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2023

Group Cognition: Reclaiming C.S. Peirce’s Specialized Theory Of Cognition And Its Implications For Sociology And The Cognitive Sciences

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Princeton, NJ : Princeton University

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GROUP COGNITION: RECLAIMING C.S. PEIRCE'S SPECIALIZED THEORY OF COGNITION AND ITS IMPLICATIONS FOR SOCIOLOGY AND THE COGNITIVE SCIENCES

Volume I

Herrissa Deborah Lamothe

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

SOCIOLOGY

Adviser: Kim Lane Scheppele

May 2023

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Abstract

This dissertation advances a theory of reference, and a theory of "group" cognition, regarding how the mind makes references to the world. It also articulates a concept learning mechanism for how the mind acquires conceptual representations that are "dual-factor" – that is, involve both meaning and reference. Both these theories of reference and of group cognition, and this articulation of a concept learning mechanism, are based on a reading of American pragmatist, Charles Sanders Peirce, as offering a theory of *specialized* cognition. This reading of Peirce on cognition maintains that we have two specialized cognitive faculties that collaborate in the elaboration of conceptual knowledge. I argue that while the first of these two specialized faculties corresponds to a contemporary literature in the cognitive sciences on "core" cognition, the latter is in keeping with work in the sociology of cognition on distributional, or topological, representations. The theory of reference that I advance, takes a Peircean specialized cognition reading of French sociologist Pierre Bourdieu's work on the bodily unitary system of dispositions called the "habitus". Such a Peircean-Bourdieusian theory of reference, I argue, addresses core concerns in the philosophy of mind and language. Moreover, I make the case that this theory of reference doubles up as the description of a specialized cognitive learning mechanism embedded in a theory of "group" cognition (a cognitive theory of reference), that is distinct from (but integrated with) a theory of "core" cognition (a cognitive theory of meaning). I show that such a cognitive theory of "group" cognition acts as a second arm in the elaboration of a domain-general concept learning mechanism that offers an alternative to Quinian Bootstrapping– a domain-general learning mechanism in the contemporary cognitive sciences literature also drawing inspiration from pragmatism. I argue that my "Peircean Synthesis" concept learning mechanism addresses a potential weakness of Quinian Bootstrapping in its treatment of "wide" content, or reference. In this way, I make the case that Peircean Synthesis, and a Peircean specialized view of cognition, offer a bridge between the sociology of cognition and the cognitive sciences that stands to fundamentally change the relationship between the two disciplines.

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Abbreviations

EP Charles Sanders Peirce, *The Essential Peirce*, ed. Peirce Edition Project, 2 vols. (Bloomington and Indianapolis: Indiana University Press, 1992, 1998).

LCS Charles Sanders Peirce, *Logic, Considered as Semeiotic: An Overview of Charles Peirce's Philosophical Logic, Constructed from Manuscript L75, Version 1*, ed. Joseph Randsell. (online source: <https://arisbe.sitehost.iu.edu/menu/library/bycsp/L75/ver1/l75v1-01.htm>, accessed 15 July 2022).
**Page numbers refer to a printed hard copy of the online publication.*

LL Charles Sanders Peirce, *Charles S. Peirce: Lowell Lectures of 1903 (3rd draught, MS 464 and 465)*, ed. Gary Fuhrman. (online source: <https://www.gnusystems.ca/Lowells.htm>, accessed 15 July 2022).

MS, MSS Catalog numbers assigned to Peirce's manuscripts by Richard Robin for manuscripts housed at Harvard's Houghton Library.

W Charles Sanders Peirce, *The Writings of Charles S. Peirce: A Chronological Edition*, ed. Peirce Edition Project, 8 vols. (Bloomington: Indiana University Press, 1982-2010).

Acknowledgements

This dissertation came out of a journey involving many twists and turns, in which I pushed far beyond the intellectual limits that I initially set out for myself. It was a transformative journey that left me much “more” at the end of it than I was at the beginning.

There are many to thank and much to be grateful for. I begin by thanking my family for their support. It came in all kinds of ways, and took all kinds of shapes, but always, I felt love. In particular, I would like to thank my mother, Rosemaine Lamothe, for her constant support. She was always a phone call away, and during the most isolating times of this process, that meant the world. I thank my father, Herrio, for supporting us also.

I thank the Panovs, Tyurina, Tyurin, and Falix, for their openness, support, and good wishes. In particular, I thank Anastasia Tyurina for her wonderful meals that helped impart much needed community and human companionship. I thank Prof. Inna Zakharevich and Thomas Barnet-Lamb for their mentorship and friendship during this period. I thank Franziska Paulmann for her continent-crossing friendship. Our regular “podcasts” were always bright points in my days.

I thank Rebecca Lamothe-Solis, Christopher Lamothe Solis, Jemima Lamothe, Anastasia Lamothe, Marie Petuelle Laine, and my partner, Peter Panov, for being my support team. In particular, I thank Rebecca, Anastasia, and Peter for proofreading and digitizing figures, and for much sound advice along the way. I thank Mikele for introducing me to the power of mindfulness. I thank my friends, and everyone whose good wishes and small gestures of connection sustained me throughout the process.

I thank the MIT cognitive sciences community (in particular Profs. Joshua Tenenbaum, Laura Schulz, Roger Levy and their labs) for taking me into their folds; and for giving this wandering scholar hospitality, and the hope of an intellectual community. I also thank Prof. Susan Silbey and the MIT Anthropology department, who hosted me in the early days of my visit to MIT, and did much to integrate me into the various MIT communities. In addition, I thank Prof. Sally Hasslanger and the WOGAP reading group for feedback on my early work on this dissertation; as well as the MIT Linguistics and Philosophy department for exposing me to new and interesting philosophical perspectives. I thank Prof. Aaron Clauset, his lab, and the Computer Science department at the University of Colorado (Boulder) for supporting my early foray into the intersection of sociology, computation, and AI.

An enormous word of thanks to my committee and to my advisor, Prof. Kim Lane Scheppele, for supporting a highly unorthodox dissertation journey. I thank Prof. Brandon Stewart for his instrumental organizational role on the committee; for his sound, practical, advice; and for always having his door open. I also thank Prof. Shamus Khan for his energy, responsiveness, and helpful feedback at a pivotal time during the dissertation writing process.

Lastly, a special word for Peter. Thank you for being my “duck”, conversation partner, support team member, personal scheduler, cook, homemaker, and everything else you felt I needed to get through this journey. My conversations with you throughout the process always offered new perspectives and trenchant insight. The depth of your love, generosity, and earnestness humbles me. I cannot put into words what your unconditional love and support mean to me.

Chapter 1: Sociology's Role in Developing a More Balanced Theory of Conceptual Development

Core cognition's approach to our reasonings about social groups

The idea of "group" concepts– or mental representations that capture human (and non-human) animals' tendency to form "groupings", and to "attend" to these groupings differently (Spelke and Kinzler 2007)– have started to spark interest in the cognitive sciences (Kinzler et al. 2009; Shutts et al. 2013). This is particularly the case in the wake of a recent theoretical paradigm that views conceptual knowledge to be articulated by "theory" knowledge structures that offer high-level conceptual explanations of their object (Carey 1985; Gopnik and Meltzoff 1997; Gopnik and Wellman 1992; Karmiloff-Smith 1988; Keil 1989; Perner 1991; Wellman 1985; Wellman and Gelman 1992). This paradigm has been accompanied by the cognitive theory of "core cognition" (Carey 2009) or "core knowledge" (Carey and Spelke 1994, 1996), which makes the case that certain innate systems of knowledge about the world are the building blocks for the learning of higher-level conceptual knowledge.

In this conversation, group knowledge has been presented as one of the "core" systems of knowledge that we are equipped with at birth (Spelke and Kinzler 2007). Much like knowledge about objects, agents, numbers and spatial geometry, the introduction of core "group" knowledge would suggest that we have a core, innate, system of knowledge that regulates our thinking about social partners and social groups.The core cognition perspective argues that we have innate symbolic representations of objects, and a set of computations defining them, that capture the ways these symbolic representations are related to one another, and how they are expected to behave from the perspective of causal inference (Wellman & Gelman 1992). For example, in the case of core cognition about physical objects, core cognition theories argue that we come to the world equipped with innate meanings that relate to what objects are *functionally* for the mind from the perspective of inference. Such innate representations of objects can be partly described, according to some (Block 1986; Harman 1982), in terms of conceptual roles that capture the causal relations associated with such objects. For example, in the case of physical objects, the innate meaning of "object" is a set of conceptual roles that specifies object permanence (i.e. that an occluded

object is still present) (Aguiar and Baillargeon 1999; Baillargeon et al. 1985; Baillargeon 1986; Gopnik 1998), and how it will react when in contact with other objects (Leslie and Keeble 1987).

This view of cognition is a theory that stresses that we come to the world equipped with an innate stock of meanings (called “primitives”) that are internal and intelligible to the mind, as well as an innate set of learning mechanisms for constructing explanatory hypotheses of the world – and thus new meanings or primitives– from this initial stock (Carey 2009). While these theories differ in their accounts of how much construction is needed to articulate core meanings – about whether we have *innate knowledge* (Spelke, 1988), per se, or whether we have innate representations and processes that can *construct knowledge within a domain* (Carey 1985, Carey 2009) – they generally agree that our core domains come equipped with both innate *narrow* content (i.e. meanings in the head), and *wide* content (i.e. a reference, or at the very least a *way* of making references, to entities in the world). In this way, core domains come equipped with *both* innate internal meanings, and an innate associated way of making references to the world. Another way of saying it, is that according to this view, we have certain representations that come “online” very early in our developmental trajectory, which impart both innate narrow content about what these kinds of representations *do*; and innate wide content about what these representations *are in the world*.

In the context of core *group* cognition, the characterization of the domain of “group” representations dovetails with research that implies that we are born with an innate tendency to socially discriminate (Bar-Haim et al. 2006; Baron and Banaji 2006; Cosmides, Tooby, and Kurzban 2003; McKee 2006; Mehler et al. 1988). Such a core domain associated with social groupings would thus suggest that we have innate “in group” (and at least implicitly, innate “out group”) representations associated with computations defined over those representations that capture what such representations “do” or what *we* are *to do* vis-a-vis such representations as identified in the world. These innate computations defined over this hypothesized core domain, for example, would involve a showing of *preference* for in-group members (Kelly et al. 2005, 2007), and discriminatory behaviors in the allocation of cognitive resources (such as attention) (Bar-Haim et al. 2006; Kelly et al. 2005, 2007; Mehler et al. 1988; Moon et al. 1993), and that

such preferences and allocation of cognitive resources extend even to *objects* associated with in-group versus out-group members (Kinzler et al. 2009; McKee 2006; Shutts et al. 2010).

The view that we come equipped with a core domain of representations that govern our reasoning about social groups and social partners, if true, comes with some distressing implications about the broader picture regarding the nature of humans as social beings. The characterization of our cognition of social groups in terms of core knowledge comes with a view that we come equipped with built-in *preferences* for entities classified as "in-group" and innate *distaste* or *dis-preferences* for entities that have been classified as "out-group". And, in addition, such a core theory of social groups must also commit itself to the idea that we come with innate *mappings* regarding what entities in the world correspond to "in-group" and "out-group" innate representations. Moreover, because according to one of the views on core cognition most influential in that literature (Carey 2009), such core domains of cognition are *indefeasible*. That is, they remain stable throughout an individual's life-course and do not change in light of evidence. While we can (and according to Carey's view) *do* create new representations from this initial stock that build *new* primitives, these old ones remain, and are still our *first, automatic, responses* to any input that falls into the core domain. Consequently, within this framework, while as thinking agents we would be able to create new representations for race or gender, for example, that are more rationalized and in-line with our experiences in the world; our first response to individuals characterizes them as "in-group" or "out-group". These classifications of individuals would occur according to some metric that we do not control, and would still be the innate behavioral responses of preference and dispreference (or distaste). This would be especially the case of new experiences, or new interactions with social partners that we have not encountered before.

The empirical findings in this area of core group cognition, thankfully, have been lukewarm. The burgeoning research on groups (social and linguistic) has found that group cognition comes online much later than other kinds of core representations. For example, while an infant quickly shows preferences for faces and linguistic patterns that they've been exposed to, they do not seem to develop a group representation of *gender* until around age 3 or 4, such that they have patterned responses to group cues

(Shutts et al 2013). Moreover, the evidence for early preferences for same-language speakers does not clearly distinguish the effects of simple attunement to familiar sounds. Group representations of race, by this metric, seems to come online by age 5 (Kinzler and Spelke 2011). While this evidence is not conclusive in either direction, I argue that the lack of overwhelming evidence in favor of a core domain for reasoning about social groupings is a concern not just for a theory of core group cognition, but for core cognition in general.

The lack of overwhelming support for a core domain for reasoning about social groupings, raises some important questions about the theory of core cognition as it is currently articulated, and about the structure of the conceptual learning mechanism with which it is associated. If core cognition is right, we *should* have such a core domain for social groupings. Core domains of cognition are supposed to be associated with things that have been with us, in our environments, over the course of our evolutionary history. As primates and social animals, human beings have been in groups for millions of years. For core cognition to be consistent, we *should* have a core domain of cognition dedicated to reasoning about groups. So what would it mean if we didn't? The lukewarm case for a core cognition domain related to social groupings, I argue, encourages us to rethink an important assumption of core cognition as it currently stands. One of these assumptions is that we come pre-loaded with *wide* as well as *narrow* content (Spelke 1988; Carey 2009; Baillargeon 1993). In other words, it assumes not only that we have innate representations that capture what a physical object *does*, but that we also come pre-loaded with a tendency to classify certain classes of entities in the world *as* objects through a mapping between entities in the world and meanings in the head that is evolutionarily bequeathed.

The mappings between these meanings in the head and these entities in the world, in a core cognition setting, are called a "learning" mechanism (Fodor 1975; Carey 2009), and are innate and specific to a domain. However, this account begins to come apart when we start to think about the cognition of *social groups*. In other words, according to the core cognition view, not only are the meanings that we have about the world innate, but these innate meanings are already pre-wired at birth to attach to some kind of extension in the world. However, there are many ways in which to determine a group, and throughout our

evolutionary history, we have certainly used a wide array of principles of group divisions. Unlike the core domains of object and number, for example, whose inputs remain fairly stable over time, it is a harder challenge to articulate a theory of how innate domains for reasoning about groups come pre-wired to latch onto social divisions and distinctions which are constantly in flux.

In other words, a cognitive theory of social groupings that takes them to be core domains of cognition struggles because it is hard to form a *definition* of groups in terms of an evolutionary history of qualitative states of the brain and body associated with them – i.e. in terms of the qualitative properties that such groups are supposed to have[1]. In this way, it seems harder to argue that just as we come equipped with the ability to make reference to an object in the world based on some qualitative properties that it has for the mind, and with which objects have been associated with in our evolutionary history; we come equipped with an innate mapping between core representation for groups that are in the head, and entities in the world that are instances of groups. Such a view would imply that we have some internal meaning, or primitives, attached to certain properties in the world that make them instances of groups, based on the kinds of group environments we've experienced over millions of years. Such a view is harder to hold in light of the diversity in which groups are organized, and have been organized in our evolutionary history. While not impossible, it raises the bar for explanation and suggests a benefit to looking further afield for alternative explanations.

I argue that the sociology of cognition offers an alternative theory of group representations that can account for how human beings cognize social groups, which does not commit us to the moral and theoretical implications of a core cognition theory of social groupings. In addition, this approach to group cognition opens the door for the articulation of an additional specialized faculty of cognition– in addition to core cognition– that takes seriously the problem of reference, or wide content determination, that becomes so prominent when we start to consider theories about the cognition of social groupings. I take steps to begin developing a theory about this additional specialized faculty of cognition, for which I reserve the name, "group cognition". In order to do so, I draw on the work of American pragmatist

[1] In this way, this problem mirror Kripke's thoughts regarding the challenges of fixing references (Kripke 1980)

philosopher– Charles Sanders Peirce, whom I argue was engaged in the development of a *specialized* theory of cognition that established different cognitive faculties for the elaboration of “feelings” – which I associate with core cognition; and of “efforts” – which I associate with group cognition. Moreover, I argue that just as core cognition is associated with a theory of a learning mechanism that allows us to construct, or learn, *new* primitives from an initial starting state; my reading of Peirce can be developed into a theory of a concept learning mechanism that takes into account *both* an innate stock of primitives or meanings *and* learned references to the world.

Group cognition, as we will see, differs from core cognition in a number of important ways. First, it is not innate, but learned. And secondly, it operates primarily through dispositional states of the body’s distributed system of muscular memory. I argue that this approach to group cognition has deep roots in sociology in the work of Pierre Bourdieu (Bourdieu 1984; Bourdieu 1990), and more recently, in the work of Eviatar Zerubavel (Zerubavel 1997). And that it offers some answers to a long-standing struggle in the philosophy of mind, language, and cognition regarding how the mind comes to acquire its references to entities in the world, and the role that such references (or wide content) play in the development of conceptual knowledge.

The sociological alternative to core group representations: sociology of cognition and attentional (topological) representations

The sociological view on groups as I identify it in the works of the Zerubavelian school of cognition (Brekhus 1996; DeGloma 2015; Mullaney 1999; Ryan 2006; Simpson 1996) and in the work of French sociologist Pierre Bourdieu, takes the stand that group representations are not narrow content, or meanings. They are not part of core domains. Instead, groups are attentional topological concepts about how we put things together according to a particular order– such that we systematically put things that are in the world together in the mind in a particular way. For example, there is literature in sociology on memory (DeGloma 2015; Frisch 1989; Zerubavel 2003) and on the construction of narratives and time (Mullaney 1999; Zerubavel 2018; Foster 1996) and attention (Zerubavel 2015; Friedman 2013; Davis

1983), that attests that these things are socially patterned. In other words, people from different societies pay attention to different things differently. Putting some things in the foreground and others in the background. The way they remember is shaped by their society – some things are relevant while others are not. Group representation, in this tradition, is related to our ability to *order* the world to give rise to a particular topology of it. Such that we attribute different *shapes* to the world around us that creates the canvas over which we see the world and build our conscious perceptions and conceptions.

According to this view, group representations are different ways of ordering that govern how we manipulate the input of the world, in a way that structures the emphases we put on that input. So that we pay more attention to some things, and less to others, and construct a picture out of it that would seem to be the full shape of reality, but really involves the practical manipulation of the input. An analogy would be the example of having a flat sheet of paper and crumpling it up so that it looks like a face, or ring, or any topological shape. We are thus focusing on the surfaces that have been foregrounded in the crumpling or folding, which are supported by all the possible points and creases that *could* have been made on the sheet, but have instead been relegated to the background.

This is the topological understanding of what group representations are in sociology that I think is a very powerful one and an alternative to the understanding of what group representations look like in the cognitive sciences within the framework of core cognition. I argue that this view that sociology has about group representations is not living in isolation, as an interesting but isolated way of thinking about group representations. Rather, it is *fundamental* for being able to come up with a theory of cognition at all. This is because it offers, in my view, a theory about how it is that we make reference to the world that is, in a sense, true of the world. Such a theory is fundamental for being able to come up with any kind of conceptual knowledge.

The cognitive science's struggle with wide content and sociology's response

An important tenet in the philosophy of mind and language, and in the cognitive sciences is that the concepts that we have in our minds are *dual-factor* (Block 1986) and have narrow content– or meanings that mean something *to us*, that tell the mind what it needs to do in order to generate a qualitative experiential state. As well as wide content– references to entities that are "out there" in the world that our mental representations are picking out. It is a concept's wide content that gives it its veridical property, or its *truth* in its reference to the world. It is because of a concept's wide content that we can say that the hypotheses about the world that we come up with in our minds actually map on to the things that are in the world in a way that is true of it. According to this view, both narrow and wide content are needed in order to articulate what conceptual knowledge is and what constitutes full conceptual representation.

In core cognition, in order to develop that perspective, the cognitive sciences have attempted to offer theories of conceptual development based on these two kinds of contents (Fodor 1998; Dretske 1981; Carey 2009). I am arguing that while they offer a compelling picture in their characterization of the initial state of cognition in terms of innate core domain of meanings; there is a weakness in the way that they think about wide content. This is a weakness that the cognitive sciences are very aware of and have pointed out (Carey 2009). It is in handling how the mind comes to possess content that is fundamentally external to it. This is related to the age-old mind-body problem in philosophy. How is it that the mind– which is something very different from the material, in that it is abstract and symbolic– can come to have some kind of determining relationship with a world which is very much physical and material? In other words, how does the abstract come to determine the physical, and the physical the abstract? I argue that one important insight from philosophy is that they do *not* determine one another. According to the influential work of philosophers Saul Kripke and Hilary Putnam, intension (meaning in the head) can't determine extension (entity in the word) (Kripke 1980/72, Putnam 1974). And vice versa– things in the world can't determine meanings in the head.

What this means is that we need a theory of cognition that does not break these two fundamental tenets in the cognitive sciences and the philosophy of mind and language. That allows *both* wide content and narrow content to stand semi-independently and distinctly from one another, while still having a

collaborative relationship that allows us to come up with conceptual representations of the world that relies on both kinds of content and synthesizes them together. The theories in core cognition thus rely on some kind of articulation of a learning mechanism that allows us to come up with conceptual knowledge based on both wide and narrow content. In this space, the work of Susan Carey has been very influential because it is one of the few articulations of a theory of conceptual development that takes seriously this balance between meaning in the head and entities in the world, where neither determines the other.

I argue that the way in which Carey's bootstrapping treats wide content, however, leads us to make hypotheses such as the idea that we have core domains of knowledge that are about *groups*– which as we see, from a sociological perspective seem to have little to do with meanings and all to do with reference (or ways of ordering entities in the world). I make the case that there is an alternative here for how we think about the relationship between core and what I call "group" cognition that comes out of a reading of the American pragmatist tradition. This tradition has already influenced this community via the work of Susan Carey on a concept learning mechanism that takes inspiration from Willard Quine (Quine 1960; Quine 1969)– a new-pragmatic philosopher.

