war as inherently chaotic and uncontrollable. The German command system therefore evolved around *Auftragstaktik*, or mission type controls. Since combat defied attempts to control it, the next best option was to give leaders the autonomy and authority they needed to adapt to the situation. Adaptation meant experimentation and new ideas.

Unfortunately, the strategic culture explanation also has an implementation problem: the German state (or army) may have been uniquely creative and innovative, but this characteristic does not explain why or how the German army managed to refine and transmit its innovative ideas across the entire organization. Strategic culture also fails to explain why the German army was better at picking the ideas that - with the benefit of hindsight - we know were right. Innovative and creative problem solving should lead to wrong answers at least as often as they lead to right ones.

More damning to a cultural thesis, the German army did not have a monopoly on innovative thinking. French and British soldiers also came up with new ideas, many of which bore a striking resemblance to German tactical concepts, and many of which were developed at the exact same time that the German army came up with theirs. Captain Laffargue's pamphlet on modern assault doctrine closely mirrored Major Kalsow and Captain Rohr's

early work on storm troop tactics. There is no evidence that they were aware of one another's work. The British and Germans likewise developed predicted firing techniques at roughly the same time. The key difference seems to have been that the German army was more systematic and efficient about generating, capturing, refining, and transmitting new ideas than its competitors. At least this was the case until the British army adopted a moderately decentralized command culture, an assessment mechanism, and a centralized training structure.

International competition The realist version of this counterargument is that Germany's position in the international system forced it to be hyper-rational. Encirclement meant Germany had two options: maintain a decisive military edge, or suffer defeat. The army became good at identifying and implementing best practices because it had no other choice – international anarchy's competitive logic forced it to become an innovation machine.

This argument suffers from the exact opposite gap as the strategic culture variant: Germany's position in the international system explains why it might be more efficient at selecting and implementing, but it does not really explain how it came to generate innovative ideas in the first place. After all, innovation requires experimentation, and experiments involve risk – especially when they are done on the battlefield.

There is another problem with the competition thesis. Although France was not as encircled as Germany, it nonetheless faced a major existential threat: Germany. Nor were France's allies necessarily reliable in a crisis. French leaders doubted how long it would

take Russia to mobilize in a crisis and whether the British would mobilize at all. For these reasons, France faced reasonably strong incentives to develop and adopt best practices. At a bare minimum, if this counterargument were true, then we should expect France – not Britain – to have been right behind the German army in the race to optimize.

Leaders and leadership changes explain most of the doctrinal variation

As chapter 2 discussed, the literature on military change agrees on only a few points. One of them is that leaders matter. Therefore, it is entirely reasonable to expect that leaders drove optimization in the First World War. Again, we see a strong correlation between new leaders and new practices. Ludendorff, Nivelle (for better or for worse) and Petain all managed major tactical reforms after rising to power.

Yet this alternative theory has a problem explaining the British army on the Western Front. Haig was the Commander in Chief from late 1915 until the end of the war. With a few exceptions, even Haig's primary staff remained unchanged for most of the war.[9] In fact, Haig rarely showed much interest in his army's tactical doctrine.[10] Nevertheless, the British army optimized almost as well as its German adversary.

There is also a chronological problem with this counterargument. Ludendorff certainly authorized modern assault tactics, combined arms, and an elastic defense in depth after he assumed command. But he was only able to authorize their implementation because the

[9] Lloyd George managed to remove Haig's chief of staff and chief of intelligence after becoming Prime Minister.
[10] To reiterate a point made in chapter 6 – Haig's diary mentions lunch more often than it does tactics.

German army had worked on them for years. All three were the product of a system, not individuals.[11] CAT theory sheds light on why and how this system functions.

The real challenge facing existing theories on leaders and military change is that they do not tell us a lot about where innovative leaders come from in the first place; where they get their ideas from; why a previously status quo leader might nonetheless advocate change; and the tools at their disposal to help them implement change across a large, unwieldy, and often reluctant organization.

In the final analysis, CAT theory does not try to supplant what we already know about leaders and their role in supporting or undermining military change. Instead, it is designed to give us a more sophisticated way to think about leaders and wartime change. CAT theory explains why and when leaders are most likely to receive new ideas as well when they are most likely to listen to them (i.e. command culture). It answers the under-explored question of how leaders distinguish good ideas from bad ones (assessment mechanisms). And CAT theory sheds light on how a single leader with limited time and energy can nonetheless ensure a new practice is implemented efficiently and effectively (training structures).

[11] Although historians often attempt to ascribe them to one man, e.g. Rohr, Geyer, Hutier, Lossberg, Bruchmuller, and of course Ludendorff.

Regime type, institutional milieu, and access to technology

Finally, there are a series of standard alternative explanations we can reject because of this study's cross comparative design. Regime type did not exert a systematic impact on the three armies. Germany, an authoritarian state (or a hybrid at the very least) optimized. It is true that the two democracies did not adopt fully optimal doctrines, but Britain was not far behind Germany and was certainly ahead of its democratic coalition partner. Even if British and French 'failure' (in a relative sense) appears superficially related to their shared regime type, nothing in the evidence suggests a causal mechanism linking the political system with the tactical outcome.

The same basic argument goes for each country's institutional milieu. Germany and France were both heavily bureaucratized states, their armies were the dominant military branch, and both of their armies relied on short service conscripts / long term reservists for manpower. Nevertheless, the difference in terms of the optimal doctrine was the greatest. Britain was the odd man out in all three areas – it did not share the Continental system of government, its navy long overshadowed its army, and its army drew its manpower from long-term volunteers.[12]

Finally, there were no appreciable differences in each army's access to technology. The Germans started the war with more heavy artillery and adopted the trench mortar more quickly than its adversaries. The British had the first light machine gun and the first

[12] At least until conscription was authorized in 1916.

operational tank. The French had the 75mm QF, which, despite its limitations in the attack, was actually quite effective as a defensive weapon.

Civilian intervention

Civilian intervention presents a more complicated issue. Of the nine wartime commanders in chief (French, Haig, Moltke, Falkenhayn, Ludendorff, Joffre, Nivelle, Petain and Foch)[13] only Petain and Foch faced serious civilian scrutiny. To be sure, Moltke, French, Falkenhayn, Joffre, and Nivelle were all relieved and/or promoted 'upstairs,' but there is no evidence that their civilian superiors actively intervened or overruled the way in which they led their armies before their dismissal. All five were relieved for failing to produce results, or for producing them at too high a cost. Ludendorff is the clear outlier in this regard since there was no one to fire him. He was Germany's de facto dictator by 1917.[14]

However, Petain and Foch had to answer to the Tiger. As chapter 7 described, Clemenceau – and his decision to subordinate Petain to Foch – may have prevented the French army from adopting an elastic defense in depth. He also may have been responsible for pushing the Entente to victory.[15] If anything, in the First World War civilian intervention is a confounding factor that complicates analysis rather than an alternative explanation in its

[13] Technically, Foch was the Allied Commander, not a commander in chief. He only had the power to set broad strategy, although Clemenceau clearly selected him to push the ever reluctant Petain forward into the attack. Also, technically Hindenburg was the commander in chief; Ludendorff was his quartermaster general. However, as chapter 5 pointed out, the German army had a longstanding practice of dual-command. And in this case, the 'bureaucratic professional' in the pair quickly and clearly dominated his aristocratic counterpart.

[14] The fact that Ludendorff faced little to no civilian oversight is also not a good explanation for German optimization. If anything, the fact that Ludendoff had to split his time between the army and running Germany should mean that he had even less time to decisively intervene in doctrinal decisions.

[15] Although Ludendorff's missteps and British tactical prowess played no small role either – Clemenceau could have pushed all he wanted, it was highly unlikely that France could have won the war in 1918 absent these other factors.

own right. It only seems to have seriously affected the outcome for one country (France) and in one area (defensive tactics.) Moreover, there is little systematic evidence that civilian leaders in any other country actively involved themselves in tactical and doctrinal issues.[16]

III. Remaining Issues

The First World War largely validates CAT theory. In turn, CAT theory helps us understand what happened on the Western Front and, more importantly, why it happened. Nevertheless, gaps remain and there are still limits to what a single event can tell us. Two are particularly important.

The perils of prediction

CAT theory tries to explain why some armies are better than others at innovating, adapting, and emulating in war. It starts from the assumption that a gap will always exist between an army's prewar doctrine and the problems it faces when the fighting begins. Unfortunately, this approach leaves a fascinating and important question unanswered: is there always a gap between prewar expectations and wartime realities? And is there anything states or their armies can do to make this gap as small as possible?

This question has particular relevance to the First World War. In fact, one of the enduring puzzles surrounding the war is why all three armies shared a similar doctrinal trajectory

[16] Winston Churchill definitely tried, and he was influential in terms of tank development. However, as this dissertation has tried to argue, there is a tremendous difference between fielding a weapon and figuring out the best way to use it.

before the war. In the late 19th and early 20th century, all three had tactical doctrines that were remarkably close to the doctrines they ended up developing on the Western Front. Then, in the wake of the Boer and Russo-Japanese wars – conflicts that we now take to have been harbingers of modern warfare – all three abandoned their progressive firepower doctrines and reverted to more traditional, shock oriented ones.

It is true that all three armies actively observed and copied one another before the war, so we cannot rule emulation out. At the same time, emulation cannot explain why the first mover (in this case, Germany) 'got it wrong.' The fact that Germany was then the first army to 'get it right' on the Western Front only adds to the puzzle, not least because it suggests a difference between what it takes to predict war and what it takes to respond and conform to it.

Emulation is a poor explanation in any case. The British, French and German officer corps were deeply divided over how to interpret the Boer and Russo-Japanese war and how to modify their respective tactical doctrines in response. All three armies had firepower and shock power advocates. Certainly, to put oneself in the middle of these debates in 1905, 1906, or 1907 is to realize that it was not a foregone conclusion that all three – or any of the three for that matter – would settle on shock power tactics before the war. Whatever else may have happened, these armies were not trying to fight the last war. They genuinely sought to understand the last war so they would be better prepared to fight the next. The problem – and the puzzle – was that all three would have been better off had they not bothered in the first place.

Does the First World War tell us about the world today?

The First World War is an important historical event. It is worth exploring and understanding in its own right. But does it really tell us much about the world – and the wars – armies face today? Are conventional, high-intensity, interstate wars still relevant in the 21st Century? Therefore, in a practical sense, does it matter if CAT theory can explain doctrinal optimization in continental Europe between 1914 and 1918? Can its insights help today's armies wrestle with tomorrow's wars?

These are important questions. Chapter 12 argues that there are a number of reasons to think that the world in 1914 has direct and relevant parallels to the world in 2014. These include the rapid proliferation of exogenous technologies (e.g. technologies developed for civilian use that also have direct military applications); the introduction of transformative technology (e.g. micro-processing, GPS, and the internet); and the relative absence of major interstate conflicts that might suggest how these other two factors might interact when employed on a large scale by peer competitors. Yet, even if the parallels are strong, there are even more reasons that neither the First World War nor CAT theory is directly relevant to the world and the challenges we face today.

For these reasons, Part III introduces shadow cases to test whether CAT theory's insights apply to modern, conventional armies embroiled in unconventional conflicts. Chapter 9 explores what it means to employ an optimal counterinsurgency doctrine. Chapter 10

discusses the U.S. Army in Vietnam, while Chapter 11 does the same with the U.S. Army in Iraq. It is to this final task that the dissertation now turns.

Part III

Counterinsurgency

Chapter 9

The Optimal Counterinsurgency

I. Introduction

Wars, as well as the states and armies that wage them, have changed since 1918. The question is, have these changes been so dramatic that Command, Assessment and Training (CAT) theory no longer helps us understand how armies learn and change? Even if CAT theory does a good job of capturing doctrinal optimization in the First World War, there are clearly important differences between war today and war 100 years ago. Long-range, precision weapons have replaced those of a short-range, indiscriminate nature. Small, professional forces have largely displaced conscript-based armies.[1] Limited wars are more numerous and important, not least because nuclear weapons make Great Power war far more risky. Indeed, many scholars, soldiers, and pundits do believe that war has changed to such a degree that it is time to fundamentally rethink the purpose and utility of military force.[2] In their view, states should worry about cyber war, counterinsurgency, and nation building, not combined arms, conventional wars and Great Power conflict.

So does Command, Assessment and Training (CAT) theory tell us anything about war today? Or is a relic of the past? Can it shed light on doctrinal optimization in limited and unconventional conflicts? Or is it only relevant to wars in the conventional sense? Finally,

[1] The term 'forces' is deliberate, since many states now use joint forces to fight their wars.
[2] For a sample of this literature, see Thomas X. Hammes, "The Evolution of War: The Fourth Generation," *Marine Corps Gazette* 78, no. 9 (1994): 35–44; Martin Van Creveld, *Technology and War: From 2000 B.C. to the Present*, A rev. and expanded ed., 1st Free Press ed (New York : Toronto : New York: Free Press ; Maxwell Macmillan Canada ; Maxwell Macmillan International, 1991); Rupert Smith, *The Utility of Force: The Art of Warfare in the Modern World* (London ; New York: Allen Lane, 2005); Emile Simpson, *War from the Ground up: Twenty-first Century Combat as Politics*, 2013.

does CAT theory capture how 21st century armies change? Or have they grown so complex that CAT theory's simple insights no longer apply?[3]

CAT theory and unconventional warfare

It is beyond this dissertation's scope to address whether or not, let alone the degree to which, war has changed since 1918. Nor is there space to address warfare in all of its modern manifestations. The best this dissertation can hope to do is establish CAT theory's reach by testing it against a set of wars, preferably those that are *least likely* to conform to CAT theory's predictions, and therefore *most likely* to be explained by another theory.[4]

There are perhaps no better *least likely* cases than those involving a conventional army fighting an unconventional adversary. After all, few conflicts deviate further from the First World War's 'model.' The First World War was a total conflict in which Great Powers unleashed their armies in an existential fight where victory had no price and politics had no place. If CAT theory's organizational variables should drive change anywhere, it should be in just such a war. Counterinsurgencies, in stark contrast, are far more limited, pitting conventional armies against unconventional opponents in a situation where victory has a definite price and politics an unambiguous place.

There is another reasons counterinsurgencies are a useful, least likely case for testing CAT theory. We know that conventional armies often find it hard to adjust to unconventional

[3] Peter Miller Dawkins, "The United States Army and the 'Other' War in Vietnam: A Study of the Complexity of Implementing Organizational Change" (Ph.D., Princeton University, 1979), 4.
[4] Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences*, BCSIA Studies in International Security (Cambridge, Mass: MIT Press, 2005), 121–122.

wars. Therefore, history gives us reasons to think the factors and forces that explain how conventional armies adjust to conventional wars do not apply to unconventional conflicts. If they did, then the same armies that are good at optimizing in conventional wars should also be good at optimizing in unconventional ones.

II. Vietnam and Iraq

Therefore, this dissertation concludes by presenting two shadow cases: the U.S. Army in Vietnam (1965 – 1972) and the U.S. Army in Iraq (2003 – 2011). While Part II's methodological goal was to test CAT theory's internal validity, Part III's is less ambitious. It simply tries to probe how well CAT theory generalizes to explain doctrinal optimization beyond conventional, Great Power wars. In other words, the chapters that follow test CAT theory's external validity. As a result, they settle for plausible correlation instead of definite causation.

Ultimately, chapters 10 and 11 find that CAT theory does help us understand how modern, conventional armies optimize to fight unconventional wars. It seems that the challenge of change presents the same basic dilemmas, regardless of context. Armies must still detect gaps in their existing practices, develop a range of new options, test and refine one for implementation, and apply it across the entire organization. Moreover, the same organizational characteristic (e.g. decentralization) that facilitates one part of the task (e.g. generating new ideas) inhibits another (e.g. implementation). In essence, CAT theory highlights an important dilemma that always exists when wartime realities defy prewar expectations.

These shadow cases also help establish sharper theoretical boundaries. As chapter 1 pointed out, there is no reason to expect that CAT theory's variables will always dominate. Organizational change has many sources, and there are conditions under which we should expect CAT theory's variables to operate in the background. Limited wars suggest one situation in which this becomes more likely. Political considerations and strategic limitations can permeate unconventional wars to a much greater degree than is the case in conventional wars. This fact suggests that CAT theory's variables can be 'crowded out', especially when political and strategic realities directly contravene or prohibit the optimal doctrine's core tenets.

Such an outcome is not necessarily exclusive to limited and unconventional wars. As chapter 7 demonstrated, political imperatives meant the elastic defense in depth was not a viable doctrine for the French army. Nor does such an outcome prove that CAT theory is unsound or irrelevant. Indeed, as chapters 1 and 3 argue, we should be surprised if CAT theory's variables always emerge as the most important set of factors. The important result is that they operate in a consistent way, conforming to CAT theory's expectations.

The cases: An overview

Chapter 10 looks at the U.S. Army's experience with counterinsurgency in Vietnam. Of the two cases that comprise Part III, this case is the most important, because it provides a deviant outcome. Indeed, in Vietnam the U.S. Army possessed a moderately decentralized command culture, a sophisticated assessment mechanism, and a centralized command

culture. Although it developed an optimal doctrine by 1968, most Army units persisted in using suboptimal conventional tactics until the conflict's end.

To reiterate: the fact that the Army failed to optimize does not in itself disprove CAT theory. Again, CAT theory makes no pretense that its variables will *always* be the most important. In Vietnam, the U.S. Army found itself on the horns of a strategic dilemma. It had to pacify a nation (in support of a corrupt and ineffective government), fight conventional North Vietnamese forces (alongside questionable South Vietnamese units), while deterring Soviet aggression in Europe. Right or wrong, the Army's leadership focused on the war they feared, shortchanging their ability to implement a better doctrine for the war they did not.[5]

The key point is that CAT theory's variables operated as predicted, even if they were ultimately overruled by strategic considerations. Far from undermining the theory, this case substantiates the prediction that CAT theory's variables exert a consistent influence, even when they are not the most important.