A reading of C.S. Peirce as offering a *specialized* theory of cognition, and deriving Peirce's learning mechanism from his five universal categories

I argue that the work of American pragmatist Charles Sanders Peirce offers a theory of cognition– something that's been argued before (see for example, Pietarinen and Issajeva 2019)– but more than that, it is a theory of *specialized* cognition. It presents the idea that we have two specialized domains of cognition that collaborate in the general cognition of conceptual representations. With one specialized domain for acquiring innate meanings, and another for acquiring external relational orders – ways of manipulating and ordering extensions or entities in the world. This specialized cognition view of Peirce that I offer also comes with the articulation of a learning mechanism that can be developed into a viable alternative to Carey's Quinian bootstrapping that can be couched very much in the contemporary literatures in cognitive sciences. I undertake that effort in this dissertation.

I argue that when Peirce is viewed as offering a specialized theory of cognition, he offers an alternative for thinking about representations that capture purely connections to the world, or references. These representations are distinct from those that capture purely innate meanings. Unlike the core cognition literature, however, Peirce does not think we have innate wide content in the stock of innate primitives that we have in the head.The learning mechanism that I derive from a specialized cognition reading of Peirce is articulated in one of his most well-known works. In his essay, “On a New List of Categories” (1867), Peirce makes the case that we have five universal categories of mind. In this dissertation I offer a reading of Peirce’s five innate categories of mind that shows that his five universal categories articulate a learning mechanism that is grounded in hypothetical reasoning, and what psychology today would call a *psychological essentialism* (Gelman 2004). In the Peircean learning mechanism that I derive, this takes the form of a concept learning mechanism that starts out with one key hypothesis, which is that everything seen is matched by something *un*seen, or by a process that can be inferred. I argue that Peirce leverages this idea of psychological essentialism to construct a purely hypothetical concept learning mechanism that balances both narrow and wide content in a way that does not break the fundamental tenet that intension cannot determine extension, and extension cannot determine intension.

In this way, I argue that Peirce’s work sets the groundwork for a concept learning mechanism that can bridge the best of sociology and the best of the cognitive sciences – with sociology contributing a theory of reference, and the cognitive sciences contributing a theory of meaning – as the two arms of a specialized theory of cognition that theorizes *two* rather than one specialized cognitive faculty. I show that sociology does provide a good candidate for such a theory of reference by focusing on some important work in sociology on wide content, which is the work of Pierre Bourdieu on social classes as kinds of cognitive structures.

A Peircean-Bourdieusian theory of reference

For a long time Bourdieu's work remained a bit of a puzzle in sociology about the kind of theory that it offered. However, sociologist Omar Lizardo has made the convincing case that Bourdieu's work can be read as a theory of cognition (Lizardo 2004; Lizardo 2019). And that it is grounded in a cognitive science perspective that focuses on conceptual development. Although I disagree with the grounding that Lizardo gives– he grounds Bourdieu's habitus in the work of development psychologist Jean Piaget, while I think Bourdieu transcends Piaget– nevertheless, I agree with Lizardo that we benefit greatly by looking at Bourdieu from the perspective of cognition and the cognitive sciences.

I show that in the work of Bourdieu, sociology offers a theory of reference very much in line with a tradition in the sociology of cognition which maintains that our representations about groups are topological and attention based (Zerubavel 1997). Bourdieu, in my reading of him, embraces this view, but also incorporates the idea of embodiment and the body. However, I argue that it is a view of embodiment that disagrees with the idea of embodied *meanings* (Lizardo 2019; Lizardo 2009; Taylor 1993); as such a view of embodiment adopts a Piaget-style approach in which we are able to abstract away from the embodiment to some kind of higher level symbolic representation. Such a view is tantamount to the idea that extension defines intension. Bourdieu's work on the habitus, I argue, offers a theory for how it is that we internalize relational orders outside of the mind. It is a way of thinking about extensions as systems of relations that are external to the mind. By pointing out a single extension, you point to it in relation to everything else. This is a view that is aligned with philosophers of mind and language such as Kripke (Kripke 1980; Kripke 1982), who describes such relational order in terms of "chains" and "links". In this way, we cognize extensions not qualitatively, in terms of the attributes that they have; but purely in terms of *quantitative* relations. We reference an extension by referencing the kind of *relation* it has to other things in the world– this thing (a table, but irrelevant for the pointing of the extension) is between this thing (bookcase) and that thing (the window), and above that thing (the floor). A key aspect of extension is thus that it is part of a richly interconnected relational structure.

Bourdieu, I argue, shows us how we can embody in ourselves habits for manipulating *external* relational orders in the world by first manipulating the *internalizations* of these orders in our own bodies. In so doing,

he addresses a key problem for theories of references, which is this – if we have representations whose only content is the thing that they reference, but we cannot cross the chasm from inside our heads to outside our heads, what is it that the reference is pointing to? The reference, as wide content in the mind, can't really be pointing to something out in the world because it is not in the same register. Bourdieu's work shows us that instead, something that could be happening is that these kinds of reference or wide content representations are *indexical* representations that point to *ourselves* – to our own distributed nervous system in the ways that it's been conditioned by butting up against a reality that has led it to take on certain dispositions. Representations of wide content can thus be thought of as *constituted* logical practices (Bourdieu 1990), which are ways of ordering and manipulating materiality, and of manipulating *ourselves* as materiality. It involves the physical conditioning of distributed systems of muscular memory that come to internalize the external distributed relational systems in which we are physically embedded. So, we treat ourselves *as* materiality in order to interface with a world that is materiality. I argue that this is the last, and crucial, step in a learning mechanism that can be said to be veridical, i.e true of the world.

I get to this reading of Bourdieu by putting him in light of Peirce's work on two domains of specialized cognition. I argue that in this way, Bourdieu's work is an example that strikingly parallels Peirce's work on the specialized faculty of sensations of reaction and the *indexical* representations associated with it. In this way, this Peircean-Bourdieusian theory of reference that I develop here is a powerful one that responds directly to concerns in the philosophy of language and mind about what a theory of reference would be like that meets the limitations that extension can't determine intension, and intension can't determine extension. These limitations come with more specific restrictions, such as, for example, the idea that extension cannot be determined by any qualitative state of brain or mind– or any description or definition (Kripke 1980; Putnam 1974). Yet, at the same time, that extension is a *rule* that allows us to generate an infinite number of explanations of the rule according to the context we find ourselves in (Wittgenstein 1953; Kripke 1982).

So somehow, even though the indexical representation for wide content is something that is not conceptualized, it still needs to be capable of being *rationalized* at any point in time. Consequently, there

must be a relationship between the wide content that is purely referential and indexical, and representations that have internal meaning to the mind– that we can articulate as words and as symbols that are part of conscious reasoning.

Degeneracy and a learning mechanism with different modes of operation for general, core, and group cognition

I argue that this leads us to one last aspect of Peirce's work that really brings these two specialized domains of core (or feeling) and group (or sensations of reaction) together. Peirce offers a learning mechanism that balances narrow content (reference to meanings in the head) and wide content (reference to entities in the world) that has an idea called "degeneracy" embedded in it. While Peirce's work on degeneracy has received some attention (Gorlée 1990; Kruse 1991; Buczynska-Garewicz 1979), discussions have focused on how Peirce's degeneracy relates to his semiotics. In this dissertation, I look at degeneracy as a crucial part of Peirce's theory of specialized cognition, and its associated learning mechanism. According to the view that I develop, the learning mechanism through which we arrive at wide content, and the learning mechanism through which we access and develop innate meanings in the mind, are both part of a more general learning mechanism that creates conceptual representations that have both narrow and wide content.

Consequently, according to this view, when we are looking at group cognition, we are looking at a slice of the entire domain general learning mechanism that is degenerate in the meaning aspect. Similarly, when we are looking at core cognition, we are looking at a slice of the entire learning mechanism that is degenerate in the reference aspect. Peirce's articulation of a learning mechanism is thus one that embraces core and group cognition– having them collaborate in articulating representations of the world that are knowledge, and are thus available in conscious and explicit reasoning. But in addition, Peirce's views on degeneracy give us a way of understanding how it is that we construct representations that are fully wide and fully narrow that can still be integrated back into the broader general conceptual learning mechanism. It is in this way, I argue, that we obtain a theory about our ability to rationalize

representations that are not conceptual representations, but are purely *indexical* or *group* representations with extension but no extension. And, similarly, it gives us a way to explain how we come to objectify representations that are purely *core* representations with intension but no extension.

According to this view, we can *rationalize* indexical or group representations by associating them with qualitative meanings that nevertheless fail to determine these representations. These group or indexical representations are still only determined by their reference to the world, but we can add descriptions, definitions, explanations, and other qualitative states of body and mind to them that have some kind of internal meaning to the mind. At the same time, we can have representations that are fundamentally core, or narrow in the kind of content that they impart to the mind– color is a good example; but we can go on to *add* to them an extension– objectifying them. Thus, the cup is not *redness*; rather the cup *is* or *possesses* redness. We've attributed what is fundamentally an internal meaning to an extension, while keeping as part of the representation the idea that the meaning of "redness" is still only determined by its reference to the internal meaning in the mind, and not to the extension (the cup) in the world.

In this dissertation I begin to develop a theory of cognition based on a reading of Peirce's work as offering a specialized theory of cognition. I argue that within this Peircean specialized cognition framework, we have both core cognition (or cognition about internal meanings that are innate); and group cognition (or cognition about external entities in the world that involves the internalization of external relational orders through a constitutional process that occurs via the taking on of bodily dispositions). In group cognition, it is this internalization of an external relational order in the body's own distributed muscular memory that allows us to access and reference "entities in the world" as inscribed in our own bodies. In this way, our reference to the world becomes really a reference to the ways in which we manipulate our bodies as things in the world that are part of an external relational order.

In the concluding chapter, I talk about the implications of this view of cognition in more detail, but I want to highlight here one of the main implications of this view. It is that if true, this theory of cognition stands to fundamentally change the relationship that sociology has to the cognitive sciences, and the relationship

that the cognitive sciences have to sociology with respect to the elaboration of a theory of cognition that is much more balanced in its treatment of narrow and wide content, and of core and group cognition. Such a view does not make it so that either narrow or wide content is primary and comes to determine the other. Instead, each is treated as a leg between which we have to evenly distribute our weight in order to have a good theory of how it is that our concepts stand.

Through my specialized cognition reading of Peirce, I argue that I've been able to begin articulating a theory of cognition that takes that stand. Critically, there is no empirical work in this dissertation. However, by articulating an empirically testable framework based on the idea of two collaborating specialized cognitions, and in articulating a theory of conceptual development associated with this framework, I hope to offer a resource for testing how this theory measures up to empirical data.

Overview of the Dissertation

This dissertation makes three main contributions. One is to the secondary literature on Peirce. I articulate in **Chapter 2**, a reading of Peirce as offering a *specialized* theory of cognition that maintains *two* kinds of specialized cognitions in addition to the general cognition that leads to conceptual knowledge. I show that this specialized theory of cognition is consistent throughout Peirce's academic life. As part of this contribution, I offer an interpretation of Peirce that makes sense of his universal categories, which are the best known aspects of his work. I argue in **Chapter 3** that Peirce is offering us the groundwork for a learning mechanism through these five universal categories. I offer a theory about what these five universal categories are when we view them as some kind of learning mechanism, and what the characteristics of this learning mechanism are. I make the case that Peirce's five universal categories can be seen as a theory about the mind's central processes as they are involved in conceptual development. I argue in **Chapter 3,** that it is only when all five universal categories are engaged in learning, that we acquire and can be said to "learn" knowledge about the world that is conscious and can speak to causal explanation. Also in **Chapter 3**, I focus on the idea of *degeneracy* in Peirce's work and its importance to a specialized theory of cognition.

Degeneracy, I show, allows the same domain-general concept learning mechanism to be modified so as to help us acquire different kinds of representations associated with different specialized cognitive domains. The degenerate versions of Peirce's learning mechanism – degenerate in the first and second degree– I argue, are inferential mechanisms defined over the different representational inputs of the specialized cognitive faculties of Feeling and Sensation of Reaction (Sensibility). The representational output of each faculty imparts different kinds of content to the mind. The two degenerate learning mechanisms that I describe give rise to representations that are not knowledge *per se*, but which collaborate in the way the mind constructs knowledge about the world.

In **Chapter 4**, I incorporate my reading of Peirce as offering a specialized theory of cognition into the contemporary context in both sociology of cognition and the cognitive sciences. First, I make the case that Peirce's second specialized cognitive faculty– sensation of reaction– is strikingly in line with Pierre Bourdieu's work on the acquisition of the habitus. I integrate their two approaches regarding the acquisition of our references to the world (wide content); and make the case that a Peircean-Bourdieusian framework addresses a well-known problem in the philosophy of mind and language regarding the development of a theory of reference that takes a balanced view between extension and intension (Kripke 1980, Putnam 1974).

I also develop a theory of conceptual development based on my reading of Peirce as offering a specialized theory of cognition. This theory of conceptual development also puts forward a learning mechanism that compares to the well-known "bootstrapping" mechanism proposed by Susan Carey in the cognitive sciences. I argue that Carey's bootstrapping mechanism is developed from the basis of a view that emphasizes just *one* kind of specialized cognition rather than two. Carey's work on core cognition, I argue, is very much in line with Peirce's specialized faculty of Feeling. My third contribution in this dissertation, and in this chapter, is to develop a cognitive theory of the second kind of specialized cognition, which is that of Peirce's specialized faculty of Sensation of Reaction (Sensability). I call this specialized cognition "group" cognition, for reasons that will become evident during this chapter.

These three contributions: 1) an alternative reading of Peirce; 2) the presentation of a theory of conceptual development and an associated cognitive learning mechanism; and 3) my claim that according to a specialized Peircean view of cognition, we have a second specialized kind of cognition that boils down to philosophical theory of reference– are the three main contributions of this dissertation.

Chapter 2: Peirce's Theory of Cognition and the Specialized Cognitions of Feeling, Sensibility (Sensation of Reaction), and Understanding

2.1 Introduction

Peirce's theory of cognition is not Kantian but Peircean

Peirce, in recent years, is not often read as offering a contemporary theory of cognition. Work in philosophy, which has greatly impacted how Peirce has come to be viewed in sociology and the cognitive sciences, has largely focused on Peirce's Abduction or Abductive inference (Fann 1970; Frankfurt 1958) – Peirce's ampliative inference; or on Peirce's Pragmatism – his description of a method for assessing the validity of definitions of concepts (Rorty 1982; Haack 1976; Hookway 1997; Hookway 2012; Misak 2004; Misak 2013). Despite the role that Abductive inference plays in Peirce's theory of cognition, as one of the inferences involved in a concept learning mechanism, Peirce's Abduction itself is not often read in relation to its role in a Peircean theory of cognition[2].

Work that has focused on Abduction has been largely restricted to the study of the logic of scientific inquiry, which pertains to questions on how we come up with our scientific hypotheses, and on what grounds these hypotheses can be shown to lead to truth (Harman 1965; Lipton 2004). Even in such cases, the focus has only recently shifted to Abduction as a creative process involved in the generation of hypotheses– a view of Abduction as the "logic" of inquiry (Campos 2011; McAuliffe 2015; Magnani 2001; Magnani 2009; Schurz 2008; Jantzen 2016). This trend comes as a change from a focus on the verification phase of Abduction, which involves the testing of generated hypotheses, and represents a challenge to the view that discovery is an illogical process outside the purview of philosophical investigation (Richardson 2006; Howard 2006; Reichenbach 1938).

[2] See Fann 1970 and Murphey 1961 for two notable exceptions.

This lack of focus on Peirce as offering a viable theory of cognition, and the splitting up of Peirce's philosophical legacy into numerous– adjacent– camps, seems puzzling given that Peirce himself, throughout his intellectual life, clearly saw his work as contributing to a theory of cognition. Peirce's writings are consistently littered with references to the nascent neuroscience of his days; and Peirce systematically looks for physiological mechanisms in the brain to support his theories on logic and mind's concept learning mechanism. Moreover, Peirce also relies on observations of his own and children's cognitive behavior to support his theories of mind and cognitive behavior[3]. Peirce makes substantial investments in crafting for himself a self-taught neuroscience to support his work on mind and concept learning. This self-crafted neuroscience pulls together many of the physiological findings of his days on visual perception and the retina (EP1:15, 1868), nerve cells and neuroplasticity (EP1:269, 1887-88), and memory (W2:234-5, 1868), to name a few examples.

Despite these signs that Peirce saw himself as contributing to cognition, and to what can only be described as a nascent field of cognitive science, the little that has been written on Peirce's theory of cognition has focused on two kinds of evaluations of Peirce. First, an evaluation that views Peirce's theory of cognition in light of his response to Descartes' view of cognition, documented in a small subset of writings– a series of essays written in 1868, "Questions Concerning Certain Faculties Claimed for Man", and "Some Consequences of Four Incapacities" (Haack 1982). Secondly, an evaluation that views Peirce's work on cognition in light of Immanuel Kant's theory of cognition (Murphey 1961; Tienne 1989; Radford 2004; Kaag 2014; Kaag 2005; Houser 1983). This latter approach to Peirce's work on cognition has covered the most primary material, given Peirce's repeated reference to Kant's work throughout his academic life. This second approach to Peirce's theory of cognition, which is the more grounded in Peirce's larger body of work, however, has been fairly damning of Peirce's theory of cognition.

In this camp, the work of Murrat Murphey (Murphey 1961) stands out for the thoroughness with which it makes its evaluation. Historian and Philosopher, Murray Murphey, offers a reading of Peirce's theory of cognition in light of Kant's theory of cognition and finds fault in Peirce's interpretation and integration of

[3] See Cadwallader 1985 and Murphy et al. 2021 for work that views Peirce's work as offering an example of early developmental psychology.

some of Kant's ideas in his own theory of cognition. While Murphey admits that Peirce was very deliberate in the ways in which he embraced or deviated from Kant's theory of cognition, Murphey struggles to find a framework that can make sense of Peirce's theory of cognition; which is clearly not Kantian, despite its nod of acknowledgement to Kant's work, and is its own truly novel theory of cognition.

Murphey settles on a reading of Peirce's theory of cognition that is incredibly damning, and treats Peirce's deviations from Kant harshly, as erroneous "misinterpretations" (Murphey 1961: 24), that reflect Peirce's "helpless" wanderings "(Murphey 1961: 54), and result in a system that holds many contradictions. However, there is reason to reevaluate this reading of Murphey's reading of Peirce's theory of cognition, which I argue, far outpaced the work on cognition even in Murphey's time. Murphey wrote his assessment of Peirce's theory of cognition in the 1960s, at a time when the cognitive sciences did not yet exist as an established field, and work in developmental psychology still languished in the shadows of Swiss psychologist, Jean Piaget. Peirce's hypothetical view of cognition, which emphasized an innate learning mechanism that constructed theoretical proposals about the world that needed to be confirmed through a subsequent experimental step, were not only out of step with his contemporaries, they were ahead even of Murphey's time. I argue that it is high time that we revisit Peirce's theory of cognition in light of a contemporary theory of cognition.

Nevertheless, Murphey's reading of Peirce through the lens of a Kantian theory of cognition seems to have set some interpretational trends that have stubbornly stuck. First, Murphey's view that Peirce's system of thought reflects not one, but several systems, which continue to share the same labels, even as they mean vastly different things to Peirce, reflects a view that remains popular in contemporary readings of Peirce. This is the view that takes Peirce as advocating for only one set of triadic categories of mind. Such a view maintains that Peirce has only three "universal" categories– Firstness, Secondness, and Thirdness– that he works on over decades, revises, and even re-engineers. Such a view, suggests that earlier versions of these categories are abandoned as Peirce adopts a new revision of his system. This is consistent with Murphey's interpretation that Peirce would revise his system, come to a new understanding of his categories, and keep some of his old terms to refer to new meanings within a new

system (Murphey 1961: 3). This view leads Murphey to argue that Peirce's system suffers from a "metaphysical" problem (Murphey 1961: 88) involving inconsistencies regarding how Peirce's three categories of mind can be said to relate to one another when they describe three different, and separate, worlds of experience.

Secondly, is Murphey's view that Peirce's system also suffers from a "logical" problem (Murphey 1961: 48-9, 88). This view too seems to have stuck in the literature. Murphey makes the case that Peirce's system suffers from a problem with how it defines the predication of characters– an important aspect of Peirce's concept learning mechanism (as we will see), which relates to how the mind experiences perceptual qualities. Murphey argues that Peirce conflates two definitions of predication. According to one view of predication, characters are inherited from classes that are held a priori to an experience. According to another view of predication, characters are predicated through the union of two classes which have characters in common. Murphey argues that Peirce seems to be conflating the two views of predication in his description of how things external to the mind come to possess the characters they possess vis-a-vis a particular mind. Murphey's frustration here is well-founded, I argue, but it founded in the failure to acknowledge an important aspect of Peirce's system, which is Peirce's view that we possess evolutionarily bequeathed characters that enable us to both impart characters through a relation of class inheritance, at the same time as these evolutionarily bequeathed characters are not enough to describe experience in and of themselves; and require a process of predication grounded in the *hypothetical* attribution of resemblance, or characters in *common*.

This view of "Feeling", or evolutionarily bequeathed neural associations, is a notion closely related to the idea of the contemporary cognitive science theory of core cognition which has been largely missing from the secondary literature. Moreover, its omission from Murphey's account of Peirce's theory of cognition, and of Peirce's concept learning mechanism, leads to precisely the logical problem that Murphey identifies. However, I argue that this problem lies not in Peirce's system– as it is resolved when we account for the role of "Feeling" in Peirce's concept learning mechanism– but rather, in an interpretation of Peirce's system that omits Peirce's account of "Feeling".