Chapter 11 examines the U.S. Army in Iraq. This case is useful for three reasons. First, because the war was fought under 'modern' conditions, it suggests that CAT theory is relevant to 21st century warfare (at least in an unconventional setting). Second, it demonstrates that when political and strategic imperatives do not prohibit the optimal

[5] Even this statement is not entirely correct. The Army did implement a counterinsurgency doctrine, but its counterinsurgency efforts were miniscule in comparison to its conventional campaign against VPA regulars and the Viet Cong. It was not until late in the war that the Army's counterinsurgency program approached anything resembling parity with its conventional efforts.

doctrine's implementation, CAT theory does represent the dominant explanation.[6] In Iraq the U.S. Army once again possessed a moderately decentralized command culture, an even more effective assessment mechanism than it had in Vietnam, and a highly centralized training structure. [7] And in Iraq the Army implemented an optimal doctrine. It adopted a coherent counterinsurgency doctrine in 2006 (the FM 3-24) and operated according to its precepts as part of the 'Surge' in 2007. Although General David Petraeus' leadership was undoubtedly important to the causal story, no single man – no matter how powerful – could have imposed counterinsurgency on an unwilling organization without help from institutional structures conducive to change. Moreover, as was the case with combined army in the German and British armies, doctrinal optimization was the product of an organization-wide undertaking. Much of it was bottom-up in nature.[8] The search for a hero should not blind us to the institutional factors that made heroism possible in the first place.

Third, when combined with chapter 10, the U.S. Army's experiences in Iraq allow us to control for an important variable thus far omitted from the analysis: culture. While it is possible that the Army's organizational culture changed between Vietnam and Iraq, it is less likely that the overarching 'American' strategic culture also changed.[9] In this way these chapters push back on the standard narrative that portrays the 'American way of war' as a

[6] This is not to suggest that political considerations should not interfere with doctrinal decisions. The point is related to establishing causation.
[7] The latter two variables owed much to the Army's Training and Doctrine Command (TRADOC), created after Vietnam to consolidate doctrinal analysis and training under a single roof – reforms which, ironically enough, were intended to help the Army return to its *conventional* capabilities after Vietnam. As this chapter points out, TRADOC may have been instrumental in preparing the Army for its 1991 Gulf War and 2003 invasion of Iraq, but it was also invaluable in facilitating a rapid reorientation to counterinsurgency.
[8] James A. Russell, "Innovation in War: Counterinsurgency Operations in Anbar and Ninewa Provinces, Iraq, 2005–2007," *Journal of Strategic Studies* 33, no. 4 (2010): 595–624.
[9] If it did, then there are reasons to question whether culture is a useful explanatory variable in its own right, or simply co-varies with the true source of change.

stale, tradition-bound and incapable of adapting to counterinsurgency's realities. In Vietnam, the Army made remarkable strides towards adopting truly optimal counterinsurgency doctrine, its strategic constraints notwithstanding. In Iraq it did optimize. This army neither was content to fight the last war nor obsessed with fighting the next one.

III. The Optimal Counterinsurgency Doctrine

Of course, this entire discussion is predicated on the assumption that an optimal counterinsurgency doctrine exists. While there is less consensus about the elements that constitute an optimal counterinsurgency doctrine,[10] scholars generally agree on at least a few core principles for how counterinsurgencies ought to be waged at the *tactical* level.[11] Although these principles are perhaps too general to facilitate a detailed analysis of the sort chapters 5 through 7 undertook, they suffice to sketch out the basic parameters of an optimal counterinsurgency doctrine for the purposes of a shadow case.

[10] In large part this is because there are subtle differences between a 'classic' Maoist insurgency, such as the one in Vietnam; and the doctrine needed to stamp out the politically diffuse and ideologically incoherent (yet no less deadly) version found in Iraq.

[11] On a general theory of counterinsurgency, see Anthony James Joes, *Resisting Rebellion: The History and Politics of Counterinsurgency* (Lexington, Ky: University Press of Kentucky, 2004), 232; Andrew J. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976* (Washington, DC: Center of Military History, 2006), 484–495. In terms of tactics versus strategic and operational considerations: An 'all of government' approach is clearly essential to waging an effective counterinsurgency at the operational and strategic levels. However, this dissertation is interested in the sources of tactical doctrine and makes no pretense of explaining joint, combined, and inter-agency doctrine. As the U.S. Army and Marine Corps' current doctrine on counterinsurgency succinctly frames the matter: "population security is the first requirement of success in counterinsurgency, but it is not sufficient. Economic development, good governance, and the provision of essential service, all occurring within a matrix of effective operations, must all improve simultaneously and steadily over a long period of time." Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, xix–xx.

In a basic sense, the optimal tactical doctrine for counterinsurgency in Vietnam and Iraq revolved around five highly interrelated principles.[12] To briefly discuss each in turn:

Protect the people

In Vietnam and Iraq the dominant tactical imperative was to shield civilians from insurgent – and American (see below) – violence. This goal stood in stark contrast to conventional wars, in which tactics focused on destroying the opponent's military force. This lesson proved one of the hardest for Army units to learn in both Vietnam and Iraq. The difference between fighting insurgents to protect the people; and fighting insurgents to eliminate them as a viable force; was subtle, but crucial.

There were at least three reasons to focus on population security for its own sake. First, it isolated insurgents. The local population was always the insurgents' most important source of manpower, logistics, and intelligence. To paraphrase Mao's famous dictum, the people are to an insurgent what the water is to fish. Insurgents desperately relied on civilians to support them with supplies, concealment, and information. For their part, insurgents obviously preferred it when locals offered support freely and willingly. Yet they also knew that most civilians sided with neither the insurgency nor the government[13] Violence was therefore a key tool for coercing support when it failed to arrive spontaneously. Protecting

[12] What follows is a synthesis of the following scholarly and military works on counterinsurgency doctrine: Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, chap. Preface & 1; Andrew F Krepinevich, *The Army and Vietnam* (Baltimore: Johns Hopkins University Press, 1986), 10–13; Austin Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006: RAND Counterinsurgency Study–Paper 6*, vol. 200 (Rand Corporation, 2008); Austin Long, United States, and National Defense Research Institute (U.S.), *On "Other War": Lessons from Five Decades of RAND Counterinsurgency Research* (Santa Monica, CA: RAND, National Defense Research Institute, 2006); Joes, *Resisting Rebellion*, chap. 17.
[13] Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, 36.

the people from coercion and retribution was therefore best – and perhaps only – way to cut insurgents off. As the FM 3-24 aptly frames the issue: "it is easier to separate an insurgency from its resources and let it die than to kill every insurgent."[14]

Second, protecting the population assisted in the fight for legitimacy. Ultimately, every insurgency/counterinsurgency struggle turned on whether or not the people saw their government as legitimate. Population security was a necessary but insufficient condition in this fight. Providing security did not win 'hearts and minds' on its own. However, the failure to provide security was a surefire path to illegitimacy. People did not need to read Weber to know that the monopoly over coercive violence is a prerequisite for effective and legitimate governance.[15]

Third, population security set the conditions for civil reconstruction projects. In Iraq and Vietnam it was pointless to defeat insurgents without addressing the social and economic issues that fuel popular dissatisfaction and undercut the government's legitimacy. At the same time, there was no point in redressing social and economic issues while insurgents were free to dismantle and destroy them. In this way population security abetted civil development.

[14] Ibid., 41.
[15] Max Weber, *From Max Weber Essays in Sociology*, trans. H.H. Gerth and C.W. Mills (New York: Oxford Univ. Press, 1981), chap. IV.

Trade exposure for credibility

As is always the case, security is in the eye of the beholder – Iraqis and Vietnamese civilians were only secure when they believed they were secure. American assurances had to be credible to be effective. Credibility, in turn, depended of several factors. First, American soldiers had to actually 'get out' and operate among the people. While this might seem intuitive, it was not.[16] Interacting with locals on a constant basis increased vulnerability, since it usually meant dispersing small, light infantry units among towns and villages. It also meant abandoning the key advantage bestowed by American technological superiority – stand off. It was far easier and, in the absence of doctrinal guidance, far more common for units to operate out of bases built far away from local populations; to rely on air and armor instead of dismounted patrols; and to avoid operating at night. Shifting away from these practices meant American units had to risk higher casualties.

Second, American soldiers needed to develop better cultural awareness than was the case in conventional campaigns. Language, customs and courtesy training were essential in this respect. Such capabilities made American soldiers more tolerable and trustworthy.[17] They also made it easier to communicate, abetting intelligence collection.

[16] Author's personal experience.

[17] American commanders thought that cultural misunderstandings were at least partially responsible for the increase in so-called 'green on green' attacks in Afghanistan during 2012 (in which Afghans turned on their American advisors). To redress the situation, the coalition began distributing a culture guide on American culture to Afghan soldiers. In part, the guide sought to reassure Afghan soldiers that when Americans did certain things (e.g. yelling at a soldier in public; putting their feet on a desk; or patting someone on the backside) it was out of habit and should not be taken as a sign of deep disrespect. Heath Druzin, "Afghans Create 'Western Culture' Manual to Help Counter Insider Attacks," *Stars and Stripes*, September 6, 2012.

Third, American forces had to prove that they were willing to stay put. It was not enough to 'clear' a town or village of insurgents (not least because most insurgents simply went into hiding). American soldiers had to wait the insurgents out in order to gain the peoples' trust. Locals were less likely to cooperate with Army units when they thought the Army would leave before fully dismantling the insurgent network. Otherwise, the people knew the insurgents would simply return when the Americans left, exacting retribution on collaborators. Given that there were never enough soldiers to secure every last population center, the Army usually used an 'ink blot' approach while focusing heavily on training and fielding indigenous security forces.[18]

Use precise and proportional firepower

American firepower was almost as big a threat to civilians as the insurgents. A distasteful euphemism in conventional wars, collateral damage was outright counterproductive in a counterinsurgency. Again, this principle was often difficult for American commanders to accept: it violated the long-enshrined (and not entirely unjustified) norm that American armies should expend material, not men.[19] To avoid alienating (and killing) the very people the counterinsurgency was trying to win over, commanders needed to insist on strict rules of engagement (ROE), refrain from using heavy firepower unless it was absolutely unavoidable, and respond to threats in kind.

[18] The ink blot technique meant clearing and securing and area then moving outward in concentric circles such that the areas already pacified remained protected from returning insurgents. In Vietnam, local security forces included the Regional Forces (RF) and Provisional Forces (PF) (often derisively referred to in the collective as 'ruff-puffs'); in Iraq they included the Iraqi National Guard.

[19] See Russell Frank Weigley, *The American Way of War; a History of United States Military Strategy and Policy*, The Wars of the United States (New York: Macmillan, 1973).

Integrate actions with (and subordinate military actions to) civilian agencies

In conventional wars, military objectives and means overshadow all other considerations.[20] In Vietnam and Iraq military goals and tools had to take a backseat to political, economic, and social goals.[21] Long-term legitimacy depended on a government capable of meeting its peoples' needs. Given the depth of dysfunction within the Iraqi and South Vietnamese governments, much of the burden for providing these services fell to the U.S. Government. Typically, and for good reason, the Army did not possess the expertise and capacity to repair infrastructure, run schools, operate hospitals, and re-establish agriculture. Therefore counterinsurgency demanded a 'whole of government' approach. Tactically (and practically) this requirement meant putting soldiers under civilian command; developing integrated civil-military teams; and diverting resources to support reconstruction and development. [22] Here too, security and military force were necessary but insufficient prerequisites for establishing legitimacy in the pursuit of victory.

Gather intelligence from the people

All wars are intelligence-intensive. The difference between intelligence collection in counterinsurgencies and conventional wars was twofold. First, in conventional wars the military intelligence apparatus (e.g. trained intelligence operatives and analysts coordinated by S-2 and G-2 shops) provided most of the information on enemy forces. The

[20] The hope is that they still serve political ends. But as Clausewitz himself admits, there is a tendency for military means to become their own end.
[21] Or at least cede equal precedence. See Krepinevich, *The Army and Vietnam*, 10.
[22] For a deeper discussion on this topic as it relates to Vietnam see Robert Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam* (Santa Monica, Calif.: Rand Corporation, 1972); James Hubert Embrey, "Reorienting Pacification: The Accelerated Pacification Campaign of 1968" (Ph.D., University of Kentucky, 1997); Dale Andrade and James H. Willbanks, "CORDS/Phoenix: Counterinsurgency Lessons from Vietnam for the Future," *Military Review* 86, no. 2 (2006): 9. On the same in Iraq, see Michael J. McNerney, *Stabilization and Reconstruction in Afghanistan: Are PRTs a Model or a Muddle?*, 2006.

people filled this role in Iraq and Vietnam. Insurgents depended on the local population to conceal and support them. Thus, it stands to reason that no one knew the insurgent groups as well as the people. This fact, in turn, reinforces why it was so important to keep the people safe, to increase the government's legitimacy in their eyes, and to minimize the use of firepower. Second, in conventional wars intelligence assets focused on enemy units in the field. In counterinsurgencies, the focus needed to be on the insurgent's overarching organization, not its front line operatives. Armed with this kind of intelligence, soldiers could focus on dismantling its recruiting and support networks, instead of wasting time and energy killing fighters (who did their best to avoid decisive battle in any case).

The optimal counterinsurgency doctrine
Table 9.1

Component	Description	Purpose Replaced	Requirements
Protect the people	Focus on shielding civilians from insurgent violence, coercion, and retribution	Isolate insurgents from their best source of support; increase government's legitimacy; set conditions for reconstruction	Requires units to expose themselves and to give up conventional firepower advantages. Requires commanders to forego opportunities to destroy insurgent forces
		Focus on destroying insurgent groups in the field	
Trade exposure for credibility	Operate among the people over a sustained period of time; learn culture and language; reduce emphasis on air, armor, and stand-off (i.e. accept reduced force protection for increased credibility)	Make the promise of security credible	Requires domestic support as unnecessarily exposing soldiers to enemy action can be– the counterinsurgency equivalent of an elastic defense in depth
		Heavy emphasis on air, armor, and stand-off to reduce casualties	
Use precise and proportional firepower	Use rules of engagement and the minimum amount of force absolutely needed to neutralize insurgent threats	Reduces risk of pushing moderate, unaligned civilians towards the insurgents	Requires considerable restraint and training among individual soldiers and small unit leaders
		'Never send a man when you can send a bullet'	
Integrate actions with civilian agencies	Prioritize economic, political, and social goals over (or at least on par with) military objectives. May require subordinating military personnel to civilian agencies and diverting military resources to reconstruction projects	Crucial for establishing long-term legitimacy	Requires bureaucracies to work with one another
		Military-centric operations	
Focused intelligence effort	Gather intelligence directly from the population and focus on insurgent organization and infrastructure	Facilitates precise targeting and destruction of insurgent support network	Requires a shift in the standard military intelligence collection paradigm; also requires civilians to trust the military
		Focus on front line units	

IV. Roadmap

The rest of Part III is divided into three chapters. Chapter 10 explores the U.S. Army in Vietnam, focusing on the political and strategic factors that inhibited doctrinal optimization in that conflict. Chapter 11 offers a preliminary look at the U.S. Army's experience in Iraq, a

conflict in which it did implement an optimal counterinsurgency doctrine. Chapter 12 concludes the dissertation, focusing on ways to extend the research agenda and discussing its policy implications.

Chapter 10

The Army in Vietnam: Optimization Overwhelmed

"Solutions to military problems have often been recognized but not implemented because men, with very good reason, are afraid of what would happen if they are wrong. In war the easiest thing is difficult, not because soldiers are stupid, but because they are human and do not regard human life as a resource to be expended as needed."[1]

Counterinsurgency	No

Command culture	Mod. Decentralized
Assessment mechanism	Yes
Training structure	Centralized

I. Introduction

The U.S. Army did not optimize its doctrine during the Vietnam conflict (1965 – 1972). This outcome is puzzling for several reasons. Vietnam was not the Army's first counterinsurgency. Indeed, stretching back to the American Civil War, the Army had a long history of fighting partisans, guerrillas and insurgents.[2] Successive presidential administrations leaned heavily on the Army to improve its counterinsurgency capabilities.[3] Most puzzling of all, the Army had a serviceable counterinsurgency doctrine in place well

[1] Stephen Peter Rosen, "Vietnam and the American Theory of Limited War," International Security 7, no. 2 (1982): 84.

[2] These include operations against fighting partisans during the Civil War; participating in counterinsurgencies in the Philippines and Caribbean during the late 19th and early 20th centuries; subverting Japanese forces during World War II; and advising counter-guerrilla operations in China, the Dominican Republic, Greece, Latin America, Lebanon, and of course, Indochina. Andrew James Birtle, *US Army Counterinsurgency and Contingency Operations Doctrine 1860-1941* (Washington, D.C.: US Army Center of Military History, 1988); Andrew J. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976* (Washington, DC: Center of Military History, 2006), chap. 2,6&7; Austin Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006: RAND Counterinsurgency Study–Paper 6*, vol. 200 (Rand Corporation, 2008), 3.

[3] Admittedly, President Kennedy was far more emphatic than President Johnson, who had a penchant for referring to the pacification campaign as the 'Other War.' Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 226–227; 260–261.

before large numbers of ground combat troops in 1965, and it capably adapted this doctrine to Vietnam's unique circumstances.[4] Nevertheless, from 1965 to 1972 the majority of the Army persisted in fighting as though the war was conventional.