Lastly, Murphey struggles to grasp Peirce's system which – from a Kantian perspective– seems to be conflating two types of subjects: the transcendental subject, and the empirical subject (Murphey 1961:23). The question of subject, in Peirce's theory of cognition and description of a learning mechanism, is closely associated with the question of predication. Murphey argues that Peirce describes the object of cognition, viewed as outside of experience, as a Kantian transcendental object. Such an object is viewed to be out of experience, and thus cannot be accessed through reasoning. However, in Murphey's reading of him, Peirce seems to be arguing that such an object cannot be truly outside of cognition, since it must involve mental, or cognitive, elements in order to be present to the mind. Murphey takes Peirce to conflate the transcendental object– an object outside of experience, with the empirical object– an object that can be experimented upon in order to reveal its properties. This creates a tension in Peirce's system that remains unresolved from a Kantian perspective. However, I argue that such a perspective misses Peirce's views on experimentation and simulation in an "action room" that rolls out in time (W1:92, 1861) and that involves the *comparison* of an attentional (synthesized) subject to the hypothesized substance.

A reading of Peirce that omits his views on experimentation, simulation, time, and attention, does in fact fail to explain how an object out of cognition can be considered as an object that can be tested in cognition. However, once again, this tension in Peirce's system comes less from Peirce's system itself– as this tension is explained away when we account for the role of attentional objects, or "Efforts", in Peirce's system– but instead seem to lie in an interpretation of Peirce's system that omits Peirce's accounts of "Efforts".

A possible legacy of interpretations like Murpheys, which assume discontinuity and inconsistency, in Peirce's system, may be limited work in the secondary literature on what I call Peirce's three categories of innateness or consciousness, which include Feeling, and the members of this category, which are called "feelings"; as well as, Sensation of reaction, and the members of this category, which are called "efforts". These three categories of innateness or consciousness, I argue, stand as distinct from Peirce's five universal categories, which have gained the most attention in the secondary literature. Peirce's five

universal categories include the three subcategories of: Qualities, Relations, and Representation. Consequently, the second and third interpretational problems associated with Murphey's reading of Peirce, which seems to have stuck in the secondary literature, can be traced back to the first– the failure to acknowledge not one, but several, triads in Peirce's system which play different roles in his system and in his theory of cognition.

I argue in this chapter that Peirce's theory of cognition, as well as his articulation of a conceptual mechanism associated with said cognition, are themes that he systematically builds out over the course of decades. We can see this focus beginning with some of his earliest writings. Peirce's work in this area, I argue, involves a relation among three triadic theories. First, I argue that Peirce advances a theory of cognition that maintains three specialized faculties of cognition in the mind– the faculties of Feeling, Sensation of Reaction (Sensibility), and General Conceptions. Secondly, I argue that he articulates the representations associated with these different kinds of cognitions – calling them "impulses". These "impulses" correspond to what are usually referred to as Peirce's three "persons": I, It, and Thou. Lastly, I argue that Peirce articulates three learning mechanisms that result in feelings, efforts, and conceptions– all of which utilize one or both of Peirce's ampliative inferences– abduction (or "hypothesis" by its earlier name), and induction.

A Peircean account of group and core cognition

I do not offer, here, a full exposition of Peirce's theory concepts, associated with his work on the cognition of general conceptions. Instead, I focus on the two other types of cognition that have received relatively little attention in the secondary literature– the cognition of feelings and efforts. I argue that the former, the cognition of feelings, relates directly to the contemporary cognitive theory of "core" cognition; while the latter– the cognition of efforts, relates to work on attentional concepts and mental "mindscapes", in the sociology of cognition. I take an indepth look at these two kinds of cognitions in Peirce's system, and the ways in which they support the cognition of general conceptions. I argue that Peirce's account of feelings (core cognition) and efforts (group cognition) differ in ways important to current discussions. In Peirce's

system, core cognition and its representational elements – feelings, are evolutionarily bequeathed, implemented as neural associations or circuits, and undetermined by any particular set of experience. Group cognition and its representational elements – efforts, are learned patterns of attention that describe what Peirce calls “fields” or continuum. Group cognitions in Peirce’s system are acquired from structured aspects of the environment that are ubiquitous, and for this reason impart universal and necessary elements to thoughts.

Moreover, Peirce’s work on feelings (representational elements of core cognition) and efforts (representational elements of group cognition), goes beyond a simple description of their role in cognition, it also describes the inferential processes by which feelings and efforts arise in consciousness. Moreover, it offers a clear distinction between core and group cognition on one hand, and the full cognition of general conceptions on the other. For Peirce, while core cognition informs the depth, or comprehension, of general conceptions; group cognition informs the breadth, extension or subject-selection, of general conceptions. Consequently, while more and more elaborate core or group representations can be inferred, such inferences do not rise to the level of conceptual knowledge until they gain either a subject, i.e. breadth (in the case of core cognition); or a predicate, i.e depth (in the case of group cognition). This clear distinction between core, group, and full cognition in Peirce’s system stands to contribute to ongoing contemporary debates on the nature, and limits, of core cognition. Moreover, it offers an articulation of core and group cognition that puts them, for the first time, in one framework; while incorporating theoretical aspects that the sociology of cognition has been stressing for a long time. Group cognition is not core cognition, for Peirce, and differs from core cognition in important and systematic ways.

Chapter structure

In order to address these omissions of feelings and efforts in contemporary readings of Peirce’s theory of cognition and concept learning mechanism, I begin at the beginning, and engage in a chronological reading of Peirce’s work from 1857 to his mature years. I closely track his progress from 1857, when he articulated his first triad related to a theory of mind and cognition, to 1867 when he publicly unveiled the

universal categories of mind – which include one of his most well known triads (Quality, Relation, and Representation). I track these years most closely as Peirce's system saw the most change during this time, however, I extend my scope to Peirce's mature years. I show that Peirce's changes to his theory of cognition, which often include new triads, are for the most part not refutations or revisions of earlier systems. Instead, I argue that Peirce is consistent in his use of old terms and old triads, and that he incorporates them in new versions of his system keeping their meanings fairly consistent. Instead of a story in which Peirce is rebuilding his theoretical house from the inside out (Murphey 1961:3), we get a story in which Peirce is gradually adding extensions to his theoretical home – keeping old parts of the house largely the same.

I argue that such extensions to his theoretical home take the form of a nesting structure in which Peirce gradually adds complexity and subdivisions to his old categories; and that he usually adds these subdivisions in terms of triads. We thus get three nested triadic theoretical structures in Peirce's theory of cognition. An outermost triad consisting of his triadic theory of the elements of consciousness (the three faculties of Feeling, Sensation, and Understanding), which I argue put forward three kinds of cognition (cognitions of feelings, cognitions of efforts, and cognitions of general conceptions). A middle triad consisting of the broad strokes of the representational "worlds" or domains that are associated with these three faculties (Peirce's three "persons" or "impulses": I, IT, and THOU). And an innermost triad consisting of the mechanics of Peirce's hypothetical learning mechanism (Quality, Relation, and Representation). The outermost categories that bookend this innermost triad (Peirce's categories "without content"), Substance and Being, map onto the middle triad of IT and I, with the innermost triad mapping onto the THOU in Peirce's middle triad.

In other words, I argue that Peirce's theory of cognition posits three kinds of cognition (Feeling, Sensation, and Understanding); which have their own synthesizing mechanisms that result in distinct representational elements, or "worlds" of experience (I, IT, and THOU); and that two of these distinct kinds of representational elements are brought together through a representational learning mechanism involving hypothetical inference (Quality, Relation, and Representation). The representational learning

mechanism that makes explicit use of hypothetical inference, and gives rise to the conceptual representation and meanings associated with the world of conscious experience (THOU), is itself constructed by bridging the synthesizing mechanisms that give rise to the experiential "worlds" of I and IT.

I conclude with a discussion of how my layered triadic view of Peirce's theory of cognition compares to that put forward by Murphey, which shares many interpretational elements common with contemporary readings of Peirce. I reflect briefly on Peirce's perspective on the language of thought and its implications for contemporary discussions on that topic. I finally return to the primary subject matter of the dissertation, and engage in a discussion of the implications of Peirce's three kinds of cognition for a view of cognition that maintains a distinction between core and group cognition.

2.2 Peirce's three elements of the soul and the roots of his learning mechanism in influxual causal relations

Peirce's view that we have cognitions that are not full conceptual knowledge

Peirce introduces early the idea that we can have cognitions of things that we do not fully conceive, so long as we can articulate a definition of such things. Consequently, "conceiving" – taken as full conceptual knowledge of some kind– is not a necessary condition for definition; nor is definition sufficient for full conceptual knowledge. Rather, the ability of a thing to be defined in cognition is the basis for "syllogizing", i.e. the basis for inference. And inference – described at this time in terms of syllogisms or chains of propositional statements via rules for going from one statement to the next– can be conducted over definitions that do not of themselves lead to full conceptual knowledge.

Peirce's argument from 1860, which I argue anticipates his views on cognition, can be broken down as follows.

1. Whatever can be "defined" (i.e. represented) can be "syllogised" (i.e. inferred);

2. Whatever can be "syllogised" (i.e. inferred) can be "discussed" (i.e. we can have cognitions about);
3. We can "discuss" (i.e. we can have cognitions about) and "comprehend" (i.e. have in consciousness) things whose "definition" (i.e. representation) we cannot "conceive" (i.e. have full conceptual knowledge of), or whose conceptual "synthesis" (i.e. the process that gives rise to conceptual knowledge) cannot be "completed";
4. Whatever can be "defined" (i.e. represented) can be "discussed" (i.e. we can have cognitions about), but not always "conceived" (i.e. have full conceptual knowledge of);

(W1:37, 1860)

5. Thus, we can "define" (i.e. represent) many things of which we cannot "conceive" (i.e. have full conceptual knowledge of).

(W1:40, 1860)

I put in parentheses my interpretations of Peirce's terms: defined, syllogized, discussed, and conceived. These interpretations substitute for terms used in 1860, other terms that Peirce used interchangeably in his intellectual life. These interpreted substitutions are, of course, not without challenge. But my goal here is not to prove, with only this particular example, what Peirce meant, but to begin establishing the interpretative lens that I will be using throughout this dissertation. The proof, or rather, justification, for this interpretation will be in the pudding– in the purchase that it affords us in the form of: offering a more simple interpretative hypothesis for Peirce's large and complex body of work, and of addressing interpretational difficulties that have emerged in the secondary literature on Peirce.

Such a view on what can be reasoned about is important for a theory of cognition that maintains Kant's view that cognition is representational, and that every representational cognition it itself inferred from a previous cognition. This is a view that Peirce explicitly maintains throughout his intellectual life (see for example, his views as expressed in "Some Consequences of Four Incapacities" (1868). In the first of three essays, "Three Essays on Infinity and God", Peirce seems to be making a case for a view of cognition that allows us to have cognitions (or "discuss") things which we do not have full conceptual

knowledge about (i.e. things that we do not "conceive"), so long as we can articulate a syllogistic process of inference through which such representational definitions can be generated.

This is, of course, not the most typical way in which this set of essays is usually read. Peirce's three essays on infinity and God are usually read in light of Peirce's thoughts about infinity, and other concepts whose synthesis in the mind cannot be completed (Murphey 1961:43-4). However, I argue that these early essays are an entry point into a Peircean view of cognition that does not maintain only one kind of cognition, but allows for cognitions that do not reach full or "complete" synthesis, and do not represent full conceptual knowledge.

All of Peirce's nested triads are leveraged in the construction of a theory of cognition that sees it crowning achievement to be the articulation of a learning mechanism that can explain the attainment of conceptual knowledge (thought) that is true of a world external to the mind (thought of). Consequently, these three nested triadic structures of cognition fit into a Peircean challenge to a Kantian style theory of cognition which maintains a distinction between the noumenon (the thing-in-itself, or outside of cognition), and the phenomenon (the thing as apprehended by cognition). We, thus, must also begin our analysis of Peirce's system with a description of his challenge of Kant's theory of cognition, and his theory of "influx", which articulates the need for a learning mechanism that can account for the particular causal relation between noumenon and phenomenon that Peirce calls "influx", i.e. a "sustaining" causal relation (W1:92, 1981).

Peirce's conversation on the various cognitions of which the mind is capable center around a discussion on the "innate"[4] "faculties"[5] of mind. Such a conversation relies on an understanding of what Peirce means by a "complete" synthesis and conception. The two conversations on the mechanism through which the synthesis of general conceptions is achieved, and the conversation on the innate faculties of mind, are thus deeply bound together. I do not try to separate them in this chapter, and instead track them as they flow in and out of one another over time.

[4] See W1:80-82, 1861 ("A Treatise on Metaphysics").
[5] Starting as early as W1:14, 1857 ("Raphael and Michael Angelo compared as men") and W1:26, 1859 ("Analysis of Genius").

Time and causation: Influx and its moving effect

The idea of “influx” is very important in Peirce’s early writings, and is often synonymous with “synthesis” (W1:41, 1859). Murphey takes the term, “influx”, to refer to the “inheritance of a quality” (Murphey 1961:37). But as we will see, this is a term that means so much more to Peirce, and anticipates key aspects of his mature conceptual learning mechanism which he calls “synthesis”. Peirce associates the term “influx” with the idea of causation. For him, Influx is a sequence of causally related events that occurs “in time” (W1:44, 1860). The idea of a causal relation of influx describes a relation between cause and effect that has been rendered qualitatively different by the idea of an infinite sequence of events in time.

The relationship between time and causality is an important one for Peirce, and he defines three kinds of causal relations explicitly in terms of time and the kinds of causal dependencies that time enables. In a hypothetical world where there is only one instant of time, Peirce argues that there cannot be any causal relations of cause and effect, and this requires the monitoring of events over time. Event A occurs before event B, and thus we can begin to marshall an argument that A causes B. However, such an argument cannot be made if A occurs after B, or if A and B occur at the same time. This is Peirce’s point about the relationship between time and causation.

Peirce argues that because of the nature of our perception of time, we can only speak of three kinds of causation. First, we can perceive causal relations of “community” in which we only observe one time point (suspending for now the question of whether there can be an instantaneous point of time), as causal relations of “community” (W1:38, 1859). In a causal relation of community, there can be no causal relation between two events because everything is happening at once, in one instantaneous moment in time. Peirce goes to argue that in such a state of things, we cannot even speak of “events” as such (W1:38, 1859), because events themselves are relations or dependencies.

> Let us think and consider the object of our thought (for convenience sake) as an event. Every event is a relation or dependency. The motion of a ball through the air, for example, is a complex event composed of an indefinite number of elementary events each of which is the relation of the ball at any moment to itself at the previous moment.
>
> (W1:38, 1859)

Saying that something happened, or occurred, implies that there is a reason or mechanism that led to such an occurrence. Otherwise, the occurrence would be indistinguishable from others, and could not even be said to have "occured". It would simply be something that is– it always was and always would be so. To speak of an event or occurrence, for Peirce, thus implies to speak of a change in state and implies relations in time.

The second kind of causal relation or dependency, that Peirce identifies involves two moments in time – Tn and T2 – *with an arbitrary series of time steps in between*. This causal relation involves a relation or dependence between one moment in time (Tn, the cause) and the *last* moment (T2, the effect). Peirce reserves for this second form of causal relation enabled by time the term "causality". In this kind of causal relation, enabled by time, everything that occurred before an event in a series is a potential cause for that event, and so on, ending at the last event. Such that, any event that happened before the last event in a series is a potential cause for it.

> The second necessary mode of (dependence) is causality, which is the mode of dependence everything at each moment has upon things at the last moment.
>
> (W1:38, 1859)

Consequently, causality implies a flow of time in which certain things can be said to happen prior to others. It also implies a *last* event in the series– which is the effect whose cause in time we are trying to determine.

The last kind of causal relation, or dependency, that Peirce argues is enabled by time is the causal relation of “influx”. This kind of causal relation has a peculiar relation between events in time, in that it describes the relation between a “first” event (T1, the cause) and a subsequent event (Tn, the effect) *when there has been an arbitrary number of time steps between T1 and Tn*. Unlike in the causal relation of causation, where we have a last event firmly identified, there is no last event in influx– we are dealing with a continuously moving stream of time with no fixed end point. Instead, the stream of time and causal relations is “sustained” (W1:92, 1861) by a first event (T1), which is its cause. In other words, instead of being sustained by the last event (its effect) in a series, a causal relation of influx is sustained by its first event (its cause).

Peirce argues that, in dealing with cognition, or with “the object[s] of our thought[s]” (W1:38, 1859), this kind of causal dependence is the causal relation in which “substance” and “form”, “things” and “qualities” (W1:38, 1859), as well as the “object” and “noumenon” (W1:40, 1859) (as we will soon see) are involved in. Peirce gives a clear definition of influx in 1861, that can help us understand why he sees influx to be the causal relation of interest in a theory of cognition involving “things” and their “qualities” to a mind.

> Now from one fact another follows in time, the relation is now real and forcible. The further we go back in time the more and more is the cause the origin of the effect, the greater and greater is the dependency…till we arrive at the first cause; this, since our faculty cannot think of a first in time (which, indeed, is not), becomes that which sustains this whole train of cause and effect—that from which all things perpetually emanate.
>
> (W1:92, 1861)

From this definition of the relation between time and the causal relations that it can enable, it is clear that Peirce’s definition of influx refers to a situation when we are dealing with a “first” cause, in a *dynamic* process with no set “last” event, or effect. Such a relation is in many ways the opposite of the relation of causality when we have a “last” event, or effect, and are trying to determine its cause from among a set of events which have occurred earlier in time. Because there is a definite end point or effect, in the relation

of causality, the set size does not expand indefinitely. Consequently, in the relation of causality, we are selecting a cause from among a finite set of prior events. In the case of influx, however, the cause– with respect to its effect– is a moving target that increasingly approaches the “origin” or “first” event “in time”, i.e. in a series of events. As the dynamic continues to generate a larger and larger set of events, with no last event, the distance between the moving last event (the effect), and and its cause continues to grow, until the cause seems to approaches the origin– or “first” event in the series; which, as Peirce makes sure to point out, it is not. But since we are now dealing with infinite series and limits, the cause continues to approach the origin– or first event in the series– as the dynamic continues to generate events, and the perpetually moving “last” effect flows further and further away from its cause.

Peirce makes the case that this is precisely the relation in cognition between the cause of a cognition and our experience of it. I argue that he maintains this view because he sees cognition as a dynamic process with no “last” effect, since every thought about a past event is itself a new cognition (see Peirce in “Law of Mind” (1892)). Consequently, for Peirce, cognition is a perpetual dynamic with no last event, and the relationship between a cognition and its cause must be that of influx, i.e. influxual dependency. Consequently, the noumenon– the thing external to cognition and consciousness– that began or caused the process of cognition that led to our experience of it is constantly getting further and further away from us. Moreover, by the time we are conscious of it, it approaches the first event in time– which Peirce argues we are not cognitively capable of thinking of.

How then, in such a view of mind and cognition, do we come to have our experiences? Peirce seems to take influx, or influxual dependency, as more than a metaphysical description of the state of things. Instead, he also seems to view it as a mechanism, or set of operations, that our mind employs in order to *construct* our experiences. In its guise as a mechanism, Peirce calls influx a “synthesis”. In the same series of essays on infinity and God, Peirce describes a use of influxual dependency as a mechanism for bringing together a quality (“good”) and a thing (“man”), in order to arrive at a new conception: “good man”.

> If we can think of a good man, it is because in the first place we have a notion of man and in the second place we have the conception of good and in the third place we can combine one conception with the other. When this is done, I express the synthesis by saying that an influxual dependency of *good* upon *man* is conceived of.
>
> (W1:43, 1859)

At this point in time, Peirce has not yet assigned a definition to the term “notion” and “conception”, which he does later. So I will not read them here as meaning anything other than what he describes earlier as the two kinds of things that synthesis relates– things and qualities (W1:38, 1859).

Peirce repeats this example again later, in a subsequent essay in this series.

> If we can think of a good man, it is because in the first place we have a notion of *man* and in the second place we have the conception of *good* and in the third place we can form the synthesis of these two. This synthesis I express by saying that an influxual dependency of good and man is conceived of.
>
> (W1:43, 1859)

Peirce argues that this particular mode of causal relation– which may also be a mechanism that mind uses to arrive at new conceptions involving establishing a relation between things and qualities that are *already* in the mind as notions and conceptions (loosely defined)– is also the causal relation that sustains the relation between a thing out of consciousness, or out of the mind (the noumenon); and a thing in consciousness, or in the mind (the object).

The influxual dependency between the Thought-of (Noumenon) and the Object of thought

Peirce offers a model of his understanding of cognition, consciousness, and what is in (and out) of consciousness very early. He adopts this view in a reaction against Kant’s understanding of cognition and consciousness. Characteristic of Peirce’s penchant for the use of figures and diagrams in expressing his

thoughts, Peirce draws two figures which he uses to compare his view of cognition to Kant's. I reproduce these two figures below.