Moreover, the Army failed to optimize despite possessing a moderately decentralized command culture, a sophisticated assessment mechanism, and a centralized training structure. Does such an outcome therefore suggest that CAT theory does not apply to modern armies or unconventional wars? This brief survey of the American experience in Vietnam argues that it does not. Rather, Vietnam was a case in which CAT theory's variables operated as expected, but were overwhelmed by the Army's strategic dilemma. The U.S. Army waged war Vietnam along conventional lines because its leaders perceived that the risks of fighting it the 'right' way (i.e. focusing on counterinsurgency) were greater than the costs of fighting it the 'wrong' way (i.e. focusing on the conventional threat). With hindsight we now *believe* they were wrong. At the time, it is hard to find blame given the very real threat of a major conventional incursion by the People's Army of Vietnam (PAVN) and the overarching need to maintain a credible deterrent against the Soviet Union in Europe. Indeed, as chapter 1 suggests, Vietnam was a case in which the Army's command culture, assessment mechanisms, and training structures operated in a consistent and

[4] Examples include FM 100-5 *Operations* (1954 & 1962); FM 31-15 *Operations against Airborne Attack, Guerrilla Action and Infiltration* (1953); FM 31-16 *Counterguerrilla Operations* (1967); FM 31-20 *Operations against Guerilla Forces* (1951); FM 31-21 *Guerrilla Warfare* (1955 & 1963); FM 31-22 *U.S. Counterinsurgency Forces* (1963); FM 31-73 *Advisor Handbook for Counterinsurgency* (1965); FM 41-10 *Civil Affairs Military Government Operations* (1957); FM 100-1 Ch. 1 *Doctrinal Guidance;* and FM 100-20 *Field Service Regulations, Counterinsurgency* (1964). R. A Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," *Leavenworth Papers* (1979): 25–26; Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 134–252; Walter E. Kretchik, *U.S. Army Doctrine: From the American Revolution to the War on Terror*, Modern War Studies (Lawrence: University Press of Kansas, 2011), 161–185; Robert T. Davis, *Challenge of Adaptation: The U. S. Army in the Aftermath of Conflict, 1953-2000* (DIANE Publishing, 2010), 31–32. For a dissenting view, Andrew F Krepinevich, *The Army and Vietnam* (Baltimore: Johns Hopkins University Press, 1986), 39–41.

predictable way, but were overwhelmed by other, more pressing strategic imperatives. This fact may lessen CAT theory's scope, but not its importance.

II. Political, strategic and operational factors

Although CAT theory only portends to explain wartime optimization, it is important to place the Army's experience in Vietnam within its larger political, strategic, and operational context. For these reasons the discussion will cover both the prewar (1950 – 1964) and wartime (1965 – 1972) periods.

Prewar

Politically, the transition from President Eisenhower's New Look to President Kennedy's Flexible Response was single most important event vis-à-vis the U.S. Army's counterinsurgency doctrine during the prewar period.[5] New Look, and its corresponding emphasis on Massive Retaliation, led the Army to focus on nuclear warfare.[6] The Kennedy administration doubted Massive Retaliation's credibility, especially as a response to Soviet support for revolutionary movements around the world. It wanted the flexibility to tailor a military response proportionate to the threat. Counterinsurgency was therefore one of his top priorities.

[5] For an in depth discussion of both grand strategic doctrines, see John Lewis Gaddis, *Strategies of Containment* (New York; Oxford: Oxford University Press, 2004), chap. 5–8.

[6] Put crudely, Massive Retaliation meant that the United States would counter Soviet aggression with an overwhelming (i.e. nuclear) response. Appalled by America's defense spending, Eisenhower's administration developed Massive Retaliation as a way to maintain America's global power 'on the cheap. The idea was to substitute the threat of nuclear war for the use of ground forces. For a discussion of Massive Response's impact on Army doctrine, see Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," 12–19; Andrew Bacevich, *The Pentomic Era : the US Army Between Korea and Vietnam* (Washington, D.C.: National Defense University Press, 1986); Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 157–158; Kretchik, *U.S. Army Doctrine*, 164–176.

Kennedy's attempts to impose counterinsurgency and Special Forces on the Army are well documented.[7] While Kennedy's generals certainly cannot be accused of racing to embrace his reforms, they did comply.[8] For the first time, the Army's 1962 capstone doctrine, FM 100-5 *Operations* devoted an entire chapter to unconventional warfare.[9] Most of the doctrinal manuals in the FM 31 series were updated and re-released.[10] In 1961 the Army's Continental Army Command (CONARC) directed that counterinsurgency lessons be incorporated into every level of the officer professional education process, and by 1965 all courses dedicated 20 – 27 hours to the subject.[11]

The important point is that Kennedy's directives created a strategic dilemma for the Army.

> The President insisted that it restructure itself without jeopardizing its other missions, including the defense of Europe and Korea. Lacking the time, money, and manpower to create different armies for different types of warfare, the Army favored a more gradual introduction of counterinsurgency than the President was willing to tolerate.[12]

Nor can Kennedy be completely absolved of blame for the Army's emphasis on the military aspects of the Vietnam conflict. When he created the Military Assistance Command, Vietnam (MACV) in 1961, he deliberately put it under a four star general's command. And

[7] For an in depth discussion, see Deborah D. Avant, *Political Institutions and Military Change: Lessons from Peripheral Wars* (Cornell University Press, 1994).
[8] To reiterate, the Army had not completely ignored counterinsurgency long before Kennedy took office. Counterinsurgency had been a part of the Command and General Staff College (CGSC) curriculum since 1948. The Army also relied on officers with extensive insurgency/counterinsurgency experience to write the pre-Kennedy era counterinsurgency doctrinal manuals, including Lieutenant Colonel Russel W. Volckmann and Franz Halder, a former Chief of Staff of the German General Staff during World War II. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 136; 145 & 152.
[9] Kretchik, *U.S. Army Doctrine*, 180–184.
[10] See footnote 25.
[11] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 259–261.
[12] Ibid., 227.

at no point in either his or Johnson's administration did either attempt to create a permanent civilian committee to manage the war effort.[13]

Undoubtedly, there is a cultural argument to be made that American officers ignored and marginalized counterinsurgency because they preferred to fight conventional wars.[14] However, there is an equally strong argument to be made that American military leaders marginalized counterinsurgency because they saw a conventional war against the Soviet forces as both more likely and more dangerous. The assumption that Army leaders ought to have spent far more time and energy developing a capacity for counterinsurgency warfare ignores the perceived threat that the Soviet Union might try to spread American forces thin in order to seek a decisive engagement in Western Europe.

American strategy in Vietnam before 1965 focused on propping up President Diem's increasingly fragile regime.[15] Meanwhile, the Kennedy and Johnson administrations deployed thousands of American advisors to turn Diem's ground forces[16] – the Army of the Republic of Vietnam (ARVN) – into the American Army's doppelganger.[17] Ignoring, or at least neglecting, the growing threat to internal security, American advisors (led by the

[13] Thomas W. Scoville, *Reorganizing for Pacification Support* (Washington, D.C.: Center of Military History United States Army, 1982), 5–7.
[14] Krepinevich, *The Army and Vietnam*; J.A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam: Learning to Eat Soup with a Knife* (Praeger Publishers, 2002).
[15] Between 1955 and 1960 the U.S. sent Diem's regime approximately 2 billion dollars in aid. Approximately 80% of the money went towards Diem's security apparatus. Robert Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam* (Santa Monica, Calif.: Rand Corporation, 1972), 38.
[16] The U.S. had were 900 advisors in South Vietnam when Kennedy took office. By the end of 1962 the number grew to over 10,000. By 1963 the number exceeded 17,000. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 314–316; Gregory A. Daddis, *No Sure Victory:Measuring U.S. Army Effectiveness and Progress in the Vietnam War* (Oxford University Press, 2011), 61–62; George S. Eckhardt, *Command and Control: 1950-1969*, Vietnam Studies (Washigton, D.C.: Department of the Army, 1991), 27.
[17] This and what follows are from Krepinevich, *The Army and Vietnam*, 22–26.

Military Assistance Advisory Group, or MAAG) armed, equipped, and trained the ARVN for conventional battle against the PAVN. For their part, Diem's generals did not want a conventional army.[18] They preferred flexible, light forces for fighting guerrillas. MAAG diverted some resources towards training volunteer PF and RF units. However, efforts to improve South Vietnam's internal security situation were halfhearted at best. Even Special Forces advisors tended to focus on teaching South Vietnamese soldiers how to employ guerrilla tactics, not counter them.

Wartime

The U.S. Army fought under two administrations in Vietnam. President Johnson's administration did an exceptionally poor job of framing its overarching political objectives or the strategy it would employ for their realization. Secretary of Defense McNamara's statement that American "forces will be used however they can be brought to bear most effectively" highlights the absence of a grand strategy under Johnson.[19] For his part, President Nixon pushed for a drawdown in Vietnam after assuming office. Prioritizing Europe and the Middle East, Nixon sought to push responsibility for South Vietnam's security onto the South Vietnamese.[20]

Politically, both administrations placed a number of limitations on the war and its conduct. They

[18] Nor was Diem a complete American puppet. In 1960 he ordered the ARVN to organize anti-guerrilla units. In fact, by this point nearly 60% of South Vietnam's security apparatus were engaged in security and pacification operations. Birtle, US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976, 311.
[19] Krepinevich, The Army and Vietnam, 159.
[20] Kretchik, U.S. Army Doctrine, 193.

> Wanted to keep public opinion quiet in order to keep control over the war and to avoid escalation that might lead to a large conventional or nuclear war. The need to avoid nuclear war was and is unquestionable. It quickly produced, however, a tendency to choose plans that were controllable over plans that would be militarily successful.[21]

Doctrinally, perhaps the most significant limitation was the decision not to activate the Army's sizable reserve force.[22] Short-term conscripts therefore filled the gap. This decision had three major consequences. First, although the army grew in size by nearly 600,000 soldiers between 1965 and 1968, its forces were never sufficient to meet the demands of national security strategy that required it to be prepared to fight two and one-half wars simultaneously. Second, when short-service conscripts were combined with the deployment program of single, 12-month tours, the Army developed an endemic turnover problem. At the war's peak, U.S. based units replaced 120% of their soldiers each year. Units deployed overseas faced a marginally better situation, with only 80% of their personnel leaving each year. Such policies undercut soldiers' ability (and incentive) to understand the culture in which they operated, the adversary they fought, and the population they sought to credibly assure.[23] As John Paul Vann, an Agency for International Development official, aptly pointed out, "The United States has not been in Vietnam for nine years, but for one year nine times."[24] Third, and perhaps most important, conscription helped make the war deeply unpopular, especially in its later years.

Strategically, the Army had to balance its resources between three competing objectives: winning (or at least avoiding defeat) in Vietnam, deterring Soviet aggression in Europe, and

[21] Rosen, "Vietnam and the American Theory of Limited War," 95.
[22] This and what follows are from Suzanne C. Nielsen, An Army Transformed: The US Army's Post-Vietnam Recovery and the Dynamics of Change in Military Organizations, 43 (Strategic Studies Institute, 2010), 35–37.
[23] Krepinevich, The Army and Vietnam, 210.
[24] As quoted in Ibid., 206.

maintaining the status quo in the Korean peninsula. In fact, even at the war's peak, less than one-quarter of the Army's 1.6 million soldiers were fighting in Vietnam.[25] The remaining 1.2 million soldiers were divided between deterrence missions in Europe and Korea; or held in strategic reserve in the Continental United States. Soldiers outside Vietnam had to be prepared to fight on both conventional and nuclear battlefields.

In terms of military strategy within Vietnam, the Army deployed combat forces in 1965 under the assumption that PAVN and National Liberation Front (NLF) forces were preparing for the third phase of a classic Maoist insurgency. [26] In other words, Westmoreland and his generals believed a conventional invasion by the PAVN was the dominant threat.[27]

Their belief was not as outlandish as it may now seem. The North Vietnamese government declared that 1965 would be the war's decisive year and "the beginning of the war's final phase, during which the Army of the Republic of Vietnam was to be destroyed by direct military action."[28] By November 1964 regimental-sized NLF units were massing for conventional attacks on ARVN and government facilities.[29] "When U.S. combat troops arrived in 1965 they faced a situation…in which counterinsurgents were whipsawed by a

[25] Framed differently, only nine of the army's 19 ½ divisions (as of 1968) were assigned to Vietnam. Nielsen, *An Army Transformed*, 35–37.
[26] Briefly, in the first phase revolutionaries organize and establishes base camps. In the second phase, they resort to guerrilla warfare, raiding isolated government outposts for arms and supplies; assassinating government officials; demonstrating government impotence; and demonstrating that their threats are credible to the civilian population. In the third and final phase, guerrilla units coordinate with conventional forces to decisively engage and destroy the government's army in the field.
[27] It is important to point out that MACV was a joint command, not an Army command (although Army generals were always in charge). Because Army forces and officers dominated the ground war (Marine forces were always much smaller) this chapter uses the two concepts (Army versus joint) interchangeably for simplicity's sake.
[28] Eckhardt, *Command and Control: 1950-1969*, 47.
[29] Rosen, "Vietnam and the American Theory of Limited War," 90.

dual guerrilla-conventional threat."[30] There were approximately 58,000 PAVN soldiers (i.e. 'regulars') fighting in South Vietnam in 1966; the number grew to nearly 200,000 by 1968.[31] Even Robert Komer (no apologist for America's strategic choices in Vietnam) admitted that after 1964 the Army had no choice other than to fight simultaneous conventional and unconventional campaigns.[32] The fact that a PAVN division deliberately engaged an American battalion in the Ia Drang valley in November 1965 speaks to how serious the conventional threat really was.[33]

As a result, MACV agreed to a division of labor.[34] Given the belief that the PAVN and large-scale NLF attacks were a more pressing threat than the insurgency, American units focused on conventional fighting. Meanwhile, they handed South Vietnamese forces the counterinsurgency mission.[35] Again, although faulty in hindsight, at the time this division of responsibility made sense. The U.S. Army had a clear comparative advantage in conventional warfare. The South Vietnamese government *wanted* focus on pacification. And it made sense to use Vietnamese soldiers to fight Vietnamese insurgents operating in Vietnamese villages.

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[30] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 361.
[31] Michael Lee Lanning and Dan Cragg, *Inside the VC and the NVA the Real Story of North Vietnam's Armed Forces* (College Station: Texas A&M University Press, 2008), 38.
[32] Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 111.
[33] For an in depth discussion of the Ia Drang battle and its consequences, see Harold G Moore and Galloway, *We Were Soldiers Once-- and Young: Ia Drang, the Battle That Changed the War in Vietnam* (New York: Ballantine Books, 2004).
[34] To be fair, not everyone agreed with this division of labor. Ambassador Maxwell Taylor – a former Chairman of the Joint Chiefs of Staff – wanted to invert the division of labor, sending ARVN forces to fight the PAVN and using American units to secure the population centers. Krepinevich, *The Army and Vietnam*, 140–141; Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 363–364.
[35] Scoville, *Reorganizing for Pacification Support*, 16–17; Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 47.

Of course, even after it became clear that the PAVN and NLF had reverted back to 'phase two' operations (i.e. an ongoing insurgency instead of a decisive, conventional campaign) the Army failed to transition to a counterinsurgency role Indeed,

> It became evident quite early on that the insurgents would stick to their strategy of protracted conflict: drawing U.S. units away from the populated areas to allow continue access to their logistical base (the population); generating U.S. casualties to attrite the will of the United States to continue the war; keeping U.S. forces in remote, static positions when possible… and deploying sufficient NVA [PAVN] forces to entice the Army away from populated areas.[36]

The Army's strategy throughout the rest of the war demonstrated that its leaders failed to fully appreciate the significance of the shift in PAVN/NLF strategy. The Army sought to destroy the NLF's military apparatus, especially its men and material, faster than they could be replaced. [37] Yet the NLF refused to play into the Army's plans. It avoided fighting on American terms, preferring to hit and run instead of standing and fighting. And, at least until the 1968 Tet Offensive, it always managed to replenish its losses, mostly because it obtained most of its support from the South Vietnamese – not the North or Laos as Army planners assumed.[38]

Operationally, the Army fought a conventional campaign. Airmobile operations, search and destroy missions, and artillery raids – all of the Army's dominant approaches were variations on the same theme: use firepower and mobility to destroy the NLF and PAVN military forces.[39] Army operations were not conventional because they ignored unconventional tactics. Indeed, Army units – especially those like Rangers and Special Forces with specialist training – aggressively employed guerrilla tactics against the VN.

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[36] Krepinevich, *The Army and Vietnam*, 165.
[37] Ibid., 179; Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 54.
[38] Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 56.
[39] Kretchik, *U.S. Army Doctrine*, 188–189.

Army operations were conventional because even its unconventional tactics were still directed against NLF military forces, not towards protecting the civilian population. This fact explains how the Army lost a war without ever losing a battle.[40]

III. Dependent variable

Prewar counterinsurgency doctrine

The U.S. Army is often accused of ignoring counterinsurgency before Vietnam.[41] Although rhetorically compelling (perhaps because it creates a parsimonious narrative; or perhaps because it shifts blame for a national failure onto a single organization), this critique is factually incorrect.

> Contrary to arguments that almost all officers wedded themselves to a concept of conventional battle on the European plains, the Army made serious and thoughtful attempts to develop unconventional warfare doctrine that addressed both military and nonmilitary matters. Missing was not an appreciation for balancing political and military action in a counterinsurgency environment.[42]

Indeed, between 1950 and 1965 the Army developed a remarkably sophisticated counterinsurgency doctrine. It was by no means perfect, not least because it was not adapted to Vietnam's unique characteristics. And Army schools and training programs continued, for good reason, to emphasize conventional and nuclear warfare. Yet the Army's prewar counterinsurgency was based on historical experience and endorsed remarkably prescient goals and techniques.

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[40] Robert McNamara, as cited in Errol Morris, *The Fog of War: Eleven Lessons from the Life of Robert S. McNamara*, Documentary, War, 2004.
[41] This is putting it nicely, since the Army is also accused of ignoring counterinsurgency during and after Vietnam as well.
[42] Daddis, *No Sure Victory*, 41–42.