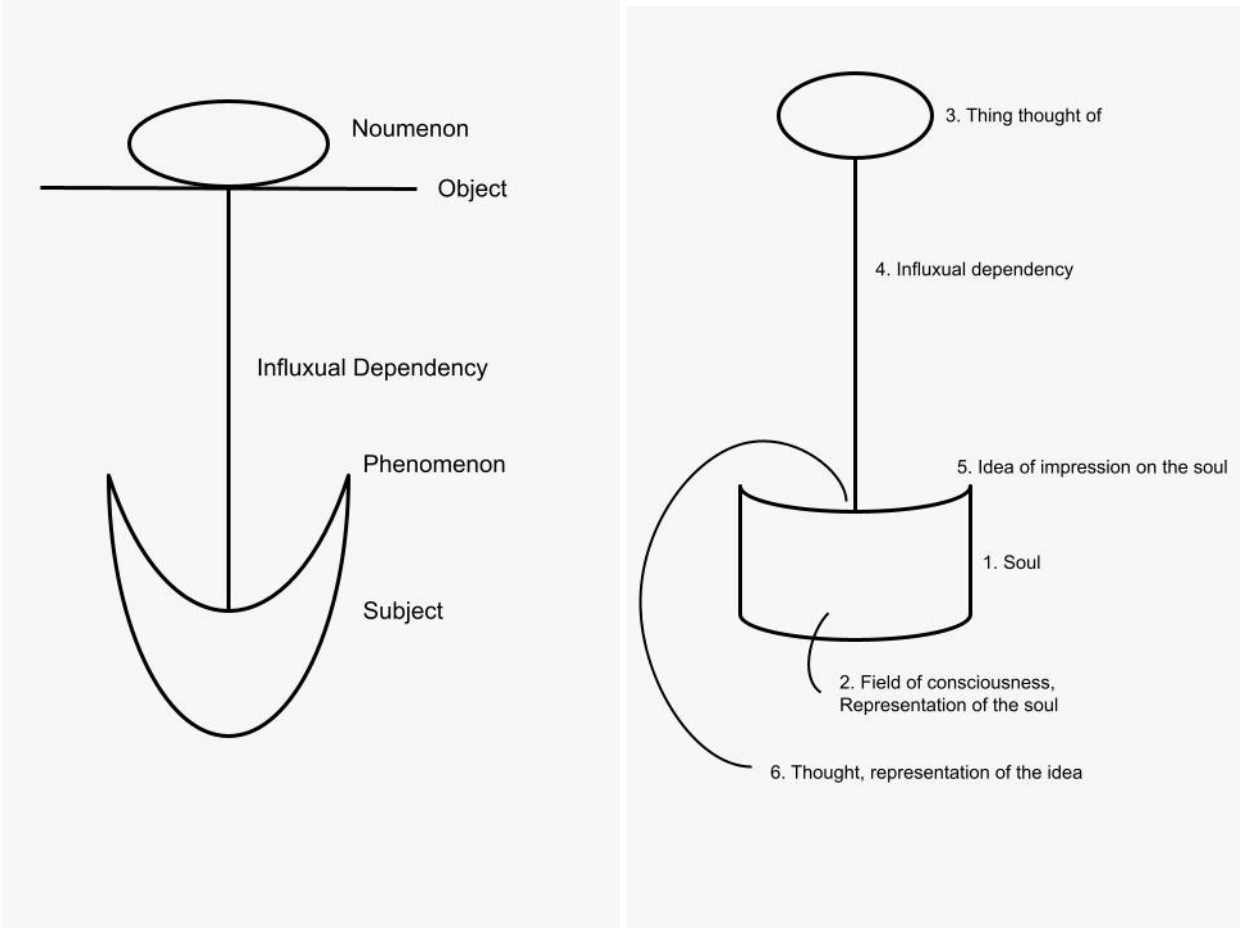


Figure 1: Peirce's illustration of Kant's theory of cognition (left). Peirce's illustration of his own theory of cognition (right). Reproduced from "Writings of Charles Sanders Peirce: Volume 1", p. 39-40.

Peirce's "Thing thought-of" here corresponds to Kant's "Noumenon" in all but one important respect. Peirce argues that unlike Kant's "Noumenon" which is wholly out of consciousness and is the thing "in itself", the "Thing thought-of" is the Noumenon as considered or regarded by thought or cognition. In other words, Peirce denies that we can even regard the Noumenon "in itself". In order to be involved in a process of cognition, the Noumenon must be capable of being "thought-of". In addition Peirce relegates to the "soul" or the "phenomenon" a host of other elements not to be found in Kant. These include "idea[s]" or "impression[s]" upon the soul; a "field" of consciousness, and "thought" proper. These elements are, at

this point, not defined in Peirce's work, but we will see these terms return as important centerpieces in Peirce's mature theory of cognition.

Consequently, the main difference between Peirce's view of cognition and Kant's view, as Peirce sees it, is not so much about the elements, but about the place of influxual dependency. Peirce argues that synthesis, or influxual dependency, does not occur between an object of thought and the phenomenal experience of that object. As we will see, Peirce sees this progress as not involving any synthesis at all, just pure analytic simplicity or deduction. Instead, Peirce argues that the influx, or synthesis, occurs between the noumenon– a thing considered as out of consciousness, and the object – a thing considered as within experience.

Peirce sees this difference between his and Kant's view to boil down to a question about where we place the boundary of consciousness (W1:515, 1866). As a mechanism that the mind uses in cognition, influx or synthesis involves mental elements. Consequently, by moving influxual dependency to *precede* the object of thought in his diagram, Peirce is making the case that the object of thought is itself derived through a process of mind. Peirce has thus moved up the boundary between in and out, of consciousness and in and out of mind, in his view of cognition. This leaves the noumenon– the thing out of consciousness, directly outside the boundaries of consciousness; yet, still interacting with it in some way. This becomes the way in which Peirce frames the problem of cognition in terms of explaining how the thing out of consciousness comes to be in consciousness, and in thought.

For Peirce, the process of influxual dependency is what gives rise to conceptions in the mind – either to conceptions that involve a relation among previous elements that are in the mind (as in the synthesis of "good man" from the notion of "good" and the conception of "man"); or to conceptions that arise from a relation of something that is out of the mind and things that are in the mind (as in the synthesis, or influxual dependency, of the object of thought from the "noumenon", which is outside the mind, and some as-of-yet underspecified elements that are in the mind).

Peirce returns to these themes in a later draft of an essay, “A Treatise On Metaphysics” (1861). In this work, he once again presents his figures of a Kantian and Peircean view of cognition. In this piece, Peirce offers some additional details. Peirce, here, articulates that his rejection of “common” interpretations of Kant’s cognition lies in a rejection of the idea that we have knowledge directly and automatically without “evolv[ing] it for ourselves" (W1:60, 1861), in a process that “affect[s]” the things that we know (W1:61, 1861). This theme of work, or of a transformative process, involved in conceptual knowledge is one that continues throughout the essay, and Peirce’s work. However, by emphasizing this process, Peirce is not saying here that we do not have any “immediate” elements of cognition. Rather, he is saying something much more nuanced. Peirce seems to be arguing that our knowledge of the “Thought-of”, or our conceptions, cannot be known immediately, and must be the result of some process. At the same time, Peirce is clear that this process involves “immediately” known elements.

Peirce, in this work, makes an interesting distinction between the “Thing thought-of” and the elements of “thought”. Peirce argues that the “Thing thought-of” is something that we know only *mediately*, as the result of some process (W1:62, 1861). In the meanwhile, “thought”– which includes “impression[s]” of the Thing thought-of on the soul that have not yet been represented as consciousness (consciousness being the representation of the soul)– is something which we know “immediately” (W1:62, 1861). This interesting, and initially counter-intuitive, distinction between “Thing thought-of” as mediately known – i.e., as the result of a process, and “Thought” as immediately known; is one that (as we will see) only makes sense in light of a view of cognition with innate, inherited, elements.

Peirce’s faculties of mind: corporeal, corporeal-mental, and mental

In “A Treatise On Metaphysics” (1861), Peirce tackles directly this question of innateness, and of innate faculties of mind. In this work, Peirce brings to the foreground a theme that he has been ruminating since at least 1857[6]– that the human mind has *innate faculties*. However, Peirce means something specific by each of these terms– by the term “faculty”, and by the term “innate”. One of Peirce’s earlier definitions of

[6] See W1:15, “Raphael and Michael Angelo compared as men”.

faculties of mind makes clear that he means by the term "faculty" something peculiar to his system, that may differ from the use of the term elsewhere.

> *A FACULTY is an original power of doing a SPECIAL thing*. I will not venture to state positively that this is the meaning established by usage. I only wish to use it so, myself….I insist he (the man of genius) has special powers inborn—**faculties**…. all who do believe in innate ideas must also believe in **faculties**.
>
> (W1:26, 1859)

Peirce wishes to focus on *mental* faculties, but he gives examples of *physical* or "bodily" faculties. For example, he writes regarding bodily faculties: " I have a faculty of bending my arm in one direction and have none of bending it in any other" (W1:26, 1859). Peirce means these similar kinds of special, modular[7], workings of cognition in his references to *mental* faculties.

> The longest vibrations which the eye perceives measure $\frac{1}{40{,}000}$ of an inch; the shortest vibrations which the ear perceives measure $\frac{1}{2}$ an inch. Supposing the eye were delicate enough to perceive any of the intermediate vibrations we should *see* them. Supposing the ear delicate enough to perceive the same vibrations we should *hear* them. Accordingly we not only have bodily organs for receiving certain vibrations, but also in ourselves faculties of seeing and of hearing. And it is not difficult to see that this must hold good in all cases that special functions always imply speciality of organism or of faculty.
>
> (W1:27, 1859)

As we can see from the passage above, Peirce links at least some of the mental faculties that he believes the human mind must have to the senses. In this way, these mental faculties act as dedicated processors of input which are modular– in that they are specialized and associated with only a certain kind of input and output. However, some of the mental faculties that Peirce lists, such as "remembering and recollecting", do not relate to the senses, but to memory.

[7] See Jerry Fodor's "The Modularity of Mind" (Fodor, 1983), for an influential work on innate modules of cognition.

> Indeed it is obviously inevitable that whatever has organs has **faculties**; and so it is with those actions which arc on the boundaries between the mental and the corporeal but which still depend upon or are connected with a complexity of organism, as seeing, remembering and recollecting.
>
> (W1:27, 1859)

Consequently, Peirce sets out to list the "special functions" of human perception and cognition, and to derive from this list a set of broader categories that "imply speciality of organism or of faculty". It is not a far stretch to call such a list a list of "special" categories.

Peirce undertakes this task of coming up with a list of "special functions" of human perception and cognition, and crafting from it a smaller list of "special" faculties or categories that same year– in 1859. In a notebook from that year, he makes an attempt and drafts the following list, labeled under the headline "On the Classification of Human Faculties" (W1:8, 1959).

> Man 1 awakens and rouses himself
>
> 2 he sees
>
> 3 he thinks
>
> 4 he desires
>
> 5 he does
>
> 6 he enjoys and suffers
>
> 7 he respects and loves
>
> I have elsewhere advanced the classification of the I-impulse, the it-impulse and the Thou-impulse, but that is not a classification according to faculties. That the present classification includes everything needs no proof, everything is there which has been inserted into any other system.
>
> (W1:8, 1859)

This is not Peirce's first attempt at drawing up a list of "special" functions or faculties. But I begin here, because it stands in good juxtaposition to previous attempts at drawing this list. Peirce lists here a list classifying the mind "according to faculties". This list does not seem organized according to an underlying unitary logic, but rather, seems to attempt to capture faculties mentioned elsewhere, as Peirce remarks that "everything is there which has been inserted into any other system". What is more interesting, however, is the relationship Peirce draws between faculty and "impulse".

Peirce writes that he has elsewhere undertaken a classification of the mind, not in terms of these special modular faculties, but in terms of impulses. He lists three such impulses: "the I-impulse", the "it-impulse" and the "Thou-impulse". And in fact, when we go back in time in Peirce's notes, we see that he has done just that. In 1857, Peirce draws a figure that establishes a relation between impulses, faculty, and the "soul", which I take to refer to cognition in general.



Figure 2: Peirce's faculties of the soul and associated "impulses". Reproduced from "Writings of Charles Sanders Peirce: Volume 1", p. 4.

The figure establishes an equivalency between "Faculty" and "Impulse" which both feed into the Soul and contribute to the production of three elements: elements of "I", elements of "THOU", and elements of "IT". The terms "I", "IT" and "THOU", are commonly referred to as Peirce's "three persons", and are considered by Murphey to be a precursor to Peirce's later system of categories (Murphey 1961: 52-3). However, I maintain that this is not quite what is going on. I dive more deeply into the three persons, I, IT, and THOU, and Peirce's categories later on in this chapter. For now, I focus on the relationship between Peirce's three persons, which he calls "impulse[s]", and his "special" faculties.

One more piece of writing, from 1857, helps us understand the relationship Peirce saw between his three impulses, and his "special" faculties. In this piece, Peirce undertakes a comparison of two men – Raphael and Michael Angelo– according to his developing scheme for making sense of minds. Peirce comes to the conclusion that these two men's genius came from having minds that worked in different ways and exhibited a superior grasp of different faculties. Following and odd, naive (Peirce was 17 or 18 years old at the time), and at first glance, gender essentialist, line of reasoning, Peirce comes to the conclusion that Raphael and Michael– both men– differed in having minds that tended femininity in one case, and masculinity on the other. And that this showed that the faculty of "understanding" or of the "intellect" was not the only faculty that the human mind possesses.

Peirce describes this second, "feminine" faculty, that nevertheless men also possessed as "the heart" (W1:14-5, 1857). Moreover, Peirce argues that a third faculty, that of the senses, was also distinguished from the faculty of understanding, or intellect, and from the faculty of the heart, forming a third "distinct element of the soul" (W1:15, 1857). Despite the odd, gender essentialist, way in which Peirce comes to this list, we see that this division of the mind is one that persists and develops in Peirce's work. I list Peirce's characterizations of the three faculties of mind below:

> 1. The Intellect &c. or that which says I,
> 2. The Heart &c. or that which says THOU,
> 3. The Sense &c. or that which says IT,
>
> (W1:15, 1857)

This piece is particularly helpful because of the ways in which it relates Peirce's modular faculties from 1859, his smaller list of three "elements" of the soul listed here in 1857, which he also refers to as "faculty" of perhaps a different sort; and his list of "impulses" also from 1857. My interpretation of this relation is that Peirce is referring to two kinds of faculties– faculties at the "boundaries" of the mental and "corporeal" (W1:27, 1869), and faculties of thought – i.e. cognitive faculties. Both are "specialized" and operate over a specialized input and have a specialized output. I show this first with Peirce's mental-corporeal special

faculties, before moving on to his three mental or cognitive faculties (which he also calls “elements” of the soul or of cognition). According to this view, all three kinds of faculties that Peirce describes– the “bodily” or corporeal, the mental-corporeal, and the mental are thus modular faculties, and “special” in the sense of being specialized– taking in a particular kind of input and conducting a specialized action over that input. Peirce’s faculties of thought or cognition, his three “cognitive” faculties labeled here as the “elements of the soul” are particularly interesting since Peirce describes them as giving rise to three different kinds of outputs, which are Peirce’s “impulses”-- the “I”, “THOU”, and “IT”. In this way, Peirce’s three specialized mental faculties– according to my interpretation– are three different kinds of cognitions altogether.

Peirce’s mapping between specialized faculties, kinds of cognitions, and outputs of cognition was not yet complete in the late 1850s. We will see Peirce change his mind from his first notes in 1857 on the relation between the three kinds of cognitions and the three kinds of impulses; however, Peirce remains consistent in his commitment to three kinds of cognitions and three kinds of impulses. Nevertheless, Peirce does not return to his work on corporeal (bodily) and mental-corporeal faculties. With respect to his mental-corporeal faculties in particular, this is not to say that he discards the idea. More than anything, it may reveal a change in emphasis. Peirce sees the modular, specialized, mental-corporeal faculties as occupying a space at the “boundaries” of the “corporeal” and the “mental” (W1:27, 1859). Peirce himself moves squarely towards the mental, and towards a theory of cognition viewed through the lens of logic and inference. Such a view of cognition may operate over an assumption of modular faculties without stating such modules explicitly. In fact, as Peirce’s system matures, this seems to be exactly the kind of distinction that he makes regarding what is within the purview of his work on cognition and what is out of it.

Late Peirce consistently argues that there are two sets of categories involved in a classification of mind– a set of “universal categories” involved in the mind’s inferential mechanism, and a set of “special categories” that Peirce not only does not see the need to elaborate in order to explain his system. Some in the secondary literature have gone in pursuit of Peirce’s second set of “special” categories (Atkins

2010). Atkins 2012, for example, who makes a case for the importance of this second set of categories to Peirce's system, argues that these special categories can be derived from Peirce's work on chemistry, and Peirce's use of ideas from chemistry in his discussions of representations. I show, however, later in this chapter, that Peirce's work on chemistry finds a very clear place in his work on the universal categories and the mind's inferential learning mechanism. This is a strike against a view that takes Peirce's work on chemistry to be the basis for his special categories. A better explanation for where to look for Peirce's special categories, I believe, is his work on the "special" modular faculties of mind. Such work, I argue, much as it has found purchase in contemporary theories of cognition (Carey 2009), could be a helpful complementary extension of Peirce's work on general cognition.

Regardless of which special faculties (corporeal, corporeal-mental, or mental) Peirce is referring to, in 1861 he makes clear that he sees these faculties as giving rise to a particular kind of output– to "simple conceptions".

> If there is any positive science of psychology…it must be that the mind is more than one unit. It must have parts, and these will be faculties. Each of these faculties will have special functions and these functions will be simple conceptions. We can only know faculties, however, through their functions; accordingly knowledge of simple conceptions will be the knowledge of the mind itself.
>
> (W1:64, 1861)

Consequently, for Peirce, a study of the mind and cognition takes the form of a study of its faculties, and the specific outputs of such faculties.

Innateness of representations and Peirce's distinction between a priori and a posteriori judgments

I have now made the case that Peirce stands by a list of three elements of the soul, or of cognition, which I take to be his list of the mental faculties of cognition. This list, I maintain, differs from his list of the specialized corporeal-mental faculties. I make the case that this second list of corporeal-mental faculties

are a better candidate for Peirce's "special" categories that he refers to later on in his career; leaving us in need of an account of how his list of mental faculties feature into his theory of cognition. I have also shown that Peirce saw his three elements of the soul, which I take to be his three mental faculties, to be in some way distinct from the three impulses of "I", "IT", and "THOU" that they give rise to as outputs. I now prepare to zero-in on these three mental faculties, or elements of the "soul" or cognition; and give an account of what I take Peirce to mean by these terms, and how they relate to core and group cognition. Following this discussion, I will transition to a discussion of Peirce's three persons in the next section, and the role that I see them as playing in Peirce's theory of cognition.

Before I move on, however, let me take a moment to take a look at Peirce's understanding of what it means for something to be "innate". As we've seen, Peirce sees his modular faculties to be "inborn", but does that imply the innateness of the mental, or cognitive, modular faculties (W1:26, 1859)? Peirce begins to address this question in 1861 in "A Treatise On Metaphysics". Peirce makes the case that the question of innateness is more complicated than it may initially seem. This is because the innate functions, or faculties, of mind are never exerted alone. They are always exerted in response to something, and that something is experience. For this reason, Peirce makes the case that "...pure consciousness though it has the faculties for thinking the different thoughts, thinks nothing before experience." (W1:72, 1861). In a similar vein, Peirce states that "if the mind has these faculties, every thought will be an action of the faculties by whatever means excited, and there must always be an occasion for such excitation" (W1:64, 1861).

Peirce's view that mental faculties are never exerted without being "excited" by experience, and are thus never observed except through their actions, greatly complicates the picture of innateness. Firstly, Peirce takes this to mean that we cannot use the conventional distinction of "a priori" meaning before experience, and "a posteriori" meaning after experience. This is because, what is before experience is but a possibility (W1:82, 1861) or potential. When it is realized, there are a number of different ways in which that potentiality can be realized in actuality, depending on the particular experiences that prompted the cognition. Consequently, faculties of mind that may be innate, in the sense of being present, as a

potential, as part of the mind's "constitution" (W1:82, 1861), cannot be assessed until they are actualized by experience. At which point, faculties that are innate *in potentia* can only be classified (according to the traditional distinction) as a posteriori. Consequently, Peirce takes on an overhaul of the definitions of a priori and a posteriori as they relate to the mind.

In order to do so, Peirce turns to Kant's definitions of a priori and a posteriori and makes an important change. He makes this overhaul explicit in two places. First, in a personal letter in 1865, in which he touches on the topic briefly; and secondly, in a lecture on Kant's philosophy, as part of a longer series of lectures during that same year. He first offers Kant's distinction between a priori and a priori, and how it itself differs from the conventional distinction. It is worth, I think, quoting the passage in full.

> The terms *a priori* and *a posteriori* in their ancient sense denote respectively reasoning from an antecedent to a consequent and from a consequent to an antecedent. Thus suppose we know that //an/every// incompetent general will meet with defeat. Then if we reason that because a given general is incompetent that he must meet his defeat, we reason *a priori*; but if we reason that because a general is defeated he was a bad one, we reason *a posteriori*. Kant however uses these terms in another and derived sense…If one judges that a house falls down on the testimony of his eyesight then it is clear that he reasons *a posteriori* because he inferes the fact from an effect of it on his eyes. If he judges that a house fails because he knows that the props have been removed he reasons *a priori*; yet not purely *a priori* for his premisses were obtained from experience. But if he infers from axioms innate in the constitution of the mind, he may be said to reason purely *a priori*.
>
> (W1:245, 1865)

Peirce makes clear here, that what is at stake is what knowledge is coming from "axioms innate in the constitution of the mind", or in other words, which can be said to be inborn; and what knowledge is coming partly or solely from experience. His point, and the problem at the heart of his quibble with Kant on this point, is that Peirce believes that there is no such knowledge in the mind. Quoting, again, from 1861, Peirce writes:

> We can only know faculties, however, through their functions…if the mind has these faculties, every thought will be an action of the faculties by whatever means excited, and there must always be an occasion for such excitation. Hence, in one view all thoughts are *a priori*, in another all are *a posteriori*. This abolishes, *as real*, the distinction upon which all philosophy is based….
>
> (W1:64, 1861)

In light of his views of faculties (mental and otherwise), Peirce has a view of innateness that is surprisingly modern, and is in line with contemporary discussions on innateness. I quote here from a description by contemporary developmental psychologist, Susan Carey, who coined the term "core cognition", on their definition of innateness.

> Representations are mental symbols—states of the nervous system that refer to entities in the world. Although it is possible that infants think about things in the world before they've had any experience with them, this is not required for the representations to be innate in the sense I mean it. "Innate" simply means unlearned—not the output of an associative process, a hypothesis-testing mechanism, or a bootstrapping process—that is, not the output of any process that treats information derived from the world as evidence. What I mean for a representation to be innate is for the input analyzers that identify the represented entities to be the product of evolution, not the product of learning, and for at least some of its computational role to also be the product of evolution.
>
> (Carey 2009: 453)

Carey is making a point similar to Peirce's here. Carey is arguing that there is a relationship between experience (the world) and the states of the nervous system (the mind). This relationship is one that is hard to tease apart, and the test of innateness of a representation is not whether an infant has had a particular state of the nervous system– or representation– from birth, but whether the *mechanism* by which they process information about the world, and through which they treat the this information about

the world as "evidence"[8], is inborn and "unlearned". We will return to Carey's view of cognition, but for now, it is enough to establish the distinction they maintain between "innate" learning mechanisms that do not treat the experience of the world as "evidence", and are the product of evolution; and "learned" learning mechanisms that do treat the experience of the world as "evidence" for an implicitly or explicitly stated hypothesis.

The unlearned mechanisms that process information are, for Carey, "input analyzers". Such input analyzers are modular cognitive-biological devices related to perception that take in inputs and output a specific kind of representation. They are in many ways very similar to Peirce's mental-corporeal "specific faculties". Consequently, under the assumption that all cognitions are the product of an interaction between faculties of the mind and information about the world, one relevant contemporary definition of innateness centers on the idea of the innateness of the *mechanism* that processes the information. In other words, on whether the mechanism that processes the data is evolutionarily bequeathed and treats the information about the world simply as data; or whether the mechanism that processes the data is "learned" and treats the information about the world as "evidence".

The idea that all mental faculties need experience in order to become actualized is precisely Peirce's criticism of Kant that leads him to redefine the terms *a priori* and *a posteriori*. Since Peirce agrees with Kant that "[e]very cognition involves an operation on the data", this also means that he takes seriously Kant's assertion that "[e]very cognition contains a sensual element" (W1:75, 1861). In light of Peirce's view that the mind is divided into "special" faculties with specialized functions that must be "excited" by experience in order to implement those functions and bear out in an actual act of cognition, he must address seriously how to determine whether the output of a faculty of mind is innate (and is, in a similar sense as Carey, bequeathed from "evolution") or learned. Peirce, like Carey, is concerned with finding a way of identifying the innateness of *representations* which are the output of inborn mental faculties. It is for this reason that he rejects the term "innate ideas" in the passage below, and insists on centering his conversation on innateness on innate "representation".

[8] See W1:77 ("A Treatise On Metaphysics", 1861), for a similar characterization of information about the world versus information about the world treated as "evidence" from Peirce.

2. Innateness of Notions

> In the phrase 'Innate Ideas', Idea is used in an improper sense instead of *representation*, which is the proper word. I used the world *notion*, because that has no definite signification, and I wish to direct attention to the quality of Innateness.
>
> (W1:80-1, 1861)

Peirce redrafts Kant's definitions of a priori and a posteriori in order to suit this purpose. He does so by redefining a term on which he judges Kant's definition depends on– this is the term "determined", and what it means for something to be determined by another thing.

> To determine means to make a circumstance different from what it might have been otherwise. For example, a drop of rain falling on a stone determines it to be wet, provided the stone may have been dry before. But if the fact of a whole shower half an hour previous is given, then one drop does not determine the stone to be wet; for it would be wet, at any rate.
>
> (W1:245-6, 1865)

Peirce argues that with inborn mental faculties, which, nevertheless, rely on experience to be activated and to generate output, we are faced with an important question about the *innateness of the representations*. Peirce, however, cannot rely on Carey's definition of innate representations because, as we will see, he does not maintain a distinction between innate and learned learning mechanisms. The learning mechanism that Peirce eventually presents, that of synthesis, is not recrafted idiosyncratically for every learning task, or for different "domains" of knowledge, like Carey's proposed learning mechanism – "bootstrapping". This is because Peirce, as we will see, has a different understanding of what it means for us to have evolutionarily bequeathed cognitions, and to what extent those cognitions can be understood to be knowledge.

Consequently, Peirce seems to maintain the idea of modular inborn mental faculties, and their distinction from a conceptual learning mechanism that he calls “logic” at around this time (W1:328, 1865). Such a learning mechanism “tests” the “truth” of an object of cognition through a process that involves the formulation of causal hypotheses. The question, with him, the question of innateness seems to reside with whether *representations* that the mind’s learning mechanisms result in are so[9]. As we will see, for Peirce, the mind’s *only* learning mechanism (synthesis) is innate or unlearned, yet can produce different outputs depending on the interaction between the mind’s inborn and inherited “constitution” (W1:28, 1859) and experience.

For this reason, since Peirce takes all faculties to be inborn, and the mind’s learning mechanism to be unlearned, he cannot adopt Carey’s distinction between innate and learned mental representations. Instead, Peirce relies on his definition of what it means for something to be determined in order to make a distinction between mental representations. Such a distinction of mental representations does not categorize them as “innate” (unlearned) or “not innate” (learned), but rather, on whether they are “determined from without”, i.e. by experience – in which case they are *a posteriori*; or whether they are “determined from within”, i.e. by the mind’s inborn and inherited “constitution” – in which case they are *a posteriori*.

Consequently, the question becomes not whether experience is involved in the workings of mental faculties, but whether experience is *determining* of the output of these mental faculties. In other words, does experience make the output of the mental faculty *differ* from what it would have been otherwise? In the case that experience has this effect, the inborn mental faculty is judged to be “determined from without”.

> …the results of experience are inferred *a posteriori*, for this reason that they are determined from without the mind by something not previously present to it; being so determined their determinants or

[9] In this way, Peirce’s views on innateness mirror Carey (2009)’s.

> //causes/reasons// are not present to the mind and of course could not be reasoned from. Hence a thought determined from without by something not in consciousness even implicitly is inferred *a posteriori*.
>
> (W1:246, 1865)

Similarly, when experience does not have the effect of causing a mental faculty to output a different representation than it would have otherwise, that representational output is judged to be "determined from within". Yet, under what conditions is this even possible? Given that "[a]ll our thought begins with experience" and "the mind furnishes no material for thought whatever", Peirce asks: "[i]s there any knowledge *a priori*?" (W1:246, 1865). His answer is that while everything may be *inferred* from experience, this does not mean that everything is *determined* by experience.

> Is there any knowledge *a priori*? All our thought begins with experience, the mind furnishes no material for thought whatever….The mind only works over the materials furnished by the sense…. In one sense, therefore, everything may be said to be inferred from experience… from the impressions of sense. But though everything in this loose sense is inferred from experience, yet everything does not require experience to be as it is in order to afford data from the inference. Give me the relations of any geometrical intuition you please and you give me the data for proving all the propositions of geometry. In other words, everything is not determined by experience.
>
> (W1:246, 1865)

A priori representations, Peirce argues, result from a learning process, or inference, in which the data from experience no longer determines the learning process– or inference– to behave differently than it would have otherwise. This can only occur, Peirce maintains, when the experience is *ubiquitous* in our environment, and thus, *no longer determining*. Just as a drop of rain after a shower no longer determines a rock to be wet, aspects of our experience that are ubiquitous no longer determine the faculties that process them to be different than they would have been otherwise. Similarly, axioms of geometry "find exemplifications in every appearance" (W1:217, 1865).

> A cognition *a priori* is one which any experience contains reason for and therefore which no experience determines but which contains elements such as the mind introduces in working up the materials of sense, or rather as they are not new materials, they are the working up.
>
> (W1:247, 1865)

For this reason, Peirce argues that both cognitions *a priori* and cognitions *a posteriori*, which are the representational outputs of specialized mental faculties, involve inference. They involve the "working up" the "materials of sense" in order to be actualized as something other than a mere possibility. However, the "materials of sense" that the specialized mental faculties are working over via inference *determine* the output of those mental faculties to be different than they would be otherwise in *a posteriori* cognition– in other words, different sensory inputs lead to different representational outputs. This is not the case in *a priori* cognition. In *a priori* cognition, the "materials of sense" that the specialized mental faculties are working via inference *do not determine* the output of the mental faculties. In other words, they do not lead the specialized mental faculties to produce an output different than they would have otherwise. This, Peirce argues, is only possible in such a setup in the case where the aspect of experience that the mental faculty is specialized in taking in, working over, and outputting, is *ubiquitous and present in every every input*. In such a case, every working up of the cognitive inference that a mental faculty specializes in will output the same representation, regardless of the input.

Peirce's three elements of the soul and the a priori representations of space and time

Peirce unpacks his very important distinction between a priori and a posteriori cognition in a personal letter to Francis E. Abbot– a contemporary. He repeats his distinction between *a posteriori* and *a priori*– which I quote here because of their slightly different focus on representation– a theme to which we will soon transition.

> Any representation then determines its object in representation. So far then as representation relates to peculiarities of this or that object; that is to say it is determined to be different from what it otherwise would be by that which it does itself in representation determine; hence it is determined *a posteriori*.
>
> (W1:159, 1865)

Peirce makes explicit what has already been said, which is that representations, in relation to their experiential object, are *a posteriori* inasmuch as they are "determined to be different" from what they would otherwise be in the act of representing the "peculiarities of this or that object". Since representations *re*present their experiential object to the mind in cognition, all representations would seem to be determined. But the exception is when the experiential objects being represented are not "peculiar" to a particular experience.

> In so far…as its character would not be altered by the difference of the object, as in the character of extension etc., it [the representation] is determined a ratione or *a priori*.
>
> (W1:159, 1865)

Peirce here speaks of a representation as having a "character", which for now I will only define as the "peculiar" meaning of the representation. In the next section, I go into a detailed analysis of Peirce's work on representation, abstraction, and the peculiarity of characters that underlies this interpretation. This "peculiar" meaning of the representation– or its character– is determined *a priori* when "it would not be altered by the difference of the object". As we saw, this can only happen when the object of the representation– the input that it is specialized to "work over" – is ubiquitous and present in all experience. Peirce argues that an example of such a ubiquitous object is "extension". By the term, Peirce means the extension of space, but also other continua such as time.

For Peirce, representations of space and time are *a priori* representations. However, since they are representations that are themselves the result of a "working over", i.e. of the inference of some kind of

learning mechanism, they are *a priori* "judgments" of cognition (W1:159, 1865). Peirce calls these kinds of cognitive judgments or representations, "pure cognitions."

> …these pure cognitions are simply cognitions contained in the experience of objects in general, that is to say, as much in any object as in any other. A straight line is the shortest distance between points. True, a straight line is not even ever given as such but this proposition is deducible from any experience…
>
> (W1:157, 1867)

Such cognitions are inferences that are supported by "any experience". These cognitions, we see, do not have to be simple. Peirce gives the example of the cognitive judgment that a "straight line is the shortest distance between points". This is a very complex inference to make. Nevertheless, because the data that supports it can be derived from any experience– a straight line can be found in any experience that involves space in the physics of our world– such an inference, if it were to be made, would be a priori.

Peirce is very explicit in both the letter to Abbot, and in his 1865 lecture on Kant that he considers space and time to be *a priori* cognitive judgments, or representations. Such "pure" conceptions of space and time, while they are not determined by experiences, still need an experiential input in order to be actualized. Without such experience, they remain merely potential – albeit predictable – potentialities in that they will lead to the same representational output whenever actualized.

Peirce reserves the term "Form of Intuition" for such "pure" cognitions, including the cognitions of "pure space" and "pure time" (W1:156, 1865). He is clear that such "pure intuitions" are determined "from within," in the sense of being inferable from any object of experience. In the passage below, Peirce uses the term "abstraction" to refer to this inferential process – a connection which I cover in section 2.2.

> …when Kant speaks of the pure intuition from within of space; he does not mean that that intuition can exist without also some empirical representations such as color being present. The word pure is used not to

> show that such representations are not present to the mind but to signify that the intuition intended is that from which these impurities have been eliminated by abstraction.
>
> (W1:247, 1865)

The a priori judgments, or representations, of space and time, are thus determined "from within" by their form of intuition– a representation *in potentia* that will always be produced in response to any experiential input. However, this representational output, when it is produced, does not exist[10] in consciousness as such. It is mixed in with other representational elements conveying other cognitions of experience– color is given as one such other mixed-in representational element here.

Peirce argues that pure, a priori, cognitions such as space and time have two important attributes. First, they are **universal**; and thus are not "peculiar" to a particular experiential object, but can be inferred from, and attributed to, all such objects. Secondly, they are **necessary** – in that they imply necessary relations of any experience in which they have been found, or inferred, to be present– which are all experiences.

> With reference to the representations of space and time, we have two data. The first is that they are both necessary and universal. Whenever we think of an object as having geometric relations, that very predication of geometric relations for this object involves as its condition that all objects whatever have spatial relations to this one; for such is the nature of space; it is in this sense that the representation of space is said to be universal. Again if any object has relations to any part of space, that is has any place, it has relations to every part of space and therefore could not have been situated as not to have a spatial relation to its present place; in other words the representation of space is necessary. In the same way, if a mode of being has any temporal relations it has relations to all parts of time and could not have so existed as not to have a date relatively to its actual time; that is to say the representation of time is necessary. So then the representations of time and space are universal and necessary.
>
> (W1:248, 1865)

[10] See Peirce on the term "exist" and its association with subjectivity and consciousness– i.e. what a thing is for a mind– in "Analysis of the Ego" (1864).

An interesting aspect of universality is not only that a universal representation is something that can be inferred from any experiential input, but it is something that for this reason, can relate experiences *we have not even had yet*. It relates everything we've experienced and everything we could experience according to a set of necessary relations according to which all we cognize, and all we could cognize, are organized.

> …space and time are universal that is relate to all bodies whether affecting our senses or not….we are perfectly sure that there was time before we remember and also that there will be hereafter. We have certainly not felt this future time; yet this future time is inseparably involved with the supposition of any time; hence every representation of time is derived from within and not from without. The same argument applies to space.
>
> (W1:249, 1865)

By arguing that the a priori judgments, or representations, of space and time are universal and necessary, Peirce is making the case that they constitute "**extensive field[s]**". Peirce makes this connection in 1861.

> An extensive field is a total which has subjective elements *ad libitum* all of which are perfectly related to the others and any one of which supposes all the others. Such are time and space.
>
> (W1:84, 1861)

Consequently, the "pure conceptions" of time and space generate representational outputs that are organized in extensive fields. Such fields are marked by the fact that they are universal– i.e. can be inferred from any experience; that they are necessary – i.e that they imply necessary relations of all experience; and that they extend indefinitely or "*ad libitum*". The extensive fields generated by the cognitions of space and time, Peirce argues, give rise to our conscious perceptions of these extensive fields as "continuum" (W1:159-160, 1865).

Thus in 1865, I argue that Peirce establishes the fact that according to his view of cognition, we have *specialized* cognitions or mental faculties. That such cognitions operate on a particular input and generate an output according to some mechanism. However, among such cognitions, some are *a posteriori*– or have their representational output determined by their experiential input. While others are *a priori*– or have their representational output *not* determined by their experiential input; a situation that can only occur when the input over which the specialized cognition is defined is ubiquitous in an environment. In such cases, a priori cognition gives rise to representational output that is both universal and necessary. These universal and necessary representational outputs are part of an extensive field, which extends indefinitely and organizes all elements in the field vis-a-vis one another. Peirce, in particular, gives the example of representations of space and time as such kinds of universal, necessary, a priori judgments. Moreover, he gives the example of "pure space" and "pure time" as the mental faculties *in potentia* that give rise to the concrete representations of space and time, which are "work[ed] up" from experiential input.

Lastly, and most importantly for this dissertation, Peirce makes explicit that the cognition of space and time is one of the specialized mental faculties. He re-affirms that there are only three such mental faculties in his system; and names the other two kinds of mental faculties.

> Now there are but the fundamental faculties of the soul: Sensibility, Understanding, and Feeling. Feeling is not a faculty of knowledge, at all. Understanding produces only class concepts. Hence space and time are products of Sensibility.
>
> (W1:249, 1865)

These three "fundamental faculties of the soul" correspond closely to the mental faculties Peirce listed nearly ten years prior, in 1857 – the "Heart", the "Intellect" and the "Sense". Moreover, Peirce articulates that these three mental faculties give rise to different kinds of representational outputs with different cognitive properties. In particular, he compares the cognitive properties of representational outputs of the cognitions of "Sensibility", compared to the representational outputs of the cognitions of "Understanding".

> From the other premiss that there is but one time and one space we may infer that extension and protension differ altogether from class concepts; such as the understanding produces. Take for instance *horse*; if this has any general totality it is one which is merely rendered possible by the separate cases of horses but it is not the several spaces and several times which render the universal space and time possible, but only the universal space and time which render the limited spaces and times possible.
>
> (W1:249, 1865)

Peirce makes the case that the representations that the cognitive faculty of "Understanding" produces differ from those that the cognitive faculty of "Sensibility" produces. This difference can be understood as a difference in the mapping between one and many. While the mental faculty of Understanding produces "class-concepts" that generalize from separate individual instances to one general concept; the mental faculty of Sensibility produces concepts, or representations, like those of space and time which determine individual instances. This is a consequence of the determining relationship between representation, cognition, and experience that Peirce captures with his a priori and a posteriori distinction.

The notions of universality, necessity, and indefinitely (the mathematical definition of infinity) play an important role in philosophy. By making these claims, Peirce is crafting a theory of cognition that is underpinned by a new philosophical system with deep roots. Yet, Peirce in many ways seems to do his best to obscure his contributions. Throughout these discussions in 1865 on space, time, and the different kinds of cognition, Peirce often presents his own ideas as Kant's. This, more than anything, may have led Murphey and others to view Peirce's work in light of Kant and to attempt to read him in a Kantian lens, as opposed to taking Peirce's ideas as forming their own system distinct from Kant in systematic and deliberate ways.

In short, Peirce does not claim his own ideas. My interpretation of Peirce here sees him as deriving this distinction between a priori and a posteriori representations in a mind that requires experience in order to be actualized from Kant. Then instead of taking ownership, Peirce seems to try to attribute his ideas to

Kant, erasing himself. One can see this pattern even in the way Peirce writes the lectures of 1865, where he finds it difficult to make “I” statements at crucial times, and instead waffling between saying “I say/, it is said” (W1:246, 1865). Peirce knows very well what Kant’s views are commonly held to be. He, in fact, makes sure to acknowledge the more common interpretations of Kant’s ideas. However, where he has reached a new interpretation of Kant, developed in light of the particular question he is working on, he does not signal that Kant has ended and Peirce has begun. He does not acknowledge that his interpretation of Kant is light of the new system that he is developing. Having developed these new ideas, Peirce seems unable to see himself and his own contributions. He hides these new ideas under Kant, creating confusion for those who follow in his wake and attempt to understand his own, Peircean, system.

Consequently, my view is that Peirce is clearly well aware of Kant’s definition, but that he is offering a new definition to suit his own system in which all cognitions involve experience, and require experience in order to be actualized. So to take Peirce as being confused about Kant’s distinction of a priori and a posteriori as Murphey (Murphey 1961:25) does is to miss the point. Peirce is not being a Kantian about this distinction, he is being a Peircean. And we must find a different way to assess his new distinction than in terms of a system that he has made a deliberate decision to move away from. This new criteria is in terms of what this new distinction buys Peirce in his new system. I return to this question in this chapter’s conclusion by arguing that it is a distinction that goes to the heart of Peirce’s system, as it not only is deeply connected to his views on the possibility of *a priori knowledge*– a view that affects his stance on the doctrine of common sense knowledge; but it also influences (as we will see) his decisions regarding the specifics of the learning mechanism through which the three mental faculties arrive at their distinct representational outputs.

2.3 The Modus of IT, Immediate Perception, and Peirce’s Abstracting Learning Mechanism

The secret algorithm hidden in Peirce’s Modus of IT

We've now covered Peirce's outermost triad in his theory of cognition– the three mental faculties, or three different kinds of cognitions, that he calls the three "elements of the soul" (W1:249, 1865). These are the faculties of Feeling, Understanding, and Sensibility. As we will see later in this chapter, Peirce plays with these names, but eventually settles on a very similar set of names for these same faculties. Moreover, he maintains these categories into the mature stages of his career. In this section, we will cover Peirce's middle triad. We've already encountered them. These are the representational outputs, or "impulse[s]" of Peirce's three specialized mental faculties. Peirce describes them in 1859 as the "I-impulse", the "it-impulse" and the "Thou-impulse" (W1:8, 1859). I describe in this section what these "impulse[s]" are, and how through them we begin to get a better sense for Peirce's learning mechanism or "synthesis", and how this learning mechanism establishes the relation of influxual dependency that Peirce sees as important for concept learning.

In 1861, Peirce described "I, IT and THOU" as "simple conceptions" (W1:45, 1861). A term we saw him reserve for the output of specialized faculties (W1:64, 1861). These three terms, consequently, according to my interpretation, represent the three kinds of output of a cognition with three specialized faculties. Peirce argues that these three specialized faculties output distinct representations that cannot "be expressed in terms of the other" (W1:45, 1861), and seem to play a particular role in cognition in general. In two successive essays in 1861, Peirce both sketches a description of these three kinds of distinct representational outputs, and attempts a first attempt at articulating how they work together in cognition. His initial sketch of the behaviors of these three kinds of representations is as follows:

> I looks in,
>
> It looks out,
>
> Thou looks *through*, out and in again.
>
> (W1:45, 1861)

While vague, we will see that this is a fairly accurate description of the cognitive behavior of Peirce's three kinds of representational outputs, and of their role in cognition in general.