It is not necessary to review all of the relevant prewar manuals in detail, since we know that their precepts were never fully adopted on the battlefield during the Army's early major combat operations.[43] Nevertheless, to at least begin dispelling the myth of the pre-Vietnam Army as tradition bound and reactionary, it is worth briefly assessing how close it came to matching the optimal doctrine.[44]

The Army's capstone doctrines (e.g. the FM 100-5 series) clearly recognized that counterinsurgencies were a political phenomenon and that the dominant task was to isolate insurgents from the people. This task, in turn, meant soldiers had to gain the populations trust.[45] Similarly, other manuals pointed out that trust depended heavily on credibility and staying power – the more civilians worried that American forces would depart before completely eradicating the insurgents, the less likely they were to cooperate. [46] The manuals called for soldiers to stay in the same village or town for as long as possible, since "rotating troops before they had a chance to gain and utilize [local] knowledge would be self-defeating."[47] Counterinsurgency operations were also to be carried out by light infantry forces. Intelligence played a central role in all operations, as

[43] See footnote 25 for a list of the relevant doctrinal manuals.
[44] It is important to see the prewar Army for what it was and not for how its post-war reputation makes it out to have been. To assume that the prewar Army was rigid, tradition bound, inflexible, and fixated on conventional warfare bestows unearned advantages to the argument that the Army failed to adapt in Vietnam because of its cultural lens. If, however, we see that the Army was responsive to its strategic environment and political imperatives – and that it opted for a conventional strategy given a rational analysis of the situation based on the information it had and the constraints/demands it faced – then it opens up the possibility that its strategic and doctrinal decisions in Vietnam were the product of good faith judgment calls. We must remember that rationality does not rule out genuine disagreement, even when faced with the same information.
[45] FM 100-5 (1954) *Operations* Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 146.
[46] FM 33-5 (1954) *Psychological Warfare Operations*, Ibid., 146–147.
[47] FM 31-20 (1951) *Operations against Guerilla Forces*, Ibid., 136.

did unified civil-military action.[48] The biggest gaps in the pre-Vietnam era doctrines were a failure to proscribe firepower's liberal application and the relative absence of specific tactics and techniques that small unit commanders could use.[49]

Thus, by 1965 the Army had an acceptable counterinsurgency doctrine, one that was "broadly accepted by both the civilian and military communities."[50] Nor was this a case where the Army wrote a doctrine to please political directives, only to shove the manuals in a dusty library room.[51] The Army actively trained its soldiers on counterinsurgency principles. Again, while counterinsurgency did not dominate pre-Vietnam training or professional military education – it would have been surprising if it had given the Army's strategic – by the early 1960s counterinsurgency was a regular part of every training program. CGSC incorporated counterinsurgency into its curriculum in 1948; by1960 CGSC students received 33 hours of counterinsurgency instruction.[52] By the mid-1950s all units were required to conduct 1/3rd of their field training at night.[53] In 1958 CGSC even organized a Department of Unconventional Warfare.[54]

The Army redoubled its efforts after President Kennedy, irritated at how slowly all of his security agencies were increasing their counterinsurgency capacities, issued National

[48] FM 31-15 (1953) *Operations against Airborne Attack, Guerrilla Action and Infiltration.* Ibid., 234–236.
[49] In fact, the 1963 FM 31-16 advocated the heavy use of firepower to fight guerrillas. Ibid., 244–245.
[50] Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006*, 200:10.
[51] Nor is it entirely clear that civilian mandates inspired the Army's foundational work on counterinsurgency. After all, the most important and prescient manuals were written at the height of Eisenhower's New Look preference for massive, nuclear retaliation.
[52] The number of hours spent learning about counterinsurgency jumped to 222 by 1969. Daddis, *No Sure Victory*, 54–55; Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 152.
[53] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 156.
[54] Daddis, *No Sure Victory*, 54–55.

Security Action Memorandum 131 in March 1962.[55] CONARC responded by requiring every officer training and education program to contain no less than 20 hours of 'pure' counterinsurgency instruction.[56] CGSC incorporated 42 hours by 1964; the Army War College introduced a three and a half week course on international development in 1963.[57] All new enlisted recruits received eight hours of counterinsurgency in basic training. After November 1962, this introductory training was augmented by the fact CONARC required every combat arms unit spend six weeks on counterinsurgency training each year.[58] While the Army's training was by no means perfect, counterinsurgency was far from ignored. This fact was all the more remarkable given that neither the Army nor its civilian leaders foresaw a need for a large-scale intervention in Vietnam at the time.

Counterinsurgency doctrine as of 1965
Table 10.1

Protect the people	Yes
Trade exposure for credibility	Yes
Precise and proportional firepower	No
Integrated action with civilians	Yes
Focused intelligence	Yes

[55] The memo directed that all officers in the Departments of Defense, State, Aid, and the Central Intelligence Agency receive counterinsurgency training. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 260–261.
[56] As Andrew Krepenivich aptly points out, some training schools played 'loose and fast' with how they defined counterinsurgency in their curricula. Krepinevich, *The Army and Vietnam*, 49–53. One West Pont professor, Brigadier General Richard Stilwell, argued that his English course, which was called the 'Evolution of American Ideals as Reflected in American Literature from 1607 to the Present' counted as counterinsurgency training because it helped cadets understand the American way of life, training he thought invaluable "in working with peoples of underdeveloped nations." As quoted and described by Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 259–260.
[57] The CGSC program was 38 weeks long. Assuming eight hour days, and five day weeks, this means counterinsurgency occupied roughly 1/38^{th,} or 2%, of the overall curriculum. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 265–266.
[58] Ibid., 272.

Wartime counterinsurgency doctrine

The real gap between doctrine and practice emerged after President Johnson ordered the Army to initiate combat operations against the PAVN and NLF. From this point forward, how the Army thought about counterinsurgency; and how units on the ground actually fought; went in different directions.

Official doctrine

On paper, the Army was quick to learn from its experiences on the ground.[59] Within two years it began distributing updated and revised counterinsurgency manuals. In 1967 it released a new FM 31-16 *Counterguerrilla Operations.* 25% longer than its predecessor, the updated manual reinforced core concepts while enumerating practical tactics and techniques.[60] The 1968 FM 100-5 capstone manual emphasized clear and hold operations (vice search and destroy missions); warned units not to rely on heavy firepower; and demonstrated a preference for small unit operations when fighting guerrillas.[61] In February 1968 MACV began issuing a new counterinsurgency manual, the *Handbook for Military Support of Pacification*. Distributed to all units in country, the handbook captured best practices as they had been developed during the previous three years of fighting.

[59] Kretchik, *U.S. Army Doctrine*, 189–190.
[60] Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006*, 200:15.
[61] Ibid., 200:15–17.

Actual practice

The Army did not struggle in Vietnam because it lacked an effective counterinsurgency doctrine. By 1968 its written doctrine espoused all of the elements of an optimal counterinsurgency doctrine, adapted to Vietnam's unique characteristics. The problem was that the Army's senior leaders employed a strategy that marginalized counterinsurgency operations. Especially before 1969 MACV and senior commanders in the field assumed "decisive results could be obtained by strong, mobile exploiting forces fixated on terrain objectives or the enemy."[62] As mentioned, commanders focused on organizing large-scale offensives to locate and destroy NLF and PAVN regular forces. For their part, the NLF and PAVN willingly led American units on a wild goose chase towards the central highlands and away from the heavily populated coastal areas.[63] "In roaming the countryside in search of targets for its unparalleled firepower, the Army ignored the basic requirement of counterinsurgency: a secure population."[64]

The Army's strategic and operational plans drove its tactics, shifting front line commanders away from the Army's sound counterinsurgency doctrine (as well as the population centers where such concepts needed to be employed) and towards air mobility, armor, and firepower. As a result, tactical commanders applied conventional tactics to solve an

[62] Kretchik, *U.S. Army Doctrine*, 188.
[63] As Ambassador Henry Cabot Lodge Jr. aptly framed it in his opening remarks to a meeting between President Johnson and South Vietnamese leaders in 1966, "We can beat up North Vietnamese regiments in the high plateau for the next twenty years and it will not end the war unless we and the Vietnamese are able to build simple but solid political instutions under which proper police can function and a climate can be created in which economic and social revolution, in freedom, are possible." As cited in Scoville, *Reorganizing for Pacification Support*, 23.
[64] Krepinevich, *The Army and Vietnam*, 197.

unconventional problem.[65] Between 1965 and 1973, Army artillerymen fired 20 million artillery rounds. Far too many of these shells were fired blindly as part of absurd 'harassment and interdiction' (H&I) fires - a practice that did more to attrite trees and civilian support than insurgent manpower.[66] Even with helicopter support, large-scale operations required so much preparation that their targets had ample advance warning to escape.[67] Worse yet, the Army failed to develop a tactical intelligence apparatus to identify and target the NLF political, social, economic, and administrative structure. Instead, tactical intelligence officers focused almost exclusively on NLF tactics and its order of battle.[68]

The situation improved after 1968. The Tet Offensive discredited Westmoreland's conventional-centric strategy and hastened General Abrams' arrival.[69] Abrams

> Championed the notion that the conflict in Vietnam should be treated as 'one war,' in which military and pacification operations blended into a seamless tapestry. Consequently, Army units started

[65] For example, in his monograph on innovations in Vietnam, General John Hay describes Operation Irving (2-24 October 1966) as a prime example of counterinsurgency innovation. Yet the operation he describes has nothing in common with the optimal counterinsurgency doctrine. Hay describes heliborne mobility, conventional tactics, artillery raids, and even B-52 strikes. "Massive firepower had decimated the enemy's forces, and his long-secure supply bases had been destroyed… The rapid reaction of U.S. forces allowed the division for the first time to capture more enemy soldiers than it killed [it killed 681 and captured 741]. The success of Operation Irving had lasting effects on the pacification of Binh Dinh Province." John H. Hay, *Tactical and Material Innovations*, Vietnam Studies (Washigton, D.C.: Department of the Army, 1989), chap. 2.
[66] Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006*, 200:12; Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 381–382.
[67] Krepinevich, *The Army and Vietnam*, 56.
[68] Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 59–60. Daddis goes further, arguing that the U.S. Army would have been successful in Vietnam were it not for the lack of reliable, consistent and sound metrics for evaluating counterinsurgency operations. Daddis, *No Sure Victory*. For a critique of Daddis' view, see Rex W. Douglass, "Why Not Divide and Conquer? Targeted Bargaining and Violence in Civil War" (Ph.D., Princeton University, 2012). The CIA-led Operation Phuong Hoang (Phoenix) was an exception to this trend. Lewis Sorley, *A Better War: The Unexamined Victories and Final Tragedy of America's Last Years in Vietnam* (New York: Harcourt Brace & Co., 1999), 66–67.
[69] Ironically, while Tet demonstrated that the NLF were still viable, the offensive cost them so many casualties that it also spelled the beginning of the end of their ability to operate as an independent force. It turned out that the NLF were actually worse at fighting on conventional terms than the Americans were at fighting unconventionally. Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," 39. The next chapter discusses this issue in detail.

> paying greater attention to the type of area security and pacification support missions that had always been central to Army doctrine, but that had been a backseat prior to 1968 due to the threat posed by the enemy's main forces." [70]

Indeed, the Army experimented with, or participated in, a number of innovative projects during this period. These included the Civil Operations and Revolutionary Development Support (CORDS) program, the Hamlet Evaluation System (HES), the Chieu Hoi defector program and the Accelerated Pacification Campaign.[71]

Nevertheless, despite placing greater relative emphasis on counterinsurgency over the conflict's final five years, the Army continued to pour far more resources into its conventional capabilities. Counterinsurgency operations were always a proverbial 'drop in the bucket.' Even at its peak, the highly effective CORDS program involved less than 3% of the half million U.S. soldiers and civilians in Vietnam.[72]

Counterinsurgency doctrine as of 1972
Table 10.2

Protect the people	No
Trade exposure for credibility	No
Precise and proportional firepower	No
Integrated action with civilians	Mixed
Focused intelligence	No

IV. Independent variables

To reiterate, the Army had a moderately decentralized command culture, a sophisticated (if somewhat unwieldy) assessment mechanism, and a centralized training structure before

[70] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 367.
[71] Sorley, *A Better War*, 64–74; Nagl, *Counterinsurgency Lessons from Malaya and Vietnam*, 165–169.
[72] Roughly 16,000 soldiers and civilians were assigned to CORDS. Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 126.

and during Vietnam.[73] CAT theory would therefore predict doctrinal optimization where none occurred. To prove that outside factors overwhelmed the Army's doctrinal system – and that CAT theory's logic still applies even if it did not drive the ultimate outcome – it is important to show that the Army's command culture, assessment mechanism, and training structures operated as CAT theory predicts.

Command culture

Junior officers exercised significant autonomy throughout the conflict. Vietnam's terrain and the nature of the fighting drove much of this. Despite Westmoreland's emphasis on large-scale search and destroy operations, "from the beginning of [his] tenure, small-unit operations vastly outnumbered large-unit operations."[74] Small unit patrols were an omnipresent necessity and an inevitable reality, even during large sweep operations.[75] Nor could commanders above the platoon (and more often the squad) level exercise control. The jungle environment made that impossible, while advanced radio technology facilitated distributed operations. While battalion, brigade, and division commanders retained centralized control over air, intelligence, and fire support assets, all were available on call to junior leaders, especially as they sought to bring firepower to bear on insurgent units.[76] In many respects, by 1969 the infantry company was the primary unit of action in Vietnam.[77]

[73] All three underwent minor modification from 1950 to 1972. This sub-section will highlight those changes where it is appropriate.
[74] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 371.
[75] Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," 31.
[76] Sorley, *A Better War*, 102–103.
[77] Ibid., 30 & 102–103.

Small unit leaders were also eager innovators.[78] Platoons, companies and battalions experimented with different organizational structures, which ultimately led the Army to add a fourth rifle company to light infantry battalions.[79] Units attempted thousands of similar, bottom-up adaptations to weapons, formations, and tactics. Nor did relatively junior commanders hesitate to complain about higher-level strategy and tactics, or to suggest alternatives.[80]

The Army's command culture did deviate from CAT theory's expectations in one way: despite its moderate decentralization, senior field commanders had a striking tendency to ignore, discount, or otherwise dismiss recommendations (and criticisms) from below.[81] Recall that CAT theory predicts that over time, leaders in armies with moderately decentralized command cultures will become *more* receptive to ideas and criticisms from below, not less. Nevertheless, senior Army leaders did not hesitate to whitewash after action reports. For example, following a sweep through the Iron Triangle, the 173rd Airborne Brigade's company and battalion commanders reported that NLF forces avoided contact. Yet in his official after action report, the brigade's commander insisted that the 173rd had "'torn apart' the Iron Triangle and destroyed 'all enemy troops.'"[82] The reasons for this trend are unclear, but may have a lot to do with the Army's excessively short command tours, which might have placed unusually harsh pressure on high ranking officers to get high marks on their performance evaluations.[83] Thankfully, as the next

[78] Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 70.
[79] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 385.
[80] Krepinevich, *The Army and Vietnam*, 171–172.
[81] Ibid., 56.
[82] As recounted in Ibid., 178.
[83] Ibid., 206–207.

section suggests, the Army's doctrinal assessment mechanism did not appear to suffer from similar biases.

Command culture as of 1972
Table 10.3

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

Assessment mechanism

In Vietnam, the U.S. Army also possessed a highly capable assessment mechanism. This capacity largely resided within a single organization – the Combat Developments Command (CDC), organized in 1962. Previously, doctrinal analysis had been an ad hoc affair. When high-level leaders thought the Army needed a new or updated doctrine, they would appoint a school (often CGSC), create a temporary committee, or, as was the case with its early counterinsurgency doctrines, pick a single officer, to write one.[84] However, by the early 1960s this ad hoc system was no longer adequate. Senior leaders were worried that the Army suffered from a doctrine gap as it acquired acquiring new technologies and missions faster than it could write appropriate doctrine.[85]

CDC consolidated doctrinal assessment functions and routinized its procedures. It also had purview over all Army doctrine, from the capstone FM 100-5 manuals to the technical

[84] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 231–232; Krepinevich, *The Army and Vietnam*, 28.
[85] The Kennedy administration's 'Flexible Response' and its corresponding requirement that the Army master unconventional, conventional, and nuclear warfare played a major role in exacerbating this gap. Dennis J. Vetock, *Lessons Learned: A History of US Army Lesson Learning* (Carlisle, PA: US Army Military History Institute, 1988), 93–94; Krepinevich, *The Army and Vietnam*, 38–39.

publications for the various arms and specialties.[86] In short, "under CDC, the Army's doctrine development process came of age."[87] As a result, CDC met all three of CAT theory's requirements to be considered an effective assessment mechanism. Briefly examining each:

Conduits

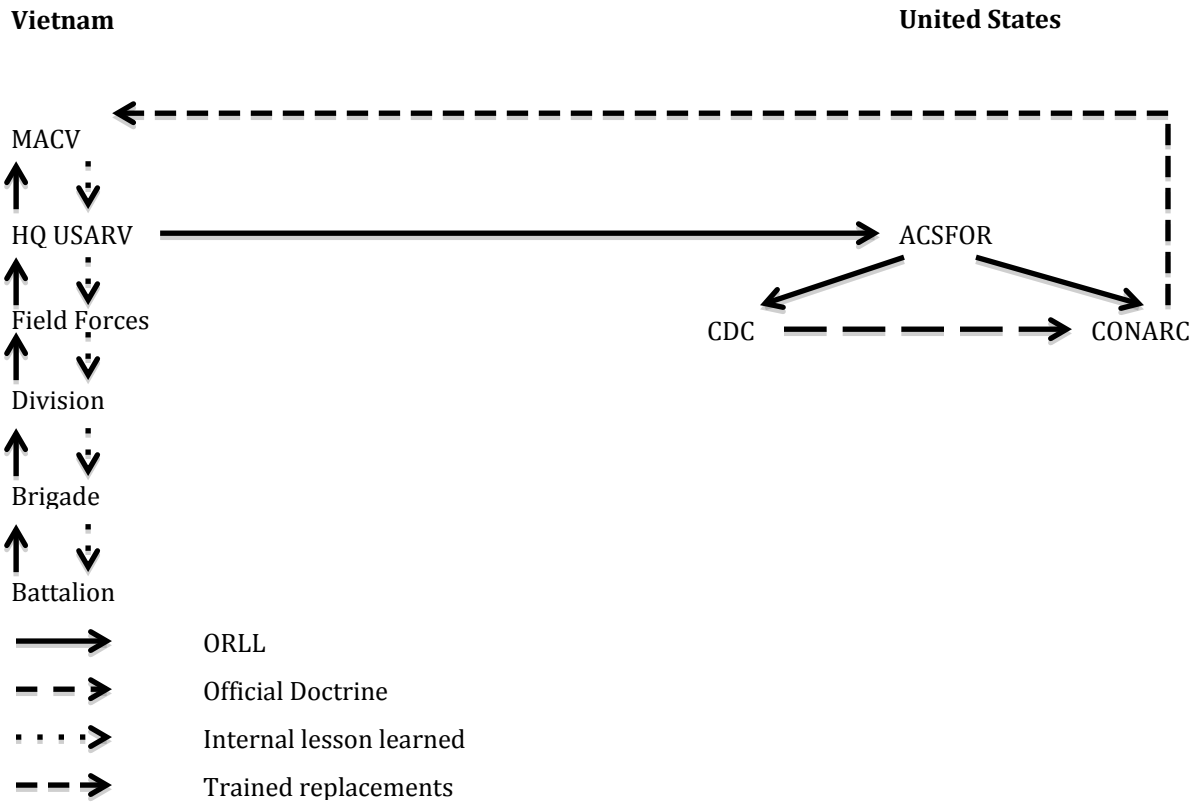
By 1966 CDC collected front line experience directly and indirectly. [88] To acquire direct, firsthand information, CDC established permanent liaison offices in Vietnam. While attaching analysts to front line units was not a new practice in the U.S. Army, Vietnam was the first time such observation was maintained on a permanent basis. "Instead of one-time or periodic visits to the theater of war, the new [CDC] observers served complete tours of duty in Vietnam while assigned to a permanent field office." In this way "they provided a continuous link for the flow of observer-derived information."[89] CDC liaison teams would transmit both data and their personal insights directly to CDC's headquarters in Fort Belvoir for processing.

In terms of indirect liaison, CDC received after action reports from front line units in country. The reporting process was standardized in accordance with Army regulations. Each quarter, every division command and above transmitted an Operational Report –

[86] Although CDC continued to delegate responsibility for actually writing lower-level doctrine to schools (i.e. the armor school would write tank-specific doctrine) it nonetheless coordinated and managed the process to ensure that the various subordinate doctrines were in concert with service-wide doctrine.
[87] Vetock, *Lessons Learned*, 94.
[88] Based on its mandate, one might assume that CDC wrote doctrine for future requirements, not current conflicts. While perhaps true in peacetime, during the Vietnam war "CDC re-oriented an appreciable portion of its resources and effort to Southeast Asia combat operations." Ibid., 97 & 111. CDC also gave the Army's leaders a single point of control over doctrine, which the Army's Chief of Staff used in the war's earliest years to refocus the entire Army on counterinsurgency. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976*, 251–253.
[89] Vetock, *Lessons Learned*, 97&100.

Lessons Learned (ORLL) to the Assistant Chief of Staff for Force Development (ACSFOR).[90] (After 1968, the Army expanded its ORLL requirement to include all battalions and brigades in Vietnam.) ACSFOR supervised both CDC (doctrine) and CONARC (training), and therefore provided both with consolidated ORLLs. CDC analysts would assess reports for useful ideas and information and updated official doctrine as needed.

Reporting Chain, Vietnam[91]
Figure 10.1



As *Figure 10.1* depicts, CDC also maintained permanent links with the Army's training apparatus. Mirroring its practice with front line units, CDC assigned a doctrine

[90] ORLLs were transmitted via the appropriate operational chain of command (e.g. division to field forces) and consolidated at the U.S. Army, Vietnam (USARV), the highest Army level command within MACV (recall that MACV was a joint command). USARV then transmitted the ORLLs to ACSFOR, a department that reported directly to the Army's Chief of Staff.
[91] This figure is a summary of Dennis Vetock's "Vietnam War Lesson-Learning Circuitry" Ibid., 142.

development group at every CONARC training school "to facilitate coordination and communication between the two commands."[92] This seemingly minor point was actually quite important for at least two reasons. First, these liaison offices gave CDC a way to evaluate how well its doctrinal updates were being implemented in the training units. It would have been important for CDC to monitor implementation under 'normal' wartime circumstances. In Vietnam, doctrinal supervision was crucial given that the Army rotated individual soldiers every 12 months, and practice that meant new trainees were constantly arriving. Second, these liaison offices helped CDC maintain a modicum of control over lower level, combat arm specific doctrine. (Recall that CDC delegated lower-level doctrine to CONARC schools.) In practice, this meant CDC had to keep low-level doctrine written at nearly 30 individual schools (themselves spread out across 20 different bases) aligned with high-level doctrine.[93] Without a permanent liaison presence, such an undertaking would have been impossible.

Capacity

The U.S. Army in general, and its CDC in particular, also possessed the analytic capacity to rigorously process, evaluate and the mountains of incoming data. Much of this capacity was based on the Army's newfound passion for operations research and systems analysis (ORSA). Indeed, while the Army may have resisted McNamara's 'Whiz Kids,' it readily

[92] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 231–232.
[93] Charles R. Shrader, *History of Operations Research in the United States Army* (Government Printing Office, 2008), 230–232; Vetock, *Lessons Learned*, 141.

adopted their techniques, creating the Office of the Deputy Undersecretary of the Army for Operations Research (ODUSA[OR]) in 1965 to coordinate ORSA efforts.[94]

As a result, Vietnam was the first conflict in which the Army relied heavily on advanced analytic techniques to assess and develop doctrine.[95] Within the combat theater, ORSA-trained analysts were permanently integrated at the division, force, and MACV levels. [96] Back in the United States, CDC also made extensive use of ORSA-trained analysts to process raw data, develop new techniques, and assess lessons learned.[97] Moreover, the ORSA approach trickled down to front line units, many of which employed ORSA techniques and concepts to test new ideas.[98]

ORSA analysts were highly educated and well prepared for the task at hand.[99] Before 1967 the Army selected 15 officers each year to purse a graduate-level ORSA degree from a civilian university. In March 1967 the Army created an official career path for ORSA specialists, called the ORSA Officer Specialist Program. Ultimately, the Army had 413 slots for ORSA officers, most of who rotated in and out of the specialty to maintain credibility in their traditional (e.g. infantry, armor, signals) specialties. While some senior officers did oppose the idea of allowing officers to specialize in ORSA, an official review "reported that

[94] Shrader, *History of Operations Research in the United States Army*, 81.
[95] The Army used analytic techniques in World War II and Korea to be sure. However, Vietnam was noteworthy for the proliferation of highly trained analysts (both contracted and in uniform) at virtually every level. Vetock, *Lessons Learned*, 91. See also Julian J. Ewell and Ira Augustus Hunt, *Sharpening the Combat Edge: The Use of Analysis to Reinforce Military Judgment* (Washigton, D.C.: Department of the Army, 1974); Shrader, *History of Operations Research in the United States Army*, chap. 1&2. While Secretary of Defense Robert McNamara's Pentagon was notorious for its obsession with operations research and systems analysis (ORSA), McNamara's 'Whiz Kids' rarely brought their analytic firepower to bear on ground tactics and doctrine in Vietnam.
[96] Shrader, *History of Operations Research in the United States Army*, 295.
[97] Ibid., 156.
[98] Ewell and Hunt, *Sharpening the Combat Edge*.
[99] This and what follows are from Shrader, *History of Operations Research in the United States Army*, 124–146.

the program was attractive to outstanding young officers and was already one of the more popular special career programs."[100]

The Army also relied heavily on professional civilian contractors for ORSA support. The war's scope, and the sheer amount of data it produced, meant there simply were not enough qualified Army officers to meet the analytic demand. In 1968, at the war's peak, contractors comprised nearly 80% of the Army's ORSA workforce. While such an arrangement certainly created principal-agent problems (see the discussion of autonomy below) it also meant the Army had a nearly inexhaustible source of highly trained ORSA specialists at its disposal.[101] What the Army lost in terms of direct control it gained in quality.

Autonomy

Establishing the degree to which the Army's doctrinal assessment mechanisms were free from undue influence by high-ranking officers is tricky, not least because of the Army's reputation for white washing and pigeonholing reports that went against 'the company line.' Certainly, as Andrew Krepinevich's anecdote about how the 173rd Airborne Brigade's Commanding General manipulated its after action report following a major search and destroy operation in the Iron Triangle, such a reputation was not entirely unearned. Nor is it possible to accurately estimate the degree to which career incentives and pressures

[100] Ibid., 146.
[101] RAND, Littleton Systems, and Booz Allen were three major providers of ORSA contractors.

caused officers at every level to make their reports conform to their superior's expectations.[102]

Nonetheless, in terms of doctrinal optimization, how an organization *systematically* processes information matters a great deal more than one-off anecdotes, no matter how reprehensible. It is telling that in his study of the U.S. Army's lessons learned process, Dennis Vetock considers the 173rd Airborne Brigade one of the best units in terms of deliberate assessment, sober analysis, and a willingness to learn from experience.[103] The key, as Vetock points out, is that the 173rd Brigade's system was larger than any single soldier or commander. Indeed, because of the Army's rotation policy, the brigade's experienced four complete turnovers in personnel and staff during its six year stay in Vietnam.[104] Again, as CAT theory predicts, it was the system that mattered.

The degree to which outside contractors assisted with tactical and doctrinal analysis also must have established and maintained a degree of autonomy that might not have existed if the Army managed all of its analysis 'in house.' Moreover, the generals in charge of fighting the war (e.g. those at MACV) controlled neither doctrine nor CDC's integrated analysts. To be sure, there is no way to dispute that the ORLLs may have been tainted by command influence, since these came to CDC via multiple levels of operational commanders (e.g. battalion, brigade, and division) and were ultimately processed by USARV, itself subject to

[102] Komer, *Bureaucracy Does Its Thing: Institutional Constraints on U.S.-GVN Performance in Vietnam*, 69–70.
[103] Vetock, *Lessons Learned*, 106–107.
[104] Ibid., 106.

MACV control. Nonetheless, CDC still had direct access to – and control over – the analysts embedded with front line units in Vietnam.

Perhaps the most compelling evidence to support the contention that the Army's doctrinal assessment mechanism retained autonomy is the fact that it produced many of the Army's most important counterinsurgency innovations; and that many of these innovations were implemented despite rejecting status quo practices. The Army Combat Operations (ARCOV) and Evaluation of United States Army Mechanized and Armor Combat Operations in Vietnam (MARCOV) studies (completed in 1966 and 1967, respectively) were two premier examples of this. "Both studies involved extensive-in country data collection and analysis by a mixed team of military personnel and ORSA analysts." [105] Both were organized under CDC's auspices.[106] And both produced findings that were implemented in doctrine and in practice despite running against current practice. For example, the ARCOV study called on CDC to do a better job of incorporating lessons learned from front line units into official doctrine; encouraged infantry commanders to keep small units foot mobile instead of relying so heavily on armor and air for transportation; called for infantry battalions to add a fourth company; and recommended the use of tactical areas of operations to assist with command and control. Less than ten months after ARCOV began its studies, CDC evaluated an endorsed all of its main findings, and the Army's Chief of Staff directed their implementation.[107]

[105] This and what follows are from Shrader, *History of Operations Research in the United States Army*, 304–309.
[106] Specifically, the CDC's Combat Operations Research Group, or CORG.
[107] Nor should we make MACV out to be the 'bad guy.' In fact, MACV sponsored studies were integral to the rural pacification program, the remote sensor program, and for limiting the use of harassment and interdiction (H&I) fires. Shrader, *History of Operations Research in the United States Army*, 311. Regarding H&I fires, a MACV study argued that cumulatively all H&I missions in 1966 killed 100 NLF and PAVN soldiers. In return, based on a

Weaknesses

The foregoing discussion was designed to counter the popular narrative about how Army leaders viewed analytics in Vietnam, and to argue that the Vietnam-era Army possessed a doctrinal assessment mechanism according to CAT theory's standards. None of this is to argue that the system was flawless. Indeed, there were at least four major problems with how the Army analyzed lessons learned.

First, the Army lacked good metrics to measures strategic and tactical effectiveness in a counterinsurgency.[108] Instead, commanders at every level tended to focus on the things that they could measure, including territory cleared, weapons seized, and, most infamously, soldiers killed. The wrong measures inevitably slowed progress towards the optimal doctrine. As Gregory Daddis aptly summarizes the problem, "Senior officers thus had no way of accurately assessing their level of success in counterinsurgency operations… consequently, MACV – and much of DoD – went about measuring everything and, in a real sense, measured nothing."[109]

Second, the U.S. government lacked a national counterinsurgency doctrine around which the Army could build and integrate its service-specific doctrine.[110] Again, in many respects

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standard dud rate, Army artillerymen left 27,000 tons of unexploded ordnance in the jungle for insurgents to use as improvised explosive devices against American personnel. Vetock, *Lessons Learned*, 96.

[108] Daddis, *No Sure Victory*, 31–35; S. S Gartner, *Strategic Assessment in War* (Yale Univ Pr, 1999), chap. 5.

[109] Daddis, *No Sure Victory*, 32.

[110] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 239.

America's failure in Vietnam went far beyond what the Army did and did not do, given that counterinsurgency, by its nature, requires an all-of-government approach.

Third, the doctrinal assessment system quickly grew unmanageable.[111] CDCs practice of delegating lower-level doctrine writing to individual schools became a source of friction vis-à-vis counterinsurgency. After all, counterinsurgency cut across multiple specialties (e.g. infantry, special warfare, armor, air, and civil affairs, just to name a few). This practice therefore led to doctrine that was stovepiped when it needed to cut across traditional boundaries.[112]

Finally, the emphasis on ORSA created an "insatiable demand for more and more data," (which, to reiterate, was rarely a good indictor of progress in a counterinsurgency in any case).[113] Front line units responded to their incentives, quickly burying CDC in data. Between March and May 1967, "CDC reviewed 218 ORLLs and separate Combat After Action Reports, of which 93 individual lessons required direct action or warranted further study," a pace of operations that remained unabated until the early 1970s.[114]

Assessment mechanism as of 1972
Table 10.4

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

[111] Ibid., 422–423.
[112] Birtle, *US Army Counterinsurgency and Contingency Operations Doctrine 1860-1941*, 251.
[113] Shrader, *History of Operations Research in the United States Army*, 77.
[114] Vetock, *Lessons Learned*, 111.

Training structure

The U.S. Army possessed a highly centralized training structure during the Vietnam War. From 1955 until 1973, a single, high-level unit – the Continental Army Command (CONARC) – exercised control over all of the Army's entry level, individual, and unit training, to include its professional military education schools.[115] CONARC was therefore the single conduit by which new soldiers learned the Army's counterinsurgency practices; career soldiers studied counterinsurgency doctrine; and units trained for counterinsurgency operations. And CONARC mandated counterinsurgency training for personnel and units across the Army. By 1969 all CGSC students received 222 hours of counterinsurgency education.[116] Starting in 1965 the Army War College ran a five-week course on economic development for senior officers.[117] Every new recruit – officer an enlisted – received mandatory counterinsurgency training. Even units in Europe and the United States were required to set aside time for counterinsurgency training each year.[118]

Training structure as of 1972
Table 10.5

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites	X	

[115] Benjamin King, *Victory Starts Here: A 35-year History of the US Army Training and Doctrine Command* (Combat Studies Institute Press, US Army Combined Arms Center, 2008), 1; Krepinevich, *The Army and Vietnam*, 28. Before CDC's creation in 1962, CONARC retained control over both doctrine and training. The two functions were separated from 1962 to the creation of Training and Doctrine Command in 1973 (TRADOC).
[116] Daddis, *No Sure Victory*, 55.
[117] Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, 266.
[118] Krepinevich critically notes that counterinsurgency training took up less than 12% of these units' overall training schedule. The problem with this critique is the fact that these units were also tasked with being prepared to meet contingencies outside Vietnam, to include conventional operations against the Soviet Union in Europe. SeeKrepinevich, *The Army and Vietnam*, 111–112.

V. The Army in Vietnam: A summary

In the final analysis, CAT theory predicts that the U.S. Army should have optimized its doctrine in Vietnam. It did not. However, as this brief analysis of the Army's experience in Vietnam has attempted to argue, the Army's failure to optimize circumscribes CAT theory's boundaries without undermining its validity outright. The theory's variables worked as expected. Front line units experimented with new ideas. CDC collected these inputs in a variety of ways; assessed them; and incorporated them into doctrinal updates. CONARC transmitted new counterinsurgency doctrine to soldiers at every level.

Doctrinal optimization failed because senior civilian and military officials intentionally decided to wage a conventional campaign. Facing multiple, competing strategic demands (the Soviets in Europe, the PAVN, and the NLF) the Army's leaders believed it was riskier to wage a true counterinsurgency campaign than it was to focus on conventional operations in the hope that U.S. soldiers could continue to deter the Soviet Union, decimate PAVN units operating in South Vietnam, and still mitigate against the insurgency. With hindsight we now know their approach was wrong. Yet we do not know that the alternative – a focused counterinsurgency campaign – would have been better. Indeed, a true counterinsurgency campaign may have led to even higher casualties, depressing popular support for an already unpopular war.[119] Moreover, we cannot know what the PAVN might have done if presented with the opportunity to square off against an American Army spread thinly throughout the country. It could simply be the case that the U.S. did not lose Vietnam;

[119] Doughty, "The Evolution of US Army Tactical Doctrine, 1946-1976," 39.

rather, the North Vietnamese won.[120] Indeed, they may have had the U.S. on the horns of a strategic dilemma the moment President Johnson decided to commit ground combat forces.

The point is not that the Army should not have adopted a counterinsurgency doctrine earlier in the war. It is simply that the decision was not nearly as clear as it might now seem with the benefit of hindsight. Strategic imperatives created constraints that CAT theory's variables could not have possibly overcome. That the Army's command culture, assessment mechanism, and training structure operated as expected is evidence enough of the theory's validity. That the Army nevertheless failed to optimize suggests an important set of boundaries – conditions under which we can expect command culture, assessment mechanisms, and training structures to operate in the background. As chapter 11 suggests, the U.S. Army's experiences in Iraq show that under different strategic conditions CAT theory can still offer a dominant explanation for why and when doctrinal optimization will occur in a counterinsurgency campaign.

[120] Lanning and Cragg, *Inside the VC and the NVA the Real Story of North Vietnam's Armed Forces*, xiii.