Peirce also takes a first stab at articulating the relationship between the three representational outputs of the three specialized mental faculties – i.e. the three faculties of cognition. He does so in an essay that is typically considered to be an interpretational challenge in the secondary literature, Peirce's "The Modus of the IT". I show here, however, that when we grasp the underlying mechanism that this essay describes, it becomes the entry point into Peirce's articulation of his synthesis, or conceptual learning mechanism. I argue that in this essay, Peirce describes three words of representations– corresponding to the three kinds of representational outputs of cognition– and that he begins to describe an algorithm for going from one world of representation to the other. In particular, an algorithm that would allow cognition to pass from the representational world of the "IT", which Peirce associates with the senses, and the representational world of the "THOU", which Peirce associates with consciousness. The algorithm that allows cognition to go from a world of sensory perception to a world of conscious knowledge, however, is one that passes through the representational world of the "I", which Peirce associates with abstractions. Peirce argues that,

> …that which is in the sensible world (IT) can only enter the mental world (Thou) by having in it a revelation which is in the abstract world (I).
>
> (W1:47, 1861)

This question about what constitutes a "revelation…in the abstract world" becomes an important question for Peirce, because it is a crucial to answering the question that motivates the essay– and that motivates Peirce more generally: "How shall sense (IT) become consciousness (Thou)?" (W1:47, 1861). This question is re-articulating the question that Peirce poses in his shifting of the boundary between within-mind and out-of-mind in his revision of Kant's picture of cognition. It is fundamentally a question about the acquisition of concepts.

Once we grasp the underlying rule, or logic, to "The Modus of the IT", the rest of what at face-value seems to be an incredibly convoluted and opaque text falls into place. Sense (IT) becomes

consciousness (Thou) through a revelation in abstraction (I). Peirce describes eight different planes in this essay, each with the three worlds of sense, consciousness, and abstraction represented. Peirce describes:

1. Three celestial worlds
2. Three abstract revelations
3. Three absolute existences
4. Three necessary modes
5. Three influxual derivations
6. Three infinite qualities
7. Three total shapes
8. Three celestial worlds

A key underlying structure to the essay, which earns it its name of “Modus”, is that the eighth plane that Peirce describes is simply the first plane repeated. Consequently, we are dealing with a *circle*, that is, with a circular structure. Peirce represents the circular structure of his essay in a figure from 1867 (W1:530, 1867). However, this figure does not make explicit the algorithm that Peirce is using here to go from one plane to the next. Consequently, I also include my own figure depicting that algorithm (see Appendix A).

Peirce describes the mechanism for going from one plane to the other to be a combination of the plane’s abstract elements (the world of “I”) from the current plane (P_n) with each of the elements from the previous plane ($P_{(n-1)}$). Moreover, because of the circular structure in which the seventh planes are connected– with the eighth plane being merely the first plane repeated; we have a way of deriving the next plane ($P_{(n+1)}$) through a combination of the abstract elements (the world of “I”). Consequently, the future plane, or the future *state*, can be defined in terms of the third element of the current state (the “I” or abstract element), and all the elements in the previous state. The formula for getting to the next plane ($P_{(n+1)}$), is as follows:

$$P_{(n+1,\{1,2,3\})} = f\left(P_{(n,3)}, P_{(n-1,\{1,2,3\})}\right)$$

Below is Peirce's description of one of these state changes. I describe his description of how the state of abstract revelations (P) can explain the next state ($P_{(n+1)}$), absolute existence, by combining the "I" element of the current state (P) with the three elements of the previous state ($P_{(n-1)}$). First, I quote Peirce's description of the previous state ($P_{(n-1)}$), which is the plane of celestial worlds. Note that each of the elements of this state are themselves a product of the elements of the two previous states. The three elements in this state are: 1) the "manifold of sense" , 2) the "world of consciousness", and 3) the "world of abstraction".

> There are three Celestial Worlds. 1 that whose heaven is a speck or the manifold of sense, 2 that whose heaven is of extensive manifestation or the world of consciousness, 3 that whose heaven is of immense manifestation or the world of abstraction.
>
> (W1:47, 1861)

Then, I quote Peirce's description of P (abstract revelations). Note that the third element in this state is "absoluteness".

> Now there are three abstract revelations, 1 that whose abstraction is in a world of time or arbitrariness, 2 that whose abstraction is in a world of space or dependence, and 3 that whose abstraction is in a celestial world or absoluteness.
>
> (W1:47, 1861)

Lastly, I quote Peirce's description of the future state, $P_{(n+1)}$, which is the plane of absolute existence. The three elements in this state are: 1) "absoluteness…in the world of sense" or **sensual absoluteness**, 2) "absoluteness…of mental revelation" or **mental absoluteness**, 3) "**abstract absoluteness**".

> Now there are three kinds of absolute existence: for if the absoluteness is only a revelation in the world of sense, the existence is mere possibility– feasibility; if the absoluteness is of mental revelation then the existence is actuality; and if the absoluteness is abstract absoluteness the existence is necessity.
>
> (W1:47, 1861)

Consequently, the elements of the future state, $P_{(n+1)}$, or the plane of absolute existence are a function of the third element of the current state P (the plane of abstract revelations), which is "absoluteness", and the three elements of the previous state, $P_{(n-1)}$, or the plane of the three celestial worlds.

$P_{(n+1,\{1,2,3\})} = f(P_{(n,3)}, P_{(n-1,1,2,3\})})$		
$P_{(n+1)}$	$P_{(n)}$	$P_{(n-1)}$
Sensual **Absoluteness**	Arbitrariness / Abstraction in world of time*	Manifold of sense / Heaven is a speck
Mental **Absoluteness**	Dependence / Abstraction in world of space*	World of consciousness / Heaven is of extensive manifestation
Abstract **Absoluteness**	**Absoluteness** / Abstraction in a celestial world	World of abstraction / Heaven of immense manifestation

Table 1: Summary of elements of the algorithm underlying the generation of conscious representations in Peirce's description of the "Modus" of IT from a sensory input. The conscious representation belongs to the world (or impulse) of "THOU", while the sensory input belongs to the world (or impulse) of "IT". This algorithm relies on a "revelation" in the world of representations that correspond to the impulse, "I" – or the world of abstract representations. In this example, the element that belongs to the world of "I" (of abstract representations) is the third element of *P* (absoluteness).

This algorithm is consistent for generating the elements of all seven states described in "The Modus of the IT" (see Appendix A).

Peirce brags about this breakthrough in an 1864 personal letter, writing that he has “made of circle” of the category of “IT” and “other categories” that he has added, where Kant’s categories “form an arc”.

> I have myself been studying Kant's categories for several years, and have called them the categories of the IT—an obvious name for them but suggesting the existence of other categories. I have added other categories of the IT and have thus made a circle of which Kant's form an arc.
>
> (W1:115, 1864)

The categories of Kant’s that Peirce seems to have in mind are listed in another 1861 essay, “SPQR”, written about a similar theme, and which we will analyze more deeply later. These categories of Kant’s that Peirce seems to be referring to are Kant’s four categories of understanding– Quantity, Quality, Relation, and Modality[11], and their subcategories.

By bragging that he has made a “circle” out of Kant’s categories, Peirce is probably bragging that he has made a circle out of Kant’s categories of *understanding*. Note that Peirce retains the term “Understanding” for one of the three mental faculties. Moreover, we have seen that each of these three mental faculties outputs a special kind of representation, or “impulse”, that Peirce calls “I, IT, and Thou”. We have seen Peirce now conduct a mapping in “The Modus of the IT” between the three mental faculties and the three impulses. The mental faculty of Sensibility is now clearly associated with the impulse of “IT”. The mental faculty of Understanding is now associated with the impulse of “Thou”; which leaves the faculty of Feeling to be associated with the impulse of “I” or abstraction. This relationship between feeling and abstraction is an important one in Peirce’s framework and will be the focus of the next subsection.

In the essay, “The Modus of the IT”, consequently, Peirce has given us a mapping of mental faculties and impulses, or words of representational outputs. This mapping, I will show, remains firmly in place in the following years. Moreover, it has associated one triad– Peirce’s triadic view of cognition, with another–

[11] See also Murphey 1961: 35.

Peirce's triadic view of worlds of representational outputs. Moreover, it has suggested a circular structure to Peirce's mental faculty of "Understanding". And lastly, it has articulated a way of relating all three mental faculties in order to lead to what can only be described as the acquisition of a concept– of going from the output of our senses to the cognition of an experience. This algorithm involves an odd detour– a "revelation" in the world of abstraction.

I show that the structure captured in "The Modus of the IT" summarizes some of the most important aspects of Peirce's theory of cognition and his conceptual learning mechanism, which will remain consistent throughout Peirce's intellectual life. I begin this exposition in the next subsection by showing how Peirce gradually develops a theory of for how the "revelation" in the world of abstraction (in "I") occurs; and how Peirce's theory of abstraction comes to play an important role in describing the relation between Peirce's three mental faculties (his outermost triad), and his three impulses (his middle triad).

Peirce's search for an abstracting process that rejects common sense knowledge

Peirce, in the years between his "A Treatise on Metaphysics" in 1861 and his lectures in 1865, wrestles with a consequential question– how should he think about abstraction? And how does abstraction lead us to have "notions" in the mind which are true of experience ? This question, he articulates as: "How Innate Notions can be True to External Fact" (W1:83, 1861), or "How should the conceptions which spring up freely in our minds by virtue of the constitution thereof be true of the outward world?" (W1:79, 1861). Peirce's view on cognition is that we cannot know directly what a thing outside of consciousness is. Instead, such a meaning must be inferred. How does that inference take place? This inference, being an act of cognition, must involve the three, inborn, mental faculties of cognition. But what should the relation among these faculties be in the elaboration of the conceptual meaning of an experience?

Peirce considers two alternatives with wide-ranging implications for his system – with import for some contemporary conversations in the cognitive sciences. Peirce decides between a view of inferential concept learning, on the one hand, which admits the idea of "pre-established harmony" (W1:83, 1861)

and its implications for inborn or "common sense" *knowledge* (W1:153, 1861); and a view that rejects common sense knowledge, on the other hand, while still offering an explanation for what seem to be innate conclusions to an inferential process– as Peirce views to be the case with the experience of sensations (W1:472, 1966). These two views come to a head in an 1861 piece called "Analysis of Creation", in which, in the first nine pages, Peirce seems to accept the idea of pre-established harmony. However, amidst the fourteen drafted pages that follow, Peirce seems to adopt the opposite view– a theory of abstraction that sees abstraction less as a pre-established truth than as a *process*. Those fourteen pages were omitted from the standard publication of Peirce's unblemished writings ("Writings of Charles S. Peirce", vol. 1)[12], but can be found in Murphey's "The Development of Peirce's Philosophy", where their import seems to have been lost.

I argue that Peirce wrestles with these two views for several years, going back and forth between them. One reason for such an extended period of ambivalence, I think, is that Peirce seems to have been searching for an alternative to pre-established harmony, which seemed to be the only established solution in 1861, but which Peirce vehemently disliked. Accepting the doctrine of pre-established harmony would have meant that Peirce would have to accept the doctrine of common sense knowledge, which he expresses scorn for repeatedly from his earliest years (W1:153, 1864). The doctrine of pre-established harmony, first proposed by early modern German philosopher Gottfried W. Leibniz, bypasses the construction of knowledge in the mind, and suggests that some knowledge can be acquired without inferential work. Peirce is opposed to the idea of such innate propositional knowledge (W1:71, 1861). However, it took time for Peirce to develop his alternative– although there are several essays during this time period leading up to, and following, the "Analysis of Creation" that show Peirce's efforts.

I argue that Peirce finally settles on his processual theory of abstraction in around 1864, and articulates his theory of abstraction in a second essay thematically similar to the "Analysis of Creation" titled, "Analysis of the Ego". Peirce's work in the "Analysis of the Ego", I argue, comes to define his views on subjectivity and the mental faculty of "Feeling". It is thus a very important piece for understanding Peirce's

[12] See editor's notes on W1:539.

system. However, in the meanwhile, Peirce is stuck between the only official doctrines that seem to address his problem, and finding none of them acceptable. Consequently, in his more formal attempts at writing (for example, in “A Treatise on Metaphysics” (1861) and “Analysis of Creation” (1861)), Peirce feels bound to operate within the confines of these established, but unappetizing, doctrines. But in his less formal attempts at writings, including an embarrassingly titled “Views of Chemistry: sketched for Young Ladies” (1861), Peirce feels more free to express his own ideas still in the midst of being worked out even as he struggles to shake off the doctrine of pre-established harmony. By 1864, however, Peirce seems to have developed his own system far enough that he is able to dedicate an entire paper to the subject of abstraction and to unveiling his own view on abstraction– and how the “IT” becomes the “THOU” – without any appeal to pre-established harmony and its slippery slope towards common sense knowledge.

Let’s begin once again with “A Treatise on Metaphysics”, where Peirce lays out the three available doctrines that seem relevant to answering his question of how we can have innate notions in the mind’s own internal meanings, that are true of external facts of experience, *if* we do not have direct access to these experiences but are only conscious of them through a long chain of inferences. Peirce articulates three options. The first option establishes that our conceptual knowledge of experience is innate and “come to us from God” (W1:66, 1861). Peirce considers this view to be “in a general way, the view of Leibnitz [sic]”. In other words, this view establishes that all knowledge comes from within, or is in some way innate. The other option establishes that “the things themselves are taken into the consciousness” which result in “an immediate seizing of the object itself” Peirce attributes this position to the doctrine of “Immediate Perception” (W1:67, 1861). The last option establishes that conceptual knowledge is necessarily true of a thing, in other words, that “[t]here is an abstraction which of itself gives actuality to existence” (W1:67:1867). Peirce attributes this view to Anselm of Canterbury, an eleventh century Christian thinker, and René Descartes.

The problem is that both extreme views of pre-established harmony and of immediate perception (as Peirce takes it to mean at the time, which is synonymous with common sense knowledge), establish that

we have knowledge *wholesale*. Representational knowledge, wholesale, comes either from within – through some act of divine intervention; or from without – through some act of divine evolution. However, both maintain that we get representational knowledge whole. Peirce is vehement that all knowledge must be inferred. To be knowledge, a mental representation must be articulated as a proposition with a subject (non-ego) and a predicate (ego) (W1:155, 1864). Peirce argues that in a representational mind, knowledge must thus be articulated as a proposition with both a representational subject and a representational object. For example, a representational proposition stating: "that thing is red". Both the doctrine of pre-established harmony and the doctrine of immediate perception (understood as common sense knowledge) make the claim that knowledge comes to us as a proposition without inferential work.

Peirce's distaste for an immediate perception that upholds common sense knowledge shares a similar reasoning as his eventual distaste for the doctrine of pre-established harmony. So I will cover it in depth here. Peirce expresses his distaste for an immediate perception that maintains the doctrine of common sense in 1864, referring to the strength of the doctrine to be that of a "potato-pop-gun" (W1:153, 1864). Peirce takes his definition of the common sense doctrine from Irish mathematician Sir William Hamilton.

> By Common Sense is meant according to Sir William Hamilton "the complement of those cognitions or convictions which we receive from nature; which all men profess in common; and by which they test the truth of knowledge and the morality of actions." The doctrine is that these convictions are cognitions.
>
> (W1:153, 1864)

Peirce has two interconnected objections to common sense knowledge, and any doctrine he perceives as upholding it. Peirce is against common sense knowledge because it is ambiguous about what such a doctrine is calling for. Peirce argues that the way the doctrine is formulated is "ambiguous" and leads to empirical observations that cannot establish the truth of the doctrine.

> The first is that it is ambiguous. It is defended in one sense, in which it is a truism. But it is inevitably applied in another sense in which it will not bear its own test.

(W1:153, 1864)

The test that the version of the doctrine of common sense knowledge that is “truism” leads to defines common sense knowledge as those “convictions” which are “no man can resist” (W1:154, 1864). Such an ambiguous description, Peirce argues, leads to attempts to distinguish between convictions that “are native to the mind” and those that are “abnormal results of experience” (W1:154:1864). Peirce makes the case that such a task confines us to looking at “indirect reasoning a posteriori”, and does not support theorizing about how the mind could be constituted that would lead it to the conclusions of its “indirect” reasonings (W1:154, 1864). Peirce sees such empirical work as “throw[ing] away two-thirds of our means of investigations” (W1:154, 1864).

The point here is that by focusing on the output of the cognitive process, and not theorizing explicitly about the underlying mechanisms of mind that give rise to this output, we lose a lot of information. Moreover, Peirce argues that when we look underneath the hood– even superficially– we come to the realization that there is no immediate knowledge, per se. Instead, even the simplest perceptual knowledge– such as knowing that the cup is red– is itself the result of an inferential process which must be explained. When this process underlying perception is analyzed, Peirce argues, we see a similar mechanism at work as the mechanism that underlies what would seem to be, at face value, more complex knowledge – such as the knowledge that my mother loves me. Peirce sees the theory of immediate perception that he rebuffs as being “put forward as opposed” to a doctrine that Peirce is deeply committed to– “the doctrine that our knowledge of the non-ego is inferential” (W1:154, 1864).

The second objection is against a more carefully thought through doctrine of common sense knowledge. One that does not speak of “convictions” but about a “testimony” of consciousness, such that it associates certain propositional knowledge about perception, such as ‘this cup is red’, directly with an experience– without the need for an inference.

> Let us now come to the celebrated application of this principle to the theory of perception. It is said to be a fact that consciousness testifies to our perceiving the non-ego. This is put forward as opposed to the doctrine that our knowledge of the non-ego is inferential. This pretended testimony of consciousness must either be given in the act of perception itself or it must be an axiom concerning perception.
>
> (W1:154, 1864)

Peirce's objection is that there are only two ways in which such a "testimony" of consciousness about the perceived experience could come about, and neither way looks promising. Either "this pretended testimony of consciousness must be given in the act of perception itself" in which case "every perception itself involves and contains a proposition" (W1:154, 1854). Or, the "pretended testimony of consciousness" "must be an axiom concerning perception" (W1:154, 1864).

In the first scenario, where the propositional knowledge is in the act of perception itself, we have a problem that centers in the definition of propositions. For Peirce, "[a] proposition is the thinking of a predicate of a subject" (W1:154, 1864). However, Peirce argues that if we have any "natural conviction" at all, it would attest that in a proposition, the subject of the proposition is "not thought but thought of", or in other words, that the subject of the proposition "does not enter into the field of consciousness", and remains in some sense out of consciousness (W1:154, 1864).

Peirce argues that we predicate redness of the cup, without knowing what "cup" is (at least in the context of the proposition). For Peirce, this indicates that in a proposition, the subject of the proposition remains out of consciousness. However, we cannot predicate redness of the cup without knowing what "red" is. Peirce argues that the use of natural languages attests to this being a reasonable candidate for a "natural conviction". However, this natural conviction– that the subject of a predicate is out of consciousness– creates a contradiction to the idea of the act of perception itself containing its own propositional knowledge. In such a scenario, the object of perception would need to enter perception as a subject known in itself. Yet, such a subject cannot be known, or *be* in consciousness, according to the very definition of a proposition. How, then, can such a proposition in the act of perception itself be formulated?

Peirce argues that this cannot be, and rejects the first version of a perceptual theory of common sense knowledge.

Peirce then tackles the second version of a perceptual theory of common sense knowledge. This formulation, as we saw, takes the form of axioms– a general, preformulated, principle that is associated with a particular perceptual input. Since this is a theory of common sense knowledge, the associated axiom is formulated as a proposition, e.g. “this thing is red” or “this thing is a cup”, or even, “this is a thing”. This axiomatic view of common sense knowledge, however, is not inference, but is merely associative as it involves a simple matching of stimuli to a pre-formulated proposition or axiom. Peirce, however, argues that this second formulation of the common sense doctrine also fails.

> If the other alternative is adopted that the doctrine in question is an axiom, what does this axiom explain and how is it suggested? A genuine axiom is a proposition which arises in the mind in view of a manifold of phenomena, and which enables us to connect this manifold into a unity. It is necessary, therefore, that an axiom should explain something; but this principle so far from doing that renders the connection of ego and nonego, which is otherwise explicable, demonstrably inexplicable.
>
> (W1:154-5, 1864)

Peirce here levies a powerful, yet subtle, objection to the doctrine of common sense doctrine based on his work on abstraction that we will see shortly. Peirce argues that immediate perception (the title of his essay) cannot be the association of a stimulus to an already preformulated axiom– i..e to a proposition– as such a proposition would not have the “connection” to its stimuli that the very articulation of the proposition depends on. Peirce’s view of abstraction, as we will see, is a *process* of abstracting or manipulating a stimuli input in order to articulate meaning. Without such a material ground, no meaning can be articulated and there can be no thought. In other words, an axiomatic view of immediate perception is like attempting to write a word without ink. Consequently, in light of his view of cognition as propositional and abstracted, Peirce rejects a common sense articulation of immediate perception. However, he does not reject the idea of immediate perception, per se.

In a lecture in his mature years, in 1903, Peirce makes clear that not only has he rejected a common sense knowledge articulation of immediate perception, he has also rejected the view of pre-established harmony and the necessitarian view of Descartes.

> If, therefore, our careful direct interpretation of perception…is that the perception represents two objects reacting upon one another, that is not only a decision from which there is no appeal, but it is downright nonsense to dispute the fact that in perception two objects really do so react upon one another.
> That, of course, is the doctrine of Immediate Perception which is upheld by Reid, Kant, and all dualists who understand the true nature of dualism, and the denial of which led Cartesians to the utterly absurd theory of divine assistance upon which the preestablished harmony of Leibniz is but a slight improvement.
>
> (EP2:155, 1903)

Peirce argues that, seemingly in contradiction to his earlier views in the 1860s, he accepts the doctrine of immediate perception. However, I argue that Peirce does not embrace here a view of immediate perception associated with common sense knowledge, wholesale. Instead, Peirce tailors that view to mean something quite different which involves "two objects reacting upon one another".