Chapter 11

The Army in Iraq: Counterinsurgency Revisited

"The American Army of 2003 was organized, designed, trained, and equipped to defeat another conventional army; indeed, it had no peer in that arena. It was, however, unprepared for an enemy who understood that it could not hope to defeat the U.S. Army on a conventional battlefield, and who therefore chose to wage war against America from the shadows."[1]

Counterinsurgency	Yes

Command culture	Mod. Decentralized
Assessment mechanism	Yes
Training structure	Centralized

I. Introduction

The U.S. Army's experience in Iraq (2003 – 2011) provides a striking counterpoint to Vietnam. Once again, the Army possessed a moderately decentralized command culture, a robust doctrinal assessment mechanism, and a highly centralized training structure. Once again, it found itself battling an unexpectedly resilient insurgency. However, the outcome was vastly different this time around – at least in terms of doctrinal optimization. Although the Army invaded Iraq ill prepared to battle an insurgency, in less than four years it developed a capstone doctrine, the FM 3-24, and implemented its core tenets as part of the 2007 'Surge.' While America's overarching campaign in Iraq may not have yielded the intended results, it was most certainly not because its Army ignored counterinsurgency.

[1] John Nagl, "The Evolution and Importance of Army/Marine Corps Field Manual 3-24, *Counterinsurgency*," as quoted in James F. Amos and David H. Petraeus, *Counterinsurgency Field Manual FM 3-24* (Chicago, IL: University of Chicago Press, 2007), xiv.

Thus, Secretary Rumsfeld's pithy explanation for why the Iraqi insurgency caught the Army off-guard was only half right. The United States did go to war with the Army it had. The larger, and ultimately more important truth, was that the Army the United States had possessed the capability to transform itself into the Army the United States needed.

A methodological caveat

Two methodological comments are necessary before assessing the U.S. Army's experience in Iraq. First, reiterating a point discussed at some length in chapter 9, this case is designed to probe how well Command, Assessment, and Training (CAT) theory explains doctrinal optimization under modern, unconventional conditions. In other words, it is a shadow case, not an in depth causal test.

Second, there is an inherent limit to what we actually know about the U.S. Army's experience in Iraq. The United States withdrew its last combat troops in December 2011, less than two years ago (as of the time this dissertation was written). An official history does not yet exist; countless documents remain classified; and rigorous scholarship on the subject is just now emerging. It will be years, if not decades, before anything resembling a complete picture emerges.

Nevertheless, neither of these limitations undercut the sound reasons for taking a cursory look at the Army in Iraq. They suggest a need to draw tentative conclusions rather than a reason to avoid the case altogether. Moreover, there is at least one methodologically sound justification for looking at this case: the U.S. Army's experience in Iraq is another least

likely case for optimization.[2] The Army planned for a lightening quick, conventional war. Expecting a grass-roots democracy to take immediate hold, it lacked a plan to stabilize Iraq after toppling Saddam Hussein's regime.[3] The U.S. Army also had a long history of rejecting, or at least marginalizing, counterinsurgency.[4] Indeed, for most of its post-Vietnam history the Army explicitly did its best to focus on its conventional capabilities.[5] Skeptics, both inside and outside the Army, believed the new doctrine would work; or, for strategic and political reasons, that the Army should not implement it even if it did.[6] For all of these reasons, even preliminary evidence that CAT theory's variables operated as expected – and indeed, that they may have emerged dominant – is strongly suggestive.

A policy imperative is also at play. The United States government anticipates defending against conventional and unconventional threats for the foreseeable future.[7] It is important, especially in the context of a project that seeks to understand why and how military organizations respond to new challenges and unforeseen circumstances, to begin

[2] Ibid., xv – xvi.
[3] James A. Russell, "Innovation in War: Counterinsurgency Operations in Anbar and Ninewa Provinces, Iraq, 2005–2007," *Journal of Strategic Studies* 33, no. 4 (2010): 1–2.
[4] Austin Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006: RAND Counterinsurgency Study–Paper 6*, vol. 200 (Rand Corporation, 2008). For a compelling counterpoint, see Andrew James Birtle, *US Army Counterinsurgency and Contingency Operations Doctrine 1860-1941* (Washington, D.C.: US Army Center of Military History, 1988); Andrew J. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976* (Washington, DC: Center of Military History, 2006).
[5] Walter E. Kretchik, *U.S. Army Doctrine: From the American Revolution to the War on Terror*, Modern War Studies (Lawrence: University Press of Kansas, 2011), chap. 5; John L. Romjue, *American Army Doctrine for the Post-Cold War* (DIANE Publishing, 1998); John L. Romjue, *From Active Defense to Airland Battle: The Development of Army Doctrine, 1973-1982* (Historical Office, US Army Training and Doctrine Command Fort Monroe, VA, 1984).
[6] The concern was that embracing counterinsurgency would hurt the Army's conventional abilities. See, for example, Gian P. Gentile, "Let's Build an Army to Win All Wars," *Joint Forces Quarterly* no. 52 (Quarter 2009): 27–33.
[7] "National Security Strategy 2010," May 2010.

unpacking what happened in the United States' most recent counterinsurgency.[8] The Army will need to change again, whether or not we fully understand what can be done to give it assistance.

II. Political, strategic and operational factors

The Iraq-era Army's political and strategic milieu appears to have neither impeded nor facilitated doctrinal optimization. To validate this claim it is necessary to briefly explore both factors as they evolved across the war's three distinct phases: the war's lead-up and early 'Phase IV' operations (spring 2003); the period in which the insurgency gained momentum (2003 – 2006); and the point at which the insurgency devolved into virtual civil war, provoking the Army-led 'Surge' around Baghdad.

2003

Politically, the Bush Administration offered three main justifications for invading Iraq: to punish Saddam Hussein's regime for violating United Nations prohibitions against acquiring weapons of mass destruction; to sever its links with international terrorists; and to eliminate a regional despot in the hopes that regime change might foster democracy's spread.[9] These justifications in no way precluded the Army from developing a counterinsurgency capacity. In fact, if anything the need to foster regime change ought to have at least encouraged the Army to dust-off its counterinsurgency playbook. Similarly,

[8] It is more accurate to say the most recently concluded counterinsurgency campaign. The U.S. counterinsurgency in Afghanistan (2001 – present) is ongoing as of the time this was written.
[9] This and what follows are from Richard W. Stewart, ed., *American Military History: The United States Army in a Global Era, 1917 - 2008*, vol. II, Army Historical Series (Washington, D.C.: Center of Military History, 2010), 480–481.

the fact that the Bush Administration telegraphed its intentions long before the invasion gave the Army ample time to do so.[10] However, these incentives operated on the periphery. There was no concerted effort within the Administration to force counterinsurgency on the Army prior to the war.

Strategically, the Bush Administration sought to decapitate Saddam's regime by means of a quick and surgical invasion that would leave Iraq and its infrastructure largely intact. Civilian policy makers and senior military planners hoped that such a precise use of force would therefore eliminate the need for a large and sustained military presence.[11]

The biggest divide between soldiers and statesmen existed at the operational level of war. Based on his attempts to transform the Army and his belief that 2001's invasion of Afghanistan represented a new model of war, Secretary Rumsfeld sought to keep Operation Iraqi Freedom (OIF) 'light.' The Army's leaders disagreed, preferring a heavier (and larger) footprint as well as a more deliberate pace.[12] The important point is that while the Army and Secretary Rumsfeld may have quarreled on the margins, in the main both sets of operational plans were conventional in nature.[13] Thus, here too the Army faced no pressure to prepare for anything other than the kind of war it wanted.

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[10] The author, a junior Marine officer during this period, became aware of the military plans for an invasion in the early spring of 2002.
[11] Kretchik, *U.S. Army Doctrine*, 260.
[12] Clearly, OIF was both a joint and combined operation – even within the ground force component. For simplicity's sake; because this chapter focuses on the Army's experiences with optimization; and because Army personnel formed the outright majority of all ground forces in Iraq; this chapter uses the term Army in lieu of combined and joint ground forces.
[13] Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:481–482; Kretchik, *U.S. Army Doctrine*, 258; Michael R. Gordon and Bernard E. Trainor, *Cobra II: The Inside Story of the Invasion and Occupation of Iraq* (Random House LLC, 2006), chap. 1–3. It is important not to take this point too far. The Army and Secretary Rumsfeld did not see eye-to-eye, as the Army preferred a much larger invasion force and a more

2003 – 2006

The invasion was a resounding success. Army and Marine units quickly converged on Baghdad, toppling Saddam and most of his statues in under a month. It was the aftermath that became the problem. Post-invasion turmoil, especially in Iraq's major cities, quickly overwhelmed the Army's ability to contain it.[14] More insidiously, the chaos obscured a nascent insurgency. If there was a point in the war when political factors might have decisively affected the Army's ability to respond doctrinally, it was during the insurgency's earliest phases. Civilian leaders blamed listless criminals and Ba'athist reactionaries for the violence. Most "Department of Defense (DOD) civilians and some coalition leaders denied that an insurgency existed. Among those who recognized the unfolding violence as an insurgency, few believed that it was sustainable."[15]

Strategically, the Bush Administration abandoned its prewar plans for a brief reconstruction effort and instead placed its hopes in a transitional authority led by L. Paul Bremer and his Coalition Provisional Authority (CPA).[16] Unfortunately, this decision

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deliberate pace to eliminate pockets of resistance and to secure lines of communication. The argument here is that the Army and its civilian leader both advocated a conventional campaign that played to the Army's strengths, even if their respective visions diverged on the details.

[14] Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:494.Indeed, in what is now the war's most famous dead horse, the Army lacked a plan for Phase IV operations. Gordon and Trainor, *Cobra II*, chap. 8. Perhaps the more important point is that even had Army planners developed a better concept of operations for Phase IV, the Army's "keystone doctrine offered little in how to counter [an insurgency] given Iraq's unique circumstances…although FM 3-0 had stressed protecting the people from insurgents, in the Iraq case neither the host government nor its various forces were capable of countermining an insurgency. The manual had not anticipated such a circumstance." Kretchik, *U.S. Army Doctrine*, 261.

[15] Kretchik, *U.S. Army Doctrine*, 261.

[16] Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:495.

empowered Bremer's disastrous double-decision to disband the Iraqi Army and ban Ba'athists from holding public jobs.[17]

Operationally, the Army's senior command at the time, Combined Joint Task Force 7 (CJTF 7), ordered units to mount offensive operations "to defeat remaining noncompliant forces and neutralize destabilizing influences in the AO [area of operations]."[18] Thus, much as it had in Vietnam, the Army opted to use conventional means to defeat an unconventional foe. From 2003 to 2005, the overwhelming majority of Army operations were focused on killing or capturing insurgents. Only about 6% were designed to protect the Iraqi people.[19] As Ahmed Hashim describes it, "the U.S. military's response to the insurgency [was] uniformly muscular, its weapon of choice the blunt military instrument… the Poles have taken to calling it the 'baseball bat' strategy."[20] An American colonel put it more bluntly: "If I were treated like this, I'd be a terrorist!"[21]

Whatever its ostensible justifications, such an approach did little to stem the violence. Attacks on coalition troops and government forces increased despite a string of battlefield successes, including Saddam's capture in December 2003, Moqtada al-Sadr's defeat in An Najaf in mid-2004, and Fallujah's virtual eradication in November of the same year. Nor did political breakthroughs slow the insurgency's momentum. Violence increased unabated,

[17] Ibid.
[18] As quoted in Kretchik, *U.S. Army Doctrine*, 262.
[19] Brigadier Nigel Aylwin-Foster and British Army, "Counterinsurgency Operations," *Military Review* (2005): 5.
[20] Ahmed Hashim, *Insurgency and Counter-insurgency in Iraq* (Cornell University Press, 2005), 325.
[21] As quoted in Aylwin-Foster and Army, "Counterinsurgency Operations," 3.

even after the CPA ceded control to an interim Iraqi government in June 2004 and the first Iraqi elections in January 2005.

2006 – 2011

The war's true turning point occurred when Sunni insurgents bombed the Golden Mosque in February 2006.[22] Pushed over the brink (which is what Sunni insurgents hoped their bombing was would do) Shi'ite militias began exterminating their rivals (which was more than the Sunni insurgents had bargained for). As a result, Iraq began unraveling into civil war.[23]

Politically, the Bush Administration responded by authorizing the deployment of 30,000 additional troops around Baghdad (the so-called 'Surge') as part of a larger civil-military plan dubbed 'The New Way Forward in Iraq.'[24] The President also put General David Petraeus, one of the Army's leading advocates for counterinsurgency reform, in charge of implementing the military component of this new strategy.[25] Operationally, General Petraeus ordered his forces to implement the counterinsurgency doctrine he helped author a year earlier, the FM 3-24. Accordingly, Army units shifted from a conventional, kinetic-based approach that emphasized "large, fortified bases, mounted patrols and transition to Iraqi security forces," to a true counterinsurgency program based on "smaller, dispersed

[22] Stephen Biddle, Jeffrey A. Friedman, and Jacob N. Shapiro, "Testing the Surge: Why Did Violence Decline in Iraq in 2007?," *International Security* 37, no. 1 (2012): 15.
[23] Stewart, *American Military History: The United States Army in a Global Era*, *1917 - 2008*, II:503.
[24] Office of the Press Secretary, "Fact Sheet: The New Way Forward in Iraq" (The White House, January 10, 2007), http://georgewbush-whitehouse.archives.gov/news/releases/2007/01/20070110-3.html.
[25] It is important to point out that General Petraeus was not the Surge's chief architect, although he is now virtually synonymous with the plan. Stewart, *American Military History: The United States Army in a Global Era*, *1917 - 2008*, II:506.

bases, dismounted patrolling, and direct provision of U.S. security for threatened Iraqi civilians."[26] In essence, the Army implemented an optimal counterinsurgency doctrine – a move credited by many for pulling Iraq back from the brink and its remarkably improved security situation.[27]

Again, the key point is that neither political nor strategic factors decisively affected doctrinal optimization.[28] Although the Bush Administration's prevailed in terms of deploying a lighter invasion force than many Army generals might have preferred, there is nothing to suggest that this decision prevented the Army from focusing on counterinsurgency and nation building in the war's run-up. While the two sides may have debated the precise size of the force to be employed, both agreed on a conventional campaign. Similarly, although the Administration ignored the emerging insurgency in 2003 and 2004, the Army did little to prepare a counterinsurgency doctrine during the same period. Even after the Administration admitted than insurgency was underway, the Army persisted in using conventional tactics. Finally, even the government's attempts to impose interagency cooperation in Iraq would not have proven effective were it not for the Army's ability to establish physical security in a way that did not engender more violence. [29]

[26] Biddle, Friedman, and Shapiro, "Testing the Surge," 7–8.
[27] Recent scholarship suggests that while the Surge may not have been singularly responsible for Iraq's dramatic security turnaround, the other factors that abetted this outcome (e.g. the Sunni Awakening) would not have been possible were it not for Surge forces and their sound application of counterinsurgency tactics. See Biddle, Friedman, and Shapiro, "Testing the Surge."
[28] Certainly political and strategic factors did not affect the Army's doctrinal decisions to the degree that they did during the Vietnam War. While factions inside and outside the Army did resist counterinsurgency on the basis that it would attrite the Army's ability to deter conventional threats like China, Iran and North Korea, there were simply no parallels to the Soviet threat in Western Europe. Similarly, despite a massive influx of foreign insurgents, Army units faced no adversary capable of mounting sustained conventional operations against it. No insurgent group in Iraq came close to rivaling the PAVN in this regard.
[29] DOD Directive 3000.5 *Military Support for Stability, Security, Transition, and Reconstruction Operations* was another example of a political level intervention. However, the directive focused almost exclusively on getting the

III. Dependent variable

Despite its experiences in Vietnam, the U.S. Army largely marginalized counterinsurgency doctrine after withdrawing from that conflict.[30] This is not say that Army doctrine *completely* ignored counterinsurgency before the invasion. The Army's newest capstone doctrine, FM 3-0 *Operations* (2001),[31] mentioned counterinsurgency principles. Yet it offered only vague prescriptions for its employment.[32] Moreover, aside from FM 100-25 *Doctrine for Army Special Operations Forces* (1991) and FM 100-23 *Peace Operations* (1993) the Army had not bothered to update its counterinsurgency manuals since Vietnam (or, in the case of FM 27-5 *United States Army and Navy Manual of Military Government and Civil Affairs,* since World War II.) Ironically, from a doctrinal perspective, the Army may have been better prepared to fight an insurgency in Vietnam than it was in Iraq.[33]

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armed forces to integrate its operations within the larger interagency process. There are two reasons we should therefore discount its impact on doctrinal optimization. First, it ceded responsibility for the reconstruction to the State Department, a laudable goal in theory, but wholly impracticable in Iraq, where the military possessed an overwhelming preponderance of the U.S. government's capacity. Second, subordinating the military's efforts to the larger civilian campaign meant little in the absence of a sound counterinsurgency doctrine. Conventional tactics were inappropriate to the task at hand, regardless of the specific agency exercising operational control. See also Russell, "Innovation in War," 33.

[30] It is beyond this dissertation's scope to address this important puzzle. For a deeper discussion, see David H. Petraeus, "The American Military and the Lessons of Vietnam: A Study of Military Influence and the Use of Force in the Post-Vietnam Era" (Ph.D., Princeton University, 1987); Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006*; Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine, 1942-1976*, chap. 10; Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:504–505.

[31] As of 2001, the Army re-designated its FM 100-5 series FM 3-0.

[32] This and what follows are from Kretchik, *U.S. Army Doctrine*, 262–263.

[33] Not least because of its long advisory experience in the country; because of the Kennedy Administration's efforts; and because of its own attempts to promulgate a viable counterinsurgency doctrine. See chapter 10.

Substantive change did not occur until the Army and Marine Corps jointly published FM 3-24 *Counterinsurgency* in 2006.[34] FM 3-24 marked an important turning point for the Army. For the first time in its history, the Army had a single, comprehensive, and high-level counterinsurgency doctrine. More important, in terms of wartime doctrinal optimization, the 3-24 "gave the Army and Marine Corps the intellectual and training tools to prosecute the fight in Iraq."[35]

The manual embraced all of an optimal counterinsurgency doctrine's core precepts. It argued that population control, not the physical destruction of insurgent forces, was the Army's primary purpose.[36] It directed commanders to divide and distribute their forces among the population instead of consolidating them in large bases, far removed from the towns and villages they were ostensibly protecting.[37] While this approach certainly increased soldiers' vulnerability in the short run, in the long run it was the only viable way to build credibility with the local population.[38] When firepower – or 'kinetic' action – was necessary, commanders were to ensure that it was applied with the utmost precision and proportionality.[39] The FM 3-24 clearly advocated civil-military integration at every level, and in every phase, of a counterinsurgency operation.[40] Finally, the manual went into exceptional detail on how commanders ought to manage intelligence in a

[34] A series of subsequent doctrinal manuals enshrined FM 3-24's core principles. These included the 2008 FM 3-0 *Operations*, and the 2008 FM 3-07 *Stability Operations.* Kretchik, *U.S. Army Doctrine*, 270; Benjamin King, *Victory Starts Here: A 35-year History of the US Army Training and Doctrine Command* (Combat Studies Institute Press, US Army Combined Arms Center, 2008), 35.
[35] Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:505–506.
[36] John Nagl, "Constructing the Legacy of Field Manual 3-24," *Joint Forces Quarterly* no. 58 (Quarter 2010): 118–120.
[37] Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, 174–178.
[38] For this reason the FM 3-24 also places a significant emphasis on information operations (IO).
[39] Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, 247–248. The FM 3-24 also dedicated an entire chapter to leadership and ethics in a counterinsurgency campaign. See Ibid., chap. 7.
[40] Amos and Petraeus, *Counterinsurgency Field Manual FM 3-24*, chap. 2.

counterinsurgency. The chapter on intelligence was, in fact, the manual's longest single section.[41] It directed intelligence officers to focus their efforts on the *entire* insurgent organization – not just its military components. The FM 3-24 similarly encouraged military intelligence officers to integrate their efforts with their civilian counterparts, and to leverage host-nation assets as well.

More impressive than the fact that the U.S. Army wrote its first capstone counterinsurgency doctrine in the middle of a war was the fact that units operated in accordance with its principles. It served as the intellectual framework for the 2007 Surge. After arriving in country, Surge units divided into small teams and manned outposts *inside* Baghdad and alongside Iraqi troops.[42] The goal was to secure in Baghdad's most violent neighborhoods, then, as conditions permitted, begin projecting security outward, much like an 'ink blot.' Foot patrols replaced armored and motorized patrols. Controls were established on the use of heavy weapons, artillery, and air strikes. The Army also heavily emphasized its contribution to civil-military units, including Provisional Reconstruction Teams (PRT), and advisor groups attached to Iraqi security units.[43]

Counterinsurgency doctrine as of 2011
Table 11.1

Protect the people	Yes
Trade exposure for credibility	Yes
Precise and proportional firepower	Yes
Integrated action with civilians	Yes
Focused intelligence	Yes

[41] Ibid., chap. 3.
[42] This and what follows are from Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*; Biddle, Friedman, and Shapiro, "Testing the Surge."
[43] To avoid creating a selection-effect whereby the 'best' officers avoided advisory duty, both the Army and Marine Corps directed that promotion boards consider advisory tours as equivalent to traditional command tours.

IV. Independent variables

Clearly, the U.S. Army optimized its counterinsurgency doctrine in Iraq.[44] The real question, in terms of testing CAT theory's generalizability, is the degree to which the Army's command culture, assessment mechanism, and training structure made such an outcome possible in the first place. Alternatively, maybe the FM 3-24 was truly the product of a single military genius? Or, perhaps the Army would have adopted this optimal doctrine regardless of its internal culture, assessment mechanism, or approach to training. As this section argues, although the evidence is still preliminary, it strongly suggests that neither the FM 3-24 nor its effective implementation would have happened were it not for CAT theory's variables.

Command culture

As it was in Vietnam, the Army's command culture remained moderately decentralized. Much of this was deliberate. The Army had long emphasized initiative and autonomy among its non-commissioned and junior officers.[45] Nor did officers report significant micromanagement, undue supervision, or superior officers who rejected their attempts to

[44] This chapter's final section takes up the issue of whether or not this doctrine was responsible for Iraq's security turnaround.

[45] For example, see Headquarters, Department of the Army, "The Army Non-Commissioned Officer Guide" (Department of the Army, December 23, 2002), chap. 3. The Army's leadership manual, FM 6-22, mentions initiative 45 times (excluding the index). Headquarters, Department of the Army, "Army Leadership: Competent, Confident, and Agile" (Department of the Army, October 12, 2006). Of course, some critics argue that the Army, despite its rhetorical emphasis on low level initiative and autonomy, prefers to micromanage in practice. See, for example, Aylwin-Foster and Army, "Counterinsurgency Operations," 7. Many of these critiques focus on the Army's penchant for detailed planning and extensive after action reporting (i.e. 'death by power point.') The problem with this view is that it confuses autonomy and initiative with chaos. As chapters 1 and 3 argue, one cannot call an audible without having first called a play. Detailed planning / reporting and initiative are not mutually exclusive – in fact, this author would argue that the two reinforce one another. Another part of the problem is that many leaders – especially American leaders – consider any attempt to manage or supervise their activity micromanagement. Again, the absence of authority, supervision, or controls is anarchy, not decentralization.

experiment.[46] Moreover, the nature of Iraq's insurgency, and the relative paucity of combat troops, required even the most reluctant commanders to cede initiative and authority to their company grade officers and non-commissioned officers. The overwhelming majority of patrols were done at the squad or platoon level.[47] Most tactical convoys were similarly sized. Perhaps the most significant piece of evidence in support of this claim is the fact that in the absence of official guidance on how to wage a counterinsurgency (i.e. the dominant condition before 2006) it was hard to find any two units employing the same technique. To quote Austin Long, "The U.S. military's actual conduct of COIN in Iraq from 2003 to 2005 can charitably be described as highly variable."[48]

Crucially, there is at least preliminary evidence to suggest that the Army's "charitable variability" was actually the source of new ideas and front line experimentation. Countless units toyed with unique approaches, many of which approximated concepts that would eventually make their way into the FM 3-24.[49] Moreover, many of the officers that were instrumental in writing FM 3-24 or advising General Petraeus as he implemented it in 2007 had previous experience as front line commanders in Iraq.[50]

[46] Russell, "Innovation in War," 74.
[47] Company and battalion level movements were simply too unwieldy to be effective.
[48] Long, *Doctrine of Eternal Recurrence–The US Military and Counterinsurgency Doctrine, 1960-1970 and 2003-2006*, 200:22. A kinder assessment is that "no school solution materialized a la Vietnam that allowed systematic biases at senior levels to impose themselves on commanders leading engaged forces." Russell, "Innovation in War," 7.
[49] James Russell's study of Army and Marine operations from 2005 to 2007 is perhaps the best single account of low-level adaptation that currently exists. For examples, see Russell, "Innovation in War," 5; 86; 89; 90; 113; 120; 130; 148; 156 & 162.
[50] Including Generals Petraeus and Mattis; Colonel H.R. McMaster; and Lieutenant Colonel John Nagle

Command culture as of 2011
Table 11.2

Senior generals only	
Battalion commanders and above	
NCOs and company grade officers and above	X
All ranks	

Assessment mechanism and training structure

Of course, all the brilliant front line experiments in the world would have made little difference without a mechanism to collect, select, and refine them into coherent doctrinal concepts. The Army, however, had a uniquely capable doctrinal assessment mechanism in place well before the Iraq War. In fact, this was the one area (vis-à-vis doctrine) in which the Army truly improved on itself from Vietnam.

The real irony is that these reforms were designed to shift the Army *away* from counterinsurgency after Vietnam. In essence, officers like General Abrams (General Westmoreland's successor at MACV and now the Chief of Staff of the Army), General DePuy (a former division commander and MACV staff officer, and a fierce critique of the idea that the Army should be involved in counterinsurgencies) and Major General Gorman (General DePuy's right hand man) sought to retain strengths in the Vietnam-era Army's analytic system while addressing its weaknesses.[51] In particular, their reforms sought to streamline

[51] See chapter 10. See also James A. Bowden, *Operation STEADFAST: The United States Army Reorganizes Itself* (Marine Corps Command and Staff College, Education Center, 1985); Suzanne C. Nielsen, *An Army Transformed: The US Army's Post-Vietnam Recovery and the Dynamics of Change in Military Organizations*, 43 (Strategic Studies Institute, 2010), 41–45.

data collection; further centralize analysis; and improve the link between doctrine and training.

The most important single change took place in 1973, when General Abrams sanctioned a plan to combine the Army's Combat Developments Command (CDC) with its Continental Army Command (CONARC), thereby creating a new Training and Doctrine Command (TRADOC).[52] It is well beyond this chapter's scope to detail the myriad ways in which TRADOC's creation revolutionized the Army's doctrine and training.[53] Three were particularly important insofar as doctrinal optimization in Iraq was concerned. TRADOC streamlined the Army's ability to collect and process ideas from the front lines; it increased the Army's analytic capacity; and it further centralized the Army's control over training.[54] To briefly touch on each

Streamlined conduits

CDC faced two key problems when it came to soliciting and generating new ideas. First, the Army's Vietnam-era lessons learned system – based on the operations report – lessons learned (ORLL) – was unwieldy and spawned information overload. In many respects,

[52] Nielsen, *An Army Transformed*, 40; Conrad C. Crane, *Avoiding Vietnam: The US Army's Response to Defeat in Southeast Asia* (Strategic Studies Institute, 2002), 6.
[53] There is a robust literature on TRADOC's formation and its impact on Army doctrine and training. See Romjue, *From Active Defense to Airland Battle*; John L. Romjue, *Prepare the Army for War. A Historical Overview of the Army Training and Doctrine Command, 1973-1993* (DTIC Document, 1993); Anne W. Chapman, *The Army's Training Revolution, 1973-1990: An Overview* (DTIC Document, 1991); Bowden, *Operation STEADFAST*; Suzanne Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform" (Harvard University, 2003); Stewart, *American Military History: The United States Army in a Global Era, 1917 - 2008*, II:389–392; King, *Victory Starts Here*.
[54] There is no evidence that these reforms either increased or decreased the autonomy of the Army's assessment mechanism, and so this subject is omitted. As TRADOC's official history notes, "That TRADOC was a major command under the leadership of a full general indicated its importance in the new scheme of things." King, *Victory Starts Here*, 102.

these tendencies emerged because units forwarded their ORLLs up through the entire chain of command, leading to replication and delay. The TRADOC reforms did away with the ORLL process.[55] In 1985, it created a replacement system, which it designated as the Center for Army Lessons Learned (CALL).[56] CALL served as the Army's new central repository for front line experience. However, an even more important change occurred in 2006, when TRADOC started allowing units to report observations, insights, and lessons (OIL) *directly* to CALL.[57] CALL historians and analysts would vet submissions and select the most promising items for distribution to subject matter experts within TRADOC.[58] Crucially, the Army abandoned the practice of re-distributing 'good ideas' among front line units, as often occurred during Vietnam (and, from Part II, was a standard practice among armies on the Western Front). Instead, Army regulations were quite clear: "observations, insights, and lessons are not lessons learned because they have not been validated by the Army's assigned proponents, and there is no assurance an actual change in behavior will occur."[59] CALL also collected ideas by embedding trained analysts (usually field grade officers) with front line units during combat operations.[60] Over 50 such embed teams had deployed to Iraq and Afghanistan by 2009.[61]

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[55] Dennis J. Vetock, *Lessons Learned: A History of US Army Lesson Learning* (Carlisle, PA: US Army Military History Institute, 1988), 119.
[56] This and what follows are from Robert T. Foley, Stuart Griffin, and Helen Mccartney, "'Transformation in Contact': Learning the Lessons of Modern War," *International Affairs* 87, no. 2 (2011): 256–258.
[57] Brigade sized units and above were still required to report after major operations. Individuals and small unit commanders were allowed to submit reports at any time. Because of the internet, both could submit reports to CALL in 'real time.'
[58] For a diagram of the collection process, see Jeffrey Clarke, "Commander's Guide to Operational Records and Data Collection: Tactics, Techniques, and Procedures" (U.S. Army Center of Military History, March 2009), 18.
[59] Ibid., 14.
[60] As a side note on institutional autonomy, CALL's analysts did not hesitate to criticize the Army for its performance, issuing a 'scathing' report on the Army's poor job of collecting, analyzing, and distributing intelligence during the Iraq War's earliest phases. Hashim, *Insurgency and Counter-insurgency in Iraq*, 322.
[61] Clarke, "Commander's Guide to Operational Records and Data Collection: Tactics, Techniques, and Procedures," 13&18–20.

Second, the original decision to split CDC and CONARC created a gap between doctrine writers and instructors. This gap was not necessarily a problem when it came to distributing new doctrine. It was, however, a major impediment in terms of soliciting new ideas. After all, Army instructors were often subject matter experts with practical, front line experience. Moreover, while serving as instructors, they specialized in the material they were teaching (e.g. small unit tactics, anti-armor weapons, or intelligence operations). By re-integrating the two functions, TRADOC provided doctrine writers with an important source of knowledge and expertise.[62]

Increased capacity

TRADOC, especially under its first leaders, Generals DePuy and Starry, heavily emphasized incorporating analytic rigor in the doctrinal process.[63] As TRADOCs first Deputy Chief of Staff for Training later noted, "DePuy's TRADOC was a place of intellectual ferment where young professionals sought to be assigned."[64]

Similarly, TRADOC increased its capacity for serious doctrinal in a number of ways. It created an institute to study military history, the Combat Studies Institute (CSI).[65] Far from a generic history department or command historian, CSI was specifically tasked with analyzing history to facilitate doctrinal development. Furthermore, in the late 1970s and

[62] King, *Victory Starts Here*, 27. From 1976 to 1983 TRADOC attempted to pull instructors back out of the doctrinal process. However, the results were suboptimal, and the two were once again combined in the 1980s. Ibid., 39–41.
[63] Nielsen, *An Army Transformed*, 43.
[64] Major General Paul F. Gorman, as quoted in Chapman, *The Army's Training Revolution*, *1973-1990*, vii.
[65] Kretchik, *U.S. Army Doctrine*, 202–203.

early 1980s many senior officers grew concerned that Command and General Staff College (CGSC) graduates were not sufficiently trained to think and operate at the higher levels of war. As a result, TRADOC organized the School of Advanced Military Studies (SAMS). Starting in 1983, SAMS would select the top graduates from CGSC to attend a second year of military education. SAMS students and faculty were subsequently integrated into the doctrine writing process.[66]

Greater control

TRADOC also expanded the Army's control over training. Indeed, its formation was a historical first: "the service had approved a doctrine that affected every unit and soldier because the bureaucratic architecture was in place to force compliance."[67] A number of subsequent reforms, made possible because training and doctrine now resided in a single command, ensured that the U.S. Army wielded tighter control over how its soldiers trained than it had at any point in its past. These included consolidating the number of schools, especially at the introductory (e.g. boot camp) level, which reduced the number of schools TRADOC needed to supervise; creating combat training centers (e.g. the National Training Center), to evaluate how well large units trained on current doctrine; forming quality control inspection teams to make sure schools operated in accordance with TRADOC directives;[68] implementing a new Army Training and Evaluation Program (ARTEP) to facilitate standards based training (e.g. soldiers qualify based on their ability to perform a

[66] Ibid., 223–229; King, *Victory Starts Here*, 8.
[67] Kretchik, *U.S. Army Doctrine*, 201. See also Romjue, *Prepare the Army for War. A Historical Overview of the Army Training and Doctrine Command, 1973-1993*.
[68] Chapman, *The Army's Training Revolution, 1973-1990*, 5–6 & 9; King, *Victory Starts Here*, 10&43–44; Kretchik, *U.S. Army Doctrine*; Romjue, *Prepare the Army for War. A Historical Overview of the Army Training and Doctrine Command, 1973-1993*.

task, not the number of hours they spent learning it) and to track individual training.[69] Whatever its other deficiencies, the U.S. Army entered the war in Iraq with a training apparatus capable of facilitating rapid doctrinal transition.

Assessment mechanism as of 2011
Table 11.3

Conduits	Yes
Capacity (prestige and education)	Yes
Autonomy	Yes

Training structure as of 2011
Table 11.4

	General in charge of training	No general in charge of training
Many schools/ training sites		
Few schools/training sites	X	

V. Conclusions

Beyond correlation: TRADOC, FM 3-24, and the Surge

Preliminary scholarship on the Iraq War suggests that, as CAT theory predicts, the Army's moderately decentralized command culture, its sophisticated assessment mechanism, and its tightly centralized training system played a critical causal role in FM 3-24's development and implementation.[70] Front line units did not hesitate to experiment. CALL captured ideas percolating up from the bottom of the organization and processed them in a

[69] Chapman, *The Army's Training Revolution, 1973-1990*, 7.
[70] David Fitzgerald, "Vietnam, Iraq and the Rebirth of Counter-Insurgency," *Irish Studies in International Affairs* 21, no. 1 (2010): 149–159; Foley, Griffin, and Mccartney, "'Transformation in Contact'"; Kretchik, *U.S. Army Doctrine*, 263–268.

cogent, rigorous way. TRADOC formed the locus for innovative thought. In fact, FM 3-24 took form after General Petraeus took command of TRADOC's major subordinate command for doctrine writing, the Combined Arms Center (which owned, and was physically co-located with, CALL).[71] Finally, as it had throughout the war, TRADOC's schools continually updated their curricula to teach students at all level new doctrine, to include the FM 3-24; the 2008 3-07 *Stability Operations*; and the 2008 FM 3-0 *Operations* (which incorporated many of FM 3-24's core precepts into the Army's capstone doctrine).[72]

What about the 'Great Man' thesis?