Peirce's theory of abstraction: the role of 'Feeling' in articulating the 'peculiar' meanings of thought

We begin to see Peirce's tailoring of the doctrine of immediate perception to articulate a view of immediate perception that rejects common sense *knowledge* in "Views of Chemistry: sketched for Young Ladies". In this piece, Peirce couches the problem of how innate notions can be true of external facts in terms of meaning. Or, in other words, how is it that we arrive at the meaning of things? Such a meaning, he argues, is the elusive "idea of the thing" (W1:51, 1861). Here, Peirce begins to appropriate the term "idea" and incorporate it as an important term in his system. Peirce argues that the "idea" of a thing is something that is "convey[ed]". Peirce, here, is implicitly drawing an analogy between the process through

which the mind arrives at the meaning of its conceptions, the process that guides "modern science" or scientific investigation, and the investigative process of a child[13].

> No modern science is the study of the material, but of the immaterial contained in the material….Now, we always ask What is the meaning of this thing? Now the *meaning of a thing is what it conveys*. Thus, when a child burns his finger at the candle, he has not only excited a disagreeable sensation, but has also learned a lesson in prudence. Now the mere matter cannot have given him this notion, since matter has no notions to give. Who originated it, then? It must be that this thought was put into nature at the beginning of the world. It must have been *meant* because it was *conveyed*.
>
> (W1:50, 1861)

In setting up the problem this way, Peirce is treating the problem of how "innate notions" can be "true" of "external facts" as a *communication problem*. In this communication problem, the communication medium is *matter*, and the message being communicated is *form*.

> Further, what is the necessary condition to matter's conveying a notion? It is that it shall present a sensible and distinct form. It must obviously possess a form, since formless matter is chaos, – is matter untouched by mind. It must be sensible in order to be anything *to us*, and it must be distinct or distinguished in order to be a form *to us*.
>
> (W1:50, 1861)

In this articulation of the proper, we take the idea of the sender of the communication as irrelevant– in this case, Peirce takes that sender to be largely out of view. Consequently, the communication problem boils down to a problem involving a message, a possible message set put "into nature at the beginning of the world"; a medium, an inferential process that discerns the message from noise or "chaos"; and a receiver.

[13] This reflects a theme in contemporary cognitive sciences, especially in developmental psychology. See Gopnik & Meltzoff 1997.

The way Peirce formulates the problem of conceptual meaning here is strikingly similar to the way the problem has been formulated in recent years in the cognitive sciences. In a piece considered to be one of the foundational pieces in a view of computational cognitive science called "analysis by synthesis", Kill et al. 1996 formulate the problem of visual perception in very similar terms. This has become the template for thinking about a host of other problems in computational cognition (see Yuille & Kersten (2006), Lee and Mumford (2003), Kersten et al. (2004)).

> Formulating visual perception as communication provides a useful metaphor for illustrating the nature of the information processing problem faced by the human visual system. A generic communication system…consists of a *message set*, from which a *transmitter* draws messages, which it codes and sends as signals down a *channel* to a *receiver*, which decodes the signal to determine the message which is sent.
>
> (Knill et al. 1996: 2)

The similarities between Knill et al.'s formulation of the problem and Peirce's are quite striking. By "transmitter", Knill et al. are referring to the sender of the message. Moreover, Peirce himself, due to his specialized view of cognition, stands by three specialized mental faculties. Like Knill et al, Peirce takes the view that that information can be sent on different "channels" and passed to the different "receivers" of specialized cognition. This creates, for Peirce, different "orders of meaning".

> Thus it is the form of a thing that carries its meaning. But the same thing conveys different meanings to the different faculties. So there are different orders of meaning in nature.
>
> (W1:50, 1861)

Much like Peirce, Knill et al. 1996 treat the transmitter, or sender, as a constituting hypothesis– needed for the metaphor, but not "identifiable". However, Knill et al. 1996 make an assumption about the "message set", which Peirce– while tempted to make in the guise of the doctrine of pre-established harmony– eventually rejects.

> Consider how this maps onto visual perception…. For simplicity of discussion, we will consider the message set as the set of all possible physical configurations of scenes in our world. While there is no identifiable transmitter, we can consider the messages (physical scenes) to be coded in the pattern of light reflected from surfaces and projected on a retinal receiving surface. The coding rules are the physical laws of light reflection, refraction, and transmittance and the geometric laws of perspective projection. The receiver is the visual system, which processes the pattern of light impingent on the retina to "decode" the message; that is, it determines as best it can at least some of the properties of the scene which are projected to an image
>
> (Knill et al. 1996: 2)

It is my view that Peirce realizes that he faces the problem of identifying the "message set" in his theory of abstraction. While still maintaining the view of pre-established harmony, which he does in 1861, Peirce first tries to assume a view much like that taken by Knill et al. 1996 who consider the "message set" of visual perception, in their analogy, to consist of "all possible configurations" of messages. However, that set would be immense, if it is even finite. How is such a set to be described? Peirce makes a first attempt to draft a list of the "final elements of abstraction" at the end of "A Treatise on Metaphysics", which he stops abruptly (W1:94, 1861). Peirce views these "final elements" to describe the "nature of the perfect" (W1:83, 1861) or the world of abstractions – that is, the world of "I" impulses which are the representational outputs of the mental faculty of "Feeling". Peirce is thus attempting to find a way to describe the world of "I" impulses, or of all the possible abstractions of the mind, which he associates with meaning.

Peirce addresses the problem of articulating all possible configurations of the abstractions of the mind in this piece as a problem of compositionality. He makes the case that abstractions, which Peirce seems to view as populating the world of "I" impulses, are "constructed in the same way" as "conceptions" (W1:84, 1861). Peirce views conceptions to populate the world of "Thou" impulses– or representational outputs of the mental faculty of understanding (W1:174, 1865). By drawing this parallel, Peirce thus posits at the end

of “A Treatise on Metaphysics” that abstractions are composed in a way similar to abstractions; that is, in terms of “elementary” elements, just as complex conceptions are composed of “elementary” conceptions.

1. Composition of Abstractions

> *Proposition*. There are elementary conceptions.
>
> *Proof*. Every thing is either simple or composed of parts. A conception is simple or complex according as it is composed of other conceptions of not.
>
> A simple conception is an elementary one.
>
> ∴ Every conception is either elementary or composed of elementary conceptions.
>
> […]
>
> Since conceptions are typical of abstractions the world of abstractions is constructed in the same way.
>
> (W1:83, 1861)

Peirce, then, attempts to draw up a list of the “final elements of abstraction”. He articulates this list in terms of “relations contain[ing] the idea of numbers; and…nothing else” (W1:84, 1861). However, Peirce falters in his attempt to draw up such a list of “final elements” or relations of abstraction, out of which more complex abstractions would be composed.

Peirce eventually arrives at a view for how to articulate the message set of conceptual meaning articulated as a communication problem that parts ways with the idea of compositionality. However, even in this early attempt, Peirce seems to be grasping for a way to reduce the message set to a few elements that could be combined to describe “all possible configurations”. In many ways, Peirce was already adopting in this early attempt what the analysis by synthesis literature eventually came to adopt, which is a *hierarchical* approach to defining the message set (Lee and Mumford 2003).

Peirce views the message set itself to be decomposable, or at least describable, in terms of a much smaller set of higher level elements. However, in a departure from the contemporary literature on

computational cognition, the solution Peirce eventually comes to adopt does not see these higher level elements to be themselves representational. In other words, he does not come to see the relationship between the elements of the message set and the full scope of the message set to be compositional or combinatorial. In the solution to the problem of abstraction that Peirce eventually adopts, we do not arrive at an articulation of the full message set by combining the different higher level elements. Instead, the relation between the higher level elements and the message set itself is *inferential.* According to this view, rather than a relation between simple and complex, the "elementary", if you will, abstractions are the *condition of inference* for "peculiar" abstracted meanings.

Peirce begins to articulate this view of abstraction in the last fourteen drafted pages of the "Analysis of Creation". In this piece, Peirce struggles with the question of language and meaning. Peirce eventually comes to tease the two apart, focusing on a view of "peculiar" meanings ("Analysis of Creation" fragment in Murphey 1961:50) whose relation to language is hypothetical–something that we will see in chapter 3. However, before he can tease the two apart, Peirce needs to settle on a view of meaning that does not rely on a "pre-established system" (W1:55, 1861). Peirce attempts to do so by establishing a relation between meaning and the need for its "expression" in some kind of material condition.

> Abstraction…to become modification of consciousness needs to be combined with that which modification of consciousness as yet unrelated to any abstraction is, that is to the perfectly unthought manifold of sensation.
>
> (W1:85, 1861)

However, Peirce does not land on a way of explaining how meaning can depend *both* upon the material condition of its expression *and* on a set of innate "elementary" elements in the main body of "Analysis of Creation". Instead, we only get a hint in the scraps of drafted material tacked on at the end of the piece.

> The abstraction must be expressed. Suppose that condition complied with, how does it come into consciousness? By the operation of abstracting. This is as follows. From two things which are alike in one respect and different in others we can separate mentally the unlike elements from the like and distinguish

> each separately. If we consider each compound as an experience the peculiar meaning of each will be its peculiarity; the common abstraction will be the condition of the abstraction of the meaning, that is the language.
>
> ("Analysis of Creation" fragment in Murpley 1961:50)

The solution that Peirce eventually adopts, and hints at here, is that abstractions, or meanings, enter consciousness through a process that relies initially on a comparison. Through this comparison, the mind "separate[s] mentally the unlike elements from the like" and crafts an abstracted "compound" from the material of experience. This abstracted meaning based on an "aspect" of experience becomes a "peculiar meaning" that can mean nothing else but itself to the mind– its meaning is "its peculiarity". In other words, the "common abstraction" or "like" element obtained through the initial comparison becomes "the condition of the abstraction of the meaning".

Peirce here is beginning to draft a unique answer to the question of how we can craft the "message set" from which conceptual meaning, seen as a particular "message" from nature, is inferred. He is arguing that the language of meaning, i.e. abstraction, is inferred from a starting state that becomes the condition of inference. This starting state, however, is one that is obtained through a comparison between the experience and something already in the mind. Then, from this starting condition, a "peculiar" meaning is crafted using the experience itself as the material through which the meaning is embodied or expressed. In other words, something in the mind acts as a filter for establishing a starting condition for inference that results in a reworking of the input to articulate a meaning that is peculiar to that input.

This is a difficult to grasp without filling it in with key details– what is the filter that the mind is using to begin the process of abstraction through an act of comparison, how does the "common abstraction" that results from this initial process of comparison act as the condition for the crafting of meanings in the mind, and how can these meanings *mean* anything if they are peculiar– i.e. if they can mean nothing other than the peculiarity that they are. In other words, how can we understand something that can only be articulated in terms of the experience itself?

Peirce makes another attempt at describing his burgeoning theory of abstraction in “Analysis of the Ego”, written three years later, in which he fills in some additional details. In the “Analysis of the Ego”, Peirce continues the work he started in the “Analysis of Creation” and its fragments. In “Analysis of the Ego”, Peirce seems to have overcome his ambivalence in the “Analysis of Creation” and commits to a view of abstraction as a process through which expressed (i.e. embodied) forms of abstraction are conveyed from the “world of sense” to the “world of Abstraction” or to the “Ego”, which is another of Peirce’s name for the “I” impulse.

Peirce, first of all, offers a new take on his notion regarding the “expression” of an abstraction. This time, by introducing the idea of a “subject” – something in which the abstraction, now called “predicate” – can be incarnated, find embodiment in, or expressed.

> The subject is subject (exists) by being an incarnation of a predicate….Every subject is the incarnation of a predicate, which is an abstraction, and which when incarnated in the consciousness is called a conception or in its relation to the exterior incarnation an idea.
>
> (W1:144, 1864)

First, Peirce introduces two important notions here in his system. First, that the same predicate, or abstraction, can be incarnated or expressed in different materials. The difference in the material in which an abstraction is incarnated, or expressed, leads to the distinction between something external to cognition– an idea; or something internal to cognition– a conception. The second important notion introduced here, is the concept of the “subject”, which we will see plays an important role in Peirce’s conceptual learning mechanism. This subject is neither the material in which an abstraction is incarnated or expressed, nor the abstraction itself. Rather, it reflects the result following a condition of existence – *if* something is the incarnation of predicate *then* it is a subject.

It is in terms of subjects that Peirce defines another important concept in his system– the notion of substance. This is a very important notion that relates to Peirce's view expressed in "Views of Chemistry: sketched for Young Ladies" – that abstraction is a *form* that must be *conveyed*; since it helps us get a sense of: conveyed through *what*?

> …it is the formed substance only of which we have any knowledge; and I say that it is by the form or collective quality that the collective substance exists…for it is by the quality that the substance in general, exits."
>
> (W1:144, 1864)

Substance that is "formed" – i.e. a subject whose "work" or behavior is determined by an abstraction– is the only way through which the form of abstraction can be conveyed from an idea (the incarnation of that abstraction *external* to the mind), to a conception (the incarnation of that abstraction *internal* to the mind). Consequently, the whole process of conceptual learning, treated as a communication problem involving the conveyance of meaning or form, depends on two questions: 1) how can an idea external to a mind be presented to it so that the mind can detect it? and 2) how can the mind *rearticulate* the form, or idea, in the substance presented to it?

Peirce sets up part of the answer to this problem here, in particular the question about how form can be *rearticulated* in the mind, by defining form or abstraction in terms of "work" directed towards a "purpose" or "final cause". Below, he explains this idea by using the example of the term "government" and how the concept it represents can be understood in terms of its determining idea (i.e. in terms of the incarnation of the same abstraction "external" to the mind, and the way the abstraction this idea expressed was conveyed to and rearticulated in the mind).

> The purpose of a government maybe doubtful but its idea as I have expressed it is that which it performs. Not the particular things which it performs, but the general statement of any thing which it can perform without the limitation actually seen in the object

(W1:147, 1864)

By emphasizing the concepts of “work”, “form” or “abstraction”, and “subject”, Peirce gives us a sense of how abstraction can be conveyed. The key take-away is that the “subject”[14], due to its association with conveyance of form, can be viewed from the perspective of an external *and* an internal determining form or abstraction. Such a form, Peirce argues, can be understood as a mathematical “function” (W1:148, 1864) because it is dynamic, and involves a determination of change over time. In this way, we are able to address the problem of how form is conveyed as a problem of *identity*, or congruence, between mathematical functions.

> In general, therefore, the idea regards the subject as doing or expressing something–as working itself out–and expresses the particular working out that it does. It disregards the abstraction worked out and it disregards that in which it is worked out, and looks to the identity or difference of the working out function itself. We may therefore disregard the vague term *idea* and substitute for it *Function*.
>
> (W1:148, 1864)

Functions are not equations with a single value output. They can output a range of values. How can two functions be established to be congruent? Let alone, how can one function be tuned so as to be congruent with another function? We can determine whether two functions are congruent to one another by looking at the way in which they determine a common subject. We can perhaps most easily see this with the simpler case of geometric congruence. Two geometric figures can be said to be congruent if one can be manipulated so as to fit one onto the other. We know two triangles are congruent if their angles and sides can be made to match up. A similar idea is at work with determining the congruence of two functions. The congruence of two functions can only be determined through the manipulation of a common subject.

[14] With the “substance” being a special kind of subject.

It is only by setting two functions to be equal to, or match up with, one another – the function that is the idea and the function that is the conception– that the conveyance of form or abstraction can occur.

> In all these instances we see very clearly that it is the actual quality which constitutes the Function which we have been determining. It has been well called the Plan. It is the *root* of the equation, which is given as a problem in the Function. Hence it is a question of equality of equilibrium.
>
> (W1:150, 1864)

Peirce has thus begun to formulate an answer to the question: how can the mind *rearticulate* the form, or idea, in the substance presented to it in a language *meaningful* to it? It does so by reproducing the form governing the behavior of the idea, so that the representation in the mind is "merely a reproduction of the order which there was in their originals"[15] (W2:304, 1869). Peirce further elaborates this answer to the problem of abstraction in 1865, after his Harvard lectures.

We will turn to this further elaboration in chapter 3. For now, it is enough to consider the implications of Peirce's answer to the question: "how can the mind *rearticulate* the form, or idea, in the substance presented to it?", for the question: "how can an idea external to a mind be presented to it so that the mind can detect it?" By maintaining that the process of abstraction, which gives thought its "peculiar" embodied meanings, begins by an act of comparison that establishes "resemblance", Peirce is making the case that there are things in cognition that precede any inference. However, in view of his rejection of common sense knowledge, Peirce must offer an alternative to what these innate conditions for meaning are. Peirce does so by arguing that we have certain innate "feelings" (W1:326, 1865), by this he means neural associations, bequeathed to us by evolution, through the process of natural selection.

[15] One of the few points on which Peirce agreed with James Mills and other English philosophers.

2.4 The relation between the specialized cognitions of 'Understanding', 'Feeling' and 'Sensibility' in Peirce's theory of cognition

The inference of sensations and a view of immediate perception and common sense as "noticing" that does not uphold innate knowledge

Peirce makes the case that the process of abstraction– through which the mind acquires meanings which are simultaneously articulated in the "material" of experience *and* innate– occurs through a process of comparison. Such a process implies, first, a presentation of experience in a way that facilitates this comparison; secondly, a thing to compare against and against which to establish resemblance; and lastly, a process through which this comparative process occurs. In this section, I address all three of these issues. I begin with the thing against which external experience is compared, and consider only after this discussion do I address the manner of presentation of external experience. I end with a discussion on the comparative mechanism upon which Peirce's process of meaning abstraction depends.

We will see in this section Peirce's views on "Feelings", which he argues "Feelings…depend upon the bodily organism" (W1:495, 1866). By this he means that they are states of neural associations. Peirce makes this argument most clearly in the late 1880s and early 1890s at a time when he was attempting to ground his theory of cognition on the basis of a burgeoning neuro-science. He associates "Feeling" with states of nerve-cell excitation.

> The cloudiness of psychological notions may be corrected by connecting them with physiological conceptions. Feeling may be supposed to exist, wherever a nerve-cell is in an excited condition.
>
> (EP1:292, 1891)

And, perhaps even more explicitly.

> Wherever there is a feeling, there a nerve-cell is in action…Feeling corresponds to nerve-cell activity….

(W4:40, 1879)

Peirce argues that these feelings consist of sections of greater neural connectivity in the biological brain. This neural connectivity of certain feelings implies an "immediate community of feeling between parts of mind infinitesimally near together" (W8:148, 1892). Moreover, these sections of greater neural connectivity arise from their inheritance through natural selection and evolution.

> There are certain phenomena which cannot be subject to any mental law. For instance, a color-blind person may ask himself by virtue of what mental law it is that he is wanting in the sense of redness. And…normal people may ask why they have just the range of feelings they have, and no others. Plainly the only conceivable answer to such questions would consist in setting forth the evolutionary history of the mind, showing that certain feelings, perhaps intermediate between smell-taste and sound-touch have become atrophied, or something of the sort. But in such explanations there would always be an element of diversification which would present the sporting of absolute lawlessness.
>
> (W8:127, 1892)

Moreover, Peirce argues that "feelings" enable the initial act of comparison that begins the process of meaning abstraction by establishing resemblance. They do so by acting as the character, predicate, or hypothesis being compared to in inference.

Peirce begins to elaborate on this theme of innate and "bodily" feelings following his 1865 lectures. He introduces this topic in the context of articulating a definition of *re*presentations of form– both those considered external to our minds and the representations of cognition that are in consciousness. Peirce argues that representations that we perceive and experience must, first, be *re*-presentations of form; and secondly, must be "addressed to us" (W1:24, 1865). By this he means that they must be representations that we have been evolutionarily equipped to perceive. Peirce writes: "[t]hat they are addressed to us is only the limitation of our selection" (W1:324, 1865). By this term "selection", I argue that Peirce means

natural selection or evolution. He repeats the thought in other places – including a few pages in the same essay.

> Now, instances taken by us are 1st in virtue of being taken by us feelings….The first character belongs to them by virtue of the limitation of our selection.
>
> (W1:326, 1864)

Peirce thus associates "feelings" with how an experience external to the mind can be "taken by us" and articulated as meaning. These feelings are related to the "limitation of our selection" which makes certain representations of form accessible to us, or "addressed" to us in the first place, and capable of being compared and possibly understood.

Feelings are involved in an act of comparison that establishes resemblance between them and an immediate impression of external forms (a topic we discuss next). It is through such a process that an experience is consciously perceived, for it is through this process that it becomes the representational output of a process of cognition. It is this process, which we saw, that establishes for Peirce a "common abstraction" ("Analysis of Creation" fragment in Murpley 1961:50) or "common character" (W1:328, 1865) to be elaborated into a "peculiar" abstracted meaning through the process of abstraction we just discussed. Peirce describes this process of establishing resemblance through a comparison, and the role of feelings in that comparison, in great detail. For Peirce, a resemblance between two forms– including between a form that is internal to the mind and one that is external to it (W8:104, 1890) involves two ideas being "thought together", or having an *overlap* in the nerve cells which constitute the material quality (as opposed to the subjective quality) of the feeling.

> In short the resemblance of ideas implies that some two ideas are to be thought together. Which are present to the mind at different times.
>
> (W3:69, 1873)

Or, more concretely:

> When two ideas resemble one another, we say that they have something in common; a part of one is said to be identical with a part of the other. In what does this identity consist?... It appears to me that in order that that should be possible, the two nerve-cells must probably discharge themselves into one common nerve-cell…[the] supposition…to confirm or reject, is that two ideas are alike so far as the same nerve-cells have been concerned in the producing of them. In short, the hypothesis is that resemblance consists in the identity of a common element, and that that identity lies in a part of the one idea and a part of the other being the feeling peculiar to the excitation of one or more nerve-cells.
>
> (W6:189-190, 1887-8)

Peirce here describes in physiological terms what he introduced in the drafted pages at the end of "Analysis of Creation" in 1861. That is, he argues that the assessment of resemblance involves separating (abstractly) the "like" elements from the "unlike". This idea is articulated here in terms of "the identity of a common element", where the "identity" in question "lies in a part of one idea and a part of the other being the feeling peculiar to the excitation of one or more nerve-cells". In other words, the "identity" of two forms that resemblance establishes involves identifying a new feeling common to the material feeling of two forms. This new feeling identified at the intersection of two forms in their material manifestation as instantaneous states of the nervous system (i.e. as feeling), becomes its own representation which expresses "the feeling peculiar to the excitation" of the nerve-cells associated with the "common abstraction", or the resemblance, between a form in and out of consciousness. This common element of feeling becomes the basis for the articulation of an experience in representational terms internal to the mind. i.e. in terms of feelings with which other feelings are associated.

Peirce, then, makes clear that resemblance or similarity can only occur if feelings are registered in a mind that is continuous– both in time and space.

> An idea…has no character or qualities but what the mind thinks of it at the time when it is present to the mind. It follows from this that if the succession of time were by separate steps, no idea could resemble

> another; for these ideas if they are distinct, are present to the mind at different times.Therefore at no time when one is present to the mind, is the other present. Consequently the mind never compares them nor thinks them to be alike, and consequently they are not alike; since they are only what they are thought to be at the time they are present.
>
> (W3:69, 1873)

Moreover, such a process involves *time*– that is a relation or comparison of various instantaneous states of the nervous system– and is thus an *inference*.

> We can draw no inference in an instant, nor can we recognize any inferential conclusion. We can neither divide nor synthesize; we can only feel. When an instant has passed that immediate consciousness can never be recovered…. We cannot compare any subsequent feeling with it, as immediate feeling…We remember it; that is to say, we have another cognition which professes to reproduce it; but we know that there is no resemblance between the memory and the sensation, because in the first place, nothing can resemble an immediate feeling, for resemblance supposes a dismemberment and recomposition which is totally foreign to the immediate….
>
> (W6:184, 1887-8)

Feelings, then, in the acquisition of an external idea are involved in an act of comparison, that is an inference, and takes time. Resemblances that result from such an act of comparison depend on the feelings that the external idea is being compared to. In other words, resemblance depends on the particular hypothesis being considered.

> …any two objects in nature resemble each other, and indeed in themselves just as much as any other two; it is only with reference to our senses and needs that one resemblance counts for more than another… Resemblance is an identity of characters; and this is the same as to say that the mind gathers the resembling ideas together into one conception.
>
> (W6:177, 1887-8)

As he described in the past. Peirce maintains that the act of comparison that leads to resemblance involves the separation (through abstraction) of the like and unlike elements in the comparison, and the "gather[ing]" up of the like elements "together" into one compound. This compound of like elements is itself a feeling, or instantaneous state of the nervous systems, and is the "common abstraction" from which peculiar meanings are derived. Peirce argues that the act of resemblance is an inference, or a "relations of reason" (W6:177, 1885). We will revisit this particular inference later in this chapter and how it differs from other inferences or "relations of reason" of the mind.

Feelings, for Peirce, articulate hypotheses about the world– both innate and constructed by a controlled reasoning process. It is through a comparison of what is immediately present and these feeling hypotheses that establishes resemblance. They also initiate the process of the abstraction of the mind's "peculiar" meanings by enabling an act of comparison that establishes resemblance between abstractions external to the mind, i.e. ideas, and feelings internal to the mind that become the condition for crafting the mind's abstracted meanings. In such a view, feelings are not knowledge, and can only even be said to become representational after the initial act of comparison.

The feeling being compared to an external idea, or even to other internal feelings, is considered by Peirce to be a "predicate" or a "hypothesis". However, Peirce argues that some of these hypothetical feelings– those that are bequeathed by evolution– are "innate" to the mind; and play an important role in the conscious experience of sensations. Feelings are thus crucial to establishing the "common abstraction" from which "peculiar" abstract meanings in the mind are crafted. Peirce is clear about this part of the process, and that "the mind notices through resemblance and difference" ("Analysis of Creation" fragment in Murphey 1961:50). Feelings thus play an important role to how the mind notices, or, how certain embodied forms become *present* to the mind.

Moreover, Peirce sees feelings as playing a second role in cognition. In addition to being the means through which the mind *notices* experience by establishing resemblance between the form *in* and the form

out of consciousness, Feelings also play an important role in conceptual learning for Peirce. They are involved in the inference of sensations, and as we will see they are also involved in the inference of conceptions or conceptual knowledge. Peirce, however, sees the inferential process that gives rise to sensations as differing from the inferential process that gives rise to conceptions.

> By sensation is understood…a mental representation determined by the character of a movement of the nerves, but without any understanding of this character. We see that a certain thing is blue, but we do not thus judge anything of it, not contained in the impressions, which we thus explained, except that it is one of those things to which by the constitution of our nature we give the innate name or sensation blue.
>
> (Peirce excerpt from Murphey 1961:70-1)

The process of inference that they engender gives rise to sensations, or "a mental representation determined by a character of a movement of the nerves, but without any understanding of this character". In short, they initiate an inferential process that outputs a representation, but has not gone through the elaborative process associated with the faculty of "understanding". Instead, the mental representation that is outputted is outputted almost automatically. However, this is not to say that this representational output is a form of *knowledge*. Peirce makes clear that the near-automatically outputted representation initiated by "innate" feeling or associations of feelings, is one that is devoid of knowledge– it is simply a marker to distinguish one aspect of the impression of the external idea upon the senses from the other. "Innate" feelings merely result in sensations which are "constitutional nominal hypothes[es]".

Feelings, both those involved in sensations and those involved in conceptions, differentiate aspects of the impression of an external idea upon the senses, or another feeling, by acting as a "constitutional nominal hypothesis". Through the act of comparison that results in resemblance, they put forward aspects of impressions as distinct representations of their own– as a "common abstraction". The feeling hypotheses are not the abstract meanings attributed to experience themselves. Instead, feelings play a role in the inference of sensation or conceptions, in that, once compared to material experience and abstracted from it, they become the *conditions* for distinguishing among different kinds of presentations of experience. In

other words, they enable the formation of a “constitutional nominal hypothesis” – a distinguishing of a distinct, or differentiated, aspect of experience; which, as of yet, is not accompanied by an abstract meaning or name.

> A judgment of sensation is thus only a constitutional nominal hypothesis; and the impressions themselves have no character which would make it illegal for the sensation of blue to arise when that of yellow now does and vice versa.
>
> (Peirce excerpt from Murphey 1961:70-1)

However, hypotheses developed due to “innate” resemblances among feelings bequeathed by evolution, differ from those where the resemblance is established by “need” and results in “relations of reason” (W6:177, 1887-8).

Judgments of sensation establish that an aspect of experience is distinguished from others. In the labeling of that aspect of sensation under a differentiating name, we establish it as something that *could* be named, or be subject to further elaborations of sensation. The name given, however, has no *reason* for it – one name is just as good as another as long as it distinguishes different aspects of an impression. For this reason, Peirce argues that it has no meaning to the mind. Peirce gives an example of this process, once again using color as his case study.

> Undoubtedly, our impressions have one character when we see blue and another when we see yellow…the elementary excitations produced by each instantaneous state of the ganglion have different relations; but those impressions cannot be colour for they are instantaneous while colour can only arise from the relative states of the nerve at different times….color requires a certain lapse of time, and all the sensations in the sum of lesser times will contain all the matter of receptivity, but yet no color.
>
> (Peirce excerpt from Murphey 1961:70-1)

This passage is worth breaking down. First, Peirce is attempting to base his theory about the role of sensation in the nearly neuro-science of his days– something that is consistent in his work. By referencing the ganglion– a category of peripheral nerve cells– he is making references to some of the findings from his times. Moreover, he is arguing that the sensation of color is a higher level sensation, or inference, that requires a comparison of different states of the nervous system– or of impressions. The sensation of color, however, is itself the result of an inference conducted over instantaneous, or near instantaneous, impressions on our nervous system. These near instantaneous distinctions of impressions have been themselves labeled as "sensations", and given a differentiating name or meaning. Here is a chain inference that does not conclude in a conception but rather in another, more abstract, sensation– i.e., in a sensation *of* a sensation *of* a sensation, etc.

Sensations thus differ from conceptions not because the elaboration of one does not involve inference, while the other one does. Both sensations and conception are representations that result from a process of inference. The difference lies in how the feeling hypotheses are suggested, and relatedly, they differ on account of the kinds of abstract meanings attributed to them on account of this process. The hypotheses that give rise to sensations are merely "constitutive" and "nominal" and remain unanalyzed (W1:491, 1866) into abstracted meanings that the mind can understand. They rely on a relationship between excitations of nerve cells established by evolution in order to be suggested. Here is Peirce's description of this inferential behavior.

> Thus both sensations and conceptions are hypothetic predicates. They are, however, hypotheses of widely different kinds. A sensation is a sort of mental name. To assign a name to a thing is to make a hypothesis. It is plainly a predicate which is not in the *data*. But it is given on account of a logical necessity; namely the necessity of reducing the manifold of predicates to unity….To give a name is therefore to make a hypothesis. Such a hypothesis, however, differs from what we usually comprehend under that term in a very important respect; namely; that while the data require *some* name they do not require any name in particular. *Chou* is as good a word as *cabbage*….It is the same with a sensation; if all that is painful to me had been pleasurable and *vice versa*, I should have derived as correct a knowledge of things from these

> sensations as I now do, because all the knowledge these sensations give us now is only that there is a difference between pleasure and painful circumstances without telling us anything of the nature of the difference.
>
> (W1:472, 1866)

The hypotheses that give rise to conceptions, on the other hand, are not merely "constitutive". The names, or predicates, they assign to an aspect of experience are the result of an elaborative process, or analysis, that *explicates* the constituted "common abstraction" for the mind. Without getting too deep into the details of this kind of inferential behavior, here is a description from Peirce about how this kind of explicable hypothesis behaves.

> Whatever part impressions play in our knowledge, they need to be reduced by the understanding to the unity of consistency and therefore to be combined, and not by chaotic aggregation but in a determinate form. This form or way of combining impressions is an element of cognition not given in the elements combined, but added to them in order to reduce them to the requisite unity…This element of cognition is termed conception.
>
> (W1:516, 1866)

In conception, a hypothesis is proposed not because of an automatic association of feelings by similarity or resemblance– established as a function of evolution– but through a process that suggests which aspects of immediate experience (i.e. impressions) to make distinct and to combine. This suggested hypothesis is a "determinate form" or "way of combining impressions" as is required to explain the aspects of immediate experience and bring them to "unity". Because these hypotheses were suggested not automatically, but as a means of solving a problem– making sense of an experience– they can be assessed vis-a-vis whether they do in fact explain such an experience. The hypotheses of conceptions can be re-articulated in terms of the explanatory problem they were proposed to solve. They are, in this way, "analyzable" where the hypotheses of sensations are not. I argue that it is this which leads Peirce to conclude as early as 1866 that:

> Judgments of sensation, emotions, and instinctive motions…are hypotheses whose predicates are unanalyzed in comprehension…
>
> (W1:491, 1866)

Peirce thus maintains that different things that are in cognition– including emotions, feelings of pain and pleasure, colors, etc. – are also elaborated by an inferential process associated with the mental faculty of "Feeling". They are the result of an inferential process that differs from that which gives rise to conceptual knowledge via the mental faculty of "Understanding". See for example Peirce extend his reasoning from the above passage to colors.

> It is the same with any other sensation. The sensation of *redness* corresponds only to a particular rate of vibration in the luminiferous ether, which the sensation itself tells us nothing of. All that the sensation is good for therefore is to tell us that *red* things are alike and differ from other things. This sensation might have been of some other kind therefore without being any the less true. So that a sensation is like a name– the data demand it but do not demand that it shall be of any particular resort so long as it is consistent.
>
> (W1:472, 1866)

The inferential elaboration that results in sensations, consequently, conclude in a marker, or representation, that distinguishes among different kinds of aspects of an impression. Sensations are thus "judgments", or representational outputs, and are the result of a comparative assessment of resemblance made possible by innate "feeling" hypotheses bequeathed through biological evolution and natural selection. This close relationship between sensation– a distinguished aspect of sensation with no meaning, and impression– the "continual determinator" (W1:165, 1865) of our judgments, leads Peirce to call impression"undifferentiated sensation".

> An impression in itself is an uncomprehended impression, and hence an undifferentiated sensation, like the feeling of our heart's motion.
>
> (W1:515, 1866)

Sensations, in this sense, differ from both impressions and conceptions. They have gone through a process of inference that assigns a predicate, or name, to a subject. Such a name while consistent is not obtained through a process that assigns to them a particular representation that stands for a particular meaning. Rather, sensations are simply an aspect of impression, which by the "constitution of our nature" we are compelled to give a name– any name– to, that differentiates it from other aspects of impression. While this name is a representational output, a conclusion of a process of inference, it differs from the representational outputs of the mental faculty of "Understanding", which are conceptions.

Peirce argues that the inferences of the mind are part of a process to reduce the "almost conceivably complicated" (W2, 199, 1868) impressions to more simple, or more unitary, feelings, predicates, or hypotheses. Such inferences subsume complicated patterns of associations of feelings under more simple feelings.

> Accordingly, a Sensation is a simple predicate taken in place of a complex predicate…it fulfills the function of hypothesis. But the general principle that every thing to which such and such sensation belongs, has such and such a complicated series of predicates, is not determined by reason (as we have seen), but is of an arbitrary nature.
>
> (W2:228, 1868)

However, the more simple feelings, or hypothetical predicates, that the inference of sensations subsumes for more complicated feelings are ones which arise not from an association among feelings that the mind establishes. Rather, these associations, since they are inherited, appear to the mind as being determined by an "occult power" (W2:228, 1868) or "arbitrary" in nature. Peirce argues that this kind of inference is one that resembles an inference from a pre-established definition to a thing defined ("definitum") in

linguistics. However, in the case of sensations, the definition which establishes an “arbitrary” premise to start the inference of resemblance is “determined by the constitution of our nature”, i.e. is bequeathed by evolution.

> Hence, the class of hypothetic inferences which the arising of a sensation resembles is that of reasoning from definition to definitum, in which the major premise is of an arbitrary nature. Only in this mode of reasoning, this premise is determined by the conventions of language and expresses the occasion upon which a word is to be used; and in the formation of sensation, it is determined by the constitution of our nature, and expresses the occasions upon which sensation, or a natural mental sign, arises.
>
> (W2:228, 1868)

Peirce’s view on sensations and “innate” names or predicates is his attempt to formulate a theory of immediate perception and common sense that does not admit innate knowledge. Peirce is clear that while sensations are *representations*, he does not consider them to be conceptual knowledge. The representations that are sensations and are automatically associated with impressions of external ideas on the nervous system only serve to *differentiate* one set of experience from the other. They do not *imply* anything else regarding the cognitive behavior of the mind. Similarly, for Peirce, the “innate” names or feeling hypotheses that constitute sensations are also not knowledge. They are neural associations that have a pre-established resemblance, or connection, to the impression of certain external ideas on the nervous system. They are not representations, and consequently, are not the output of cognition. Moreover, they do not necessarily lead to understanding or conceptions. For this reason, Innate associations among feelings are not knowledge and are at most a *condition* for knowledge, in the cases that the hypotheses of sensations and the hypotheses of conceptions coincide.

The view of immediate perception that Peirce eventually comes to accept is thus one that is closest to a view that he uses interchangeably with the term “immediate cognition”. It is a view that does not hold that we have pre-formulated axioms associated with an external experience, but rather, that certain aspects of experience are automatically *distinguished* and *differentiated* from other aspects of experience. While

such distinguished aspects of experience may become the *conditions* for the elaboration of knowledge, they are themselves not knowledge.

> Intuition is a term, which by the consent of philosophers stands for immediate cognition…In its most approved sense…[immediate cognition] means any mental representation which does not represent its object by representing another conscious representation of the latter; in other words, it is that knowledge between which and the thing no other representation in consciousness intervenes…Thus interpreted, immediate cognition is the same as what is otherwise termed an ultimate fact; that is, a premiss not itself a conclusion, an empirical constituent of knowledge not itself containing non-empirical parts, in short, an impression.
>
> (W1:515, 1866)

As we saw, Peirce means an *as yet undifferentiated* aspect of experience by the term "impression". It is an "ultimate fact", or a "continual determinator" of cognitions (W1:165, 1865), and is in a relation of *influx* to the cognitions that we come to notice in consciousness – that of the first cognition to a perpetually moving train of latter cognitions. Peirce argues that such an "ultimate premiss" or "continual determinator" from which other cognitions "perpetually emanate" (W1:92, 1861) is the only "intuition" we have in cognition and forms an axiomatic first premiss for all cognitive inferences.

Peirce's version of Immediate perception or immediate cognition is thus nothing but the *noticing* of an *impression* on the mind. It is enabled by the mind's inherited neural associations which allow it to differentiate certain aspects of experience through a relation of resemblance. Such a relation of resemblance is only made possible through the articulation of a feeling hypothesis and an act of comparison which occurs as an inference. Such an impression, as immediate perception, is the only thing in cognition that Peirce argues is not a sign (EP2:398[16], 1907) – i.e. is not representational in any way, as it is not the product of cognition, but rather, the start of cognition. An impression is not yet the "conclusion" of an inference, even an inference that would result in sensation. Instead, it is the condition for any of the

[16] This refers to an editorial note in "The Essential Peirce: Volume 2" summarizing Peirce's 1903 proof of pragmatism in Harvard Lectures.

mind's inferences, including the mind's inferences of meanings through the act of abstraction– an act that can result in sensations or conceptions depending on the particular nature of the inference.

Peirce thus comes to the acceptance of a more "subtle" brand of the doctrine of immediate perception and of a (non-representational) doctrine of common sense through his views on innate associations of feelings that he associates with Scottish Enlightenment philosopher Thomas Reid (EP2:349, 1906). I argue that Peirce maintains this more "subtle" view of immediate perception throughout his career. He articulates this view quite clearly in 1906– in the mature stages of his intellectual life.

> What is the bearing of the Present instant upon conduct? Introspection is wholly a matter of inference. One is immediately conscious of his Feelings, no doubt; but not that they are feelings of an *ego*. The *self* is only inferred. There is no time in the Present for any inference at all, least of all for inference concerning that very instant. Consequently the present object must be an external object, if there be any objective reference in it. The attitude of the Present is either conative or perceptive. Supposing it to be perceptive, the perception must be immediately known as external,—not indeed in the sense in which a hallucination is *not* external, but in the sense of being present regardless of the perceiver's will or wish. Now this kind of externality is conative externality. Consequently, the attitude of the present instant (according to the testimony of Common Sense, which is plainly adopted throughout) can only be a Conative attitude.
>
> (EP2:359, 1906)

In this passage Peirce continues to use the term "Feelings" to refer to what can be grasped "at once" (W1:84, 1861) or in an instant without inference. Such feelings are the excitations of nerve cells. These feelings alone, or as a set, produce instantaneous states of the nervous system which are impressions. At this point, feelings-as-impressions are a "present object" which are simultaneously an "external object". They are the conditions for establishing relations of similarity, or resemblance, which involve a relation of the states of the nervous system at different instants in time. Peirce is clear that in order to maintain such a view of impressions and immediate perception, he is relying on a "testimony of Common Sense" – the only testimony that Peirce will accept, which is the "intuition" of an impression (W1:515, 1866), or the

instantaneous state of the nervous system. Such an "intuition" or "feeling" is one that is not the result of any previous cognition.

Impressions, or immediate cognitions, not only have a relationship to sensations, but also to conceptions. Sensations, as we saw, are inferred over impressions through an inference that establishes a relation of resemblance between the immediate impression and an innate association among feelings. Conceptions are similarly inferred over impressions in a process that *both* differentiates impressions *and* tries to explain this differentiation in terms of an internal "peculiar" language of thought[17]. It is for this reason, I argue, that Peirce describes conceptions as being embodied in "sensation" (as much as they are in "matter" – a representational system external to the mind) in order to be communicated.

> A conception…is not in the mind in the sense in which a sensation is; it requires to be embodied in sensation, as much as it requires to be embodied in matter in order to be carried out into the external world.
>
> (W1:473, 1866)

The inferential process that leads to cognitions in the mental faculty of "Understanding", thus seems to involve a variant of the inferential process involved in the inference of sensations in the mental faculty of "Feeling". Such a variant must work on impressions, distinguish aspects of them, and – in a step that is unique to the faculty of "Understanding" – a "form" or "way of combining impressions" (W1:516, 1866) – must be added to the distinguished and differentiated impressional aspects themselves.

Peirce describes this process through which the inference of conceptions works directly over impressions by serving to differentiate impressions for a reason with the goal of "bringing it to the unity of consistency".

> Impression in general or as such, is itself by virtue of its generality not an impression but a conception. An impression does not so much as conceive itself to be an impression. It is an undifferentiated feeling whose vagueness is feebly shadowed forth by that sense of dyspepsia which tinges a man's sentiments with

[17] See the relationship Peirce establishes between meaning and language in "Analysis of Creation" (1861).

> melancholy without being directly noticed. Any reflection upon an impression, since it is a step towards bringing it to the unity of consistency is a conception.
>
> (W1:516-7, 1866)

Impression considered from the perspective of the logical inference of the faculty of Understanding is thus already differentiated as "impression in general". It becomes itself a differentiated feeling and a conception.

According to my reading of Peirce, there is thus no innate *conceptual knowledge* in his theory of cognition. For Peirce, there are only, at most, innate *conditions* for such knowledge. These innate conditions for knowledge, or innate associations among feelings, are involved in the mind's *noticing* of external aspects of experience– its impressions; and give rise to sensations, emotions, and "instinctive motions" (W1:491, 