Without question, the story of the U.S. Army's experience in Iraq cannot be told without reference to General Petraeus. It is hard to imagine the Army reorienting as quickly or as completely under a different leader. In the final analysis, it is probably impossible to fully isolate, or control for, a 'Petraeus' effect. Yet, there are at least three reasons to suspect that his role was, at most, necessary, but not sufficient. First, as a matter of common sense, General Petreaus would not have been able to devise and implement an optimal doctrine (not to mention adapt it to Iraq's unique circumstances) over the doctrine's many critics were it not for the Army's command culture, assessment mechanisms, and training structure. Ideas from the front lines invariably helped his doctrine writers adapt FM 3-24 to Iraq's unique conditions; and helped his war planners adapt FM 3-24 to the Surge's unique requirements. CALL gave General Petraeus and his writing team access to the best of these ideas, while the Combined Arms Center gave him a focal point and the resources needed to bring the best minds in counterinsurgency together. And TRADOCs schools

[71] Foley, Griffin, and Mccartney, "'Transformation in Contact'," 257.
[72] King, *Victory Starts Here*, 16; 25; 35; Kretchik, *U.S. Army Doctrine*, 270.

helped him rapidly disseminate these new, and often controversial, ideas across a massive, wartime organization.

Second, the 'system' was in the process of producing a more effective counterinsurgency doctrine *before* General Petraeus took command of the Combined Arms Center. For example, the Army produced an updated counterinsurgency manual, FM (Interim) 3-07-22 in October 2004.[73] Similarly, TRADOC continued to produce counterinsurgency doctrine after General Petraeus left the Combined Arms Center to assume command of MNF-I (including the aforementioned FM 3-0 and FM 3-07).

[73] Kretchik, *U.S. Army Doctrine*, 263–268.

Chapter 12

Conclusion

"Doctrine may be about ideas, but like so many other human endeavors its final form is frequently influenced as much by the process through which it is created as the ideas themselves."[1]

I. Recap

In this dissertation I have argued three main points: First, all armies need to change and adjust in war, but not all armies are equally adept at doing so. Second, there is a systematic reason some armies are better at optimizing in war than others. And finally, an army's organizational culture, capacity for doctrinal assessment, and training structure exert a consistent and important impact on likelihood of optimization. Part I outlined a detailed theory based on these arguments. Part II tested this theory's internal validity by comparing it against the historical record in the First World War. Part III offered an initial test of this theory's external validity by comparing it against a modern set of counterinsurgencies.

This final chapter moves beyond theory testing. First, I explore future ways to expand Command, Assessment and Training (CAT) theory. Next, I highlight several important policy implications for American policy makers and military leaders. Finally, I conclude by suggesting that the world today has important parallels with the world before 1914. If I am correct, it means the issue of military optimization is more relevant than ever.

[1] Andrew J. Birtle, *US Army Counterinsurgency and Counterinsurgency Doctrine*, *1942-1976* (Washington, DC: Center of Military History, 2006), 231.

II. Expanding the research agenda

CAT theory strives to capture the mechanism by which armies adjust their prewar doctrines to meet wartime realities. Unfortunately, time and resource constraints only allowed this theory to be tested against relied cases involving Great Power armies. But CAT theory should apply to *all* ground forces; it ought to also explain how so-called 'unconventional' groups optimize.

In fact, CAT theory yields a counterintuitive prediction for terrorist, guerrilla and insurgent military groups. It predicts that they should to be especially *slow* at optimizing their doctrines. Most people assume exactly the opposite: that unconventional groups are uniquely flexible, adaptive, and innovative, precisely because they lack conventional organizational characteristics. This divergence between theory and expectation is interesting and deserves further scrutiny.

For its part, CAT theory predicts that terrorist, guerrilla and insurgent groups should be slow optimizers because of their extreme decentralization. Such groups decentralize out of necessity. Loose structures abet their dominant tactics (hit and run), while reducing their vulnerability to government coercion and retribution. If CAT theory is correct, then decentralization cuts both ways in terms of optimization. Decentralized operations should help generate new ideas, but decentralized training should make it hard for leaders to transmit new practices across the entire organization. Complicating matters, many insurgent and terrorist organizations lack access to a robust assessment mechanism.

This question has practical implications. Maoist doctrine calls on guerrilla organizations to eventually adopt conventional methods, especially in the so-called third phase of a revolutionary uprising.[2] Similarly, as the U.S. Army proved in Iraq, conventional armies are capable of adopting new doctrines and of responding effectively to insurgent tactics. When this happens, unconventional armies must change or risk losing the war.

Standard views about insurgent organizations as hyper-flexible notwithstanding, CAT theory's prediction may actually fit the historical record. Insurgent groups seem to have problems evolving beyond hit and run tactics. Few have managed to adjust to conventional warfare when required by circumstance or strategy.[3] It may well be that conventional and unconventional armies share a common dilemma once wartime realities defy their prewar expectations.

The National Liberation Front

The National Liberation Front (NLF), or Viet Cong, might be a useful test case in this respect. The NLF was a highly effective insurgent organization and received robust support from the Peoples Army of Vietnam (PAVN).[4] From 1965 to 1968, it operated with success against both the U.S. Army and the Army of the Republic of Vietnam (ARVN). The NLF, based on decades of experience, truly mastered guerrilla warfare.

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[2] Tse-Teng Mao, *On Guerrilla Warfare*, trans. Samuel B. Griffith II, Reprint 2000 (Chicago, IL: University of Illinois Press, 1961); Kenneth Conboy, Kenneth Bowra, and Simon McCouaig, *The NVA and Viet Cong*, vol. 38 (Osprey Publishing, 1991); George Kilpatrick Tanham, *Communist Revolutionary Warfare: The Vietminh in Indochina*, 96 (Praeger, 1967).

[3] Mao's Chinese revolutionaries may be an exception.

[4] This and what follows are from Michael Lee Lanning and Dan Cragg, *Inside the VC and the NVA the Real Story of North Vietnam's Armed Forces* (College Station: Texas A&M University Press, 2008).

Then North Vietnam's strategy changed. Ho Chi Minh and his generals wanted to mount a decisive attack on the South. The offensive, to be launched during the Tet holiday, required NLF units to take to the field as a regular force and to directly challenge American units (and therefore American firepower). In other words, strategy dictated that an insurgent organization adapt to conventional warfare.

To succeed this strategy, the NLF needed to develop new tactics. Hit and run tactics would not help NLF soldiers fight the U.S. Army on its own terms. Yet the undertaking was beyond the NLF's capability. The Tet offensive was a major failure for the NLF. "Turning away from their previously very successful hit-and-run tactics," NLF units "attacked headlong into vastly superior firepower." [5] Although precise casualty data does not exist, the failed offensive cost Communist forces between 45,000 and 72,000 dead – the overwhelming majority of which were suffered by the NLF.[6] The casualties were so severe that Ho Chi Minh felt it necessary to infiltrate an additional 80,000 – 90,000 replacement troops into South Vietnam.[7] Most important, in terms of tactical effectiveness, the NLF "virtually ceased to be an effective fighting force" after Tet, "leaving the remainder of the war in the hands of the NVA."[8]

Unfortunately, at a major barrier stands between testing CAT theory against the NLF experience in Vietnam. It is difficult to pinpoint exactly how an optimal doctrine would have looked. While NLF tactics were suboptimal, how insurgents become conventional

[5] Lanning and Cragg, *Inside the VC and the NVA the Real Story of North Vietnam's Armed Forces*, 171.
[6] James H. Willbanks, *The Tet Offensive: A Concise History* (Columbia University Press, 2013), 111.
[7] Ibid., 97.
[8] Lanning and Cragg, *Inside the VC and the NVA the Real Story of North Vietnam's Armed Forces*, 171.

soldiers is relatively understudied, and military historians do not seem to agree on the issue.

Other extensions

There are other useful ways to expand on this dissertation's research project. First, it may be worthwhile to test CAT theory's scope conditions. As chapter 3 makes clear, the theory does not claim to explain how navies and air forces change in war. Certainly, differences in structure and mission suggest that they do not change in the same way. These questions can and should be explored in greater detail.

Second, this dissertation seeks to explain how individual armies adapt in war. While this is an important question in its own right, the simple fact is that it is increasingly rare for a single army to take to the field and fight on its own. Modern wars are decidedly joint (multi-service), combined (multi-national), and interagency.[9] This trend is especially pronounced in counterinsurgency operations, as chapters 10 and 11 demonstrated. Moving forward, it is important to test the degree to which CAT theory sheds light on how multiple organizations coordinate learning and adjustment.

Finally, although CAT theory was designed to explain military optimization, its core insights may also have something to say about how other types of bureaucracies, agencies, and organizations change. While private, public, and military organizations undoubtedly differ in many important respects, they face the same basic trade-off between

[9] Although the British and French armies were ostensibly allied during the First World War, they fought as independent forces over the vast majority of that conflict.

centralization and decentralization. Large, complex organizations of all types should be able to overcome this trade-off by centralizing some tasks while decentralizing others.

IIII. Policy implications

War is likely to remain an instrument of policy for the foreseeable future. Assuming that perfect prediction remains elusive, what does CAT theory tell us about preparing our military organizations to optimize in the next war? Vis-à-vis the American military, the most relevant policy recommendations relate to command culture and doctrinal assessment.[10]

Command culture

The American military, especially its ground forces, have a well-established reputation for trusting and empowering subordinate leaders. If CAT theory is correct, then this characteristic has been – and will continue to be – an important source of innovative ideas. Yet America military leaders need to carefully protect their hard earned command culture. As this dissertation's case studies demonstrate, command cultures change with remarkable speed, especially under exigent circumstances. History suggests that it is easier to stifle initiative and centralize control than it is to empower and delegate. Certainly, this was the British and French experience on the Western Front.

[10] Training in the U.S. is already highly centralized. Training and Doctrine Command (TRADOC) controls all training and education within the U.S. Army. The Marine Corps' Training and Education Command (TECOM) fills the same function in that service.

Advances in computing and communication pose a threat to the American military's existing command culture. Both advancements make it easier for commanders to supervise and direct their subordinates. Furthermore, the fact that commanders themselves are subject to the same oversight (not to mention real-time observation by 24/7 media) increases the perceived risks and costs associated with trusting subordinates. I have had numerous conversations with junior officers returning from Iraq and Afghanistan that involve this trend. One infantry captain recounted being micromanaged to the point that a battalion commander, watching a firefight from a tower-mounted camera, told him to move his platoon 100 meters to the north.

Obviously, the recommendation is not to abandon cutting-edge communications technologies. These advances give American soldiers an important edge and should be pursued. As technology's strongest advocates suggest, one day it may well be possible to eliminate the fog of war; to kill everything that can be seen; and to see everything. At the same time, CAT theory suggests that 'perfect knowledge' may come at a price. Indeed, total battlefield awareness may impair our ability to adapt to that same battlefield. At the end of the day, one can be aware of what is happening without knowing what to do about it.

Doctrinal assessment

Doctrinal assessment mechanisms are vital to wartime optimization. Three omnipresent challenges threaten to undermine cogent doctrinal analysis despite that both the U.S. Army and U.S. Marine Corps currently possess doctrinal commands, Training and Doctrine

Command (TRADOC) and the Marine Corps Combat Development Command (MCCDC), respectively.

Undue command influence represents the first of these threats. Doctrinal analysis requires autonomy, but the need for autonomy is often subverted to other ends. As chapter 11 suggests, General Petraeus could not have developed and implemented FM 3-24 without TRADOC. This point, however, begs the question: could TRADOC have implemented FM 3-24 without General Petraeus? Ultimately, even CAT theory cannot fully disentangle the leader from the system. This issue is of particular importance to policy. The less autonomous the analytic system, the more it must depend on individual genius – and whimsy. Doctrinal assessment mechanisms operate best when protected and isolated to a greater degree than is normal practice.

The tendency to routinize lessons learned and after actions reports is another threat to doctrinal analysis. The proclivity is certainly understandable. Front line leaders have many demands on their time and may come to view after action reporting as a nuisance. Analysts want to demonstrate that they add value and so face incentives to disseminate lessons learned as fast, as far, and as wide as possible. Senior commanders may even have budgetary requirements to hire analytic contractors, further exacerbating the paperwork barrage without necessarily improving its efficacy.

Two simple solutions are to attach analysts directly to front line units and to assign front line commanders to analytic cells on a regular basis. Both approaches ensure the most

important information – front line experience – gets into the right hands. It may have the additional virtue of ensuring that front line commanders see that their after action reports serve an important purpose. This further allows analysts to see whether their lessons learned are being absorbed or are drowning front line commanders in new ideas.

A third threat to sophisticated doctrinal analysis is that the American military tends to marginalize analytic career paths. To be sure, U.S. Army and Marine officers can become analysts. Yet such career paths are far from 'elite.' Exceedingly few analysts rise to their organizations' upper-most echelons.

Many American officers would argue that the present arrangement is appropriate; after all, wartime command demands warriors and the warrior-ethos, not analysts and the scholarly mindset. Unfortunately, such a view is culturally bound. At the very least, members of the elite 19th and 20th century German General Staff would disagree vehemently. More insidiously, a cultural antipathy to analysis suggests that the American system methodically diverts the best and brightest *away* from analytic career paths. Every army needs more commanders than analysts. Problems may arise, however, when those with the most brilliant command prospects are discouraged from pursuing analytic training.

IV. The perils of prediction

Predicting what future wars will look like, and the kind of armies that we will need to fight them, is always a difficult task. However, there are conditions under which prediction becomes uniquely challenging. One such situation arises during periods of rapid

technological change, especially when these changes are exogenous to military affairs. Under these conditions, it becomes exceedingly hard to predict how politics, society, economics, demographics, and technology will interact and play out on the battlefield. Europe faced such a situation in the decades leading up the First World War. The United States may well face a similar set of circumstances today.

The past as the future

As chapter 4 recounted, European armies wrestled with a bewildering array of new technologies between the 19th and 20th centuries. Few were developed at their behest, but most affected battlefield operations. The pace of change grew so rapidly during the latter part of the 19th century that Europe's ministries of war regularly spent vast sums of money on the newest equipment, only to find their investments obsolete before the transition was complete.

Under these conditions, tactics, which invariably lag behind technology in the best of times, found it impossible to keep up. Heated debates over the best way to fight gripped every officer corps in Europe. The tactical schemes they developed were not completely off the mark. Britain, France and Germany all flirted with relatively advanced tactical doctrines in the late 19th and early 20th centuries. Nevertheless, all three reverted to more traditional (and incorrect as it turned out) shock power doctrines immediately before the war. This outcome is especially baffling given that all three armies reverted to shock power *after* the Boer and Russo-Japanese wars – conflicts that scholars now point to as the harbinger of firepower's ascendency.

The fact that every major combatant in the First World War inferred the wrong lessons from the Boer and Russo-Japanese wars should be warning enough, unless we are willing to dismiss late 19th and early 20th century officers as distinctively foolish and inept. But it should not be assumed that Europe could have avoided stalemate on the Western Front had all three – or even just one of the three – opted to stay with a firepower doctrine instead of reverting back to shock power. A simple fact buttresses this claim. Even the most progressive firepower advocates before the war did not advocate a tactical scheme similar to the optimal doctrine, as we now know it. The ideas put forth in these prewar doctrines were far too crude to deal with the real problem on the Western Front: too many men fighting in too small a space with too many bullets and not enough trucks or radios. At the end of the day there was no way to foresee the bloody and tragic way these four elements. Learning had to await fighting. Optimization was the only option, aside from avoiding war in the first place.

Future war

In many ways, the United States faces an even more complex environment today. Similar to the pre-First World War era, technology is advancing at a breakneck pace. The most obvious changes have of course unfolded in computing. Today's calculators have as much computing power as the once cutting edge space shuttle. The computing revolution has spawned changes in countless other fields, including social networking, business, surveillance, robotics, artificial intelligence, and space exploration. Other industries, including medicine and transportation, are changing as well.

As it was before the First World War, these changes also have direct military applications, but are nevertheless driven by factors outside the military's control. Precision weapons, unmanned vehicles, and cyber-warfare are but three examples. Armies, navies, and air forces can hardly afford to retrofit themselves before their investments become functionally obsolete.[11]

The high rate of technological change, combined with the absence of Great Power war, has made doctrinal development as speculative as it was in Europe before the First World War. Combined arms doctrines have fully matured since the First world War. However, it remains unclear how such doctrines will stand up in a war where all sides have precision weapons with a global reach, vast armadas of unmanned vehicles, and the ability to bring down one another's computing network.

Complicating matters, at least Europe's soldiers were relatively certain of whom they would fight and where they would fight them. For all its obvious downsides, rigid alliances simplified planning. Today's armies face a far more ambiguous range of threats and potential zones for conflict. While nuclear weapons once rendered Great Power war unthinkable, nuclear proliferation may change that calculus. There are similar reasons to think that cyber weapons could operate without violating nuclear restraint. Although the idea that 'mobilization meant war' may seem laughable now, we should be willing to contemplate that the ability to deliver a knockout blow via the internet or a precision strike

[11] Leading many military organizations to focus on building 'plug and play' platforms that rely on 'off the shelf' technologies.

– capabilities that may well exist in the near future – force us to make decisions in an even more compressed timeline.

The bottom line is that European planners failed to see what massive armies, rapid-fire weapons, and the absence of tactical logistics and communications – *and the way these factors would interact in a specific geographical space* – would mean for tactical doctrine. And they knew where the fight was likely to unfold. Today's planners are in a far more precarious position.

The point of the foregoing is not to argue that prediction is futile. Certainly, the closer we can get to the next optimal doctrine, the better our military organizations will perform in future conflicts, and the fewer casualties they will suffer. Nor is it to suggest that the next Great Power war will bog down into trench warfare on a global scale (although there are certainly reasons to speculate what precision, cyber, unmanned and A2AD weapons will mean for American strategic mobility.)

Rather, the point is simply to suggest that prediction – and doctrinal development – ought to proceed with extreme modesty under present conditions. Similarly, political leaders would be well served to pay close attention to their military's doctrines. That war is too important to be left to the generals overstates the case, but no one can lay claim to experience when it comes to future war. Moreover, the use of force – rarely a surgical instrument of policy under the best of circumstances – may prove especially unwieldy under present conditions. Europe's leaders would have been better off avoiding war in

1914. The last several hundred pages of analysis notwithstanding, this lesson may have been the most important one of all.

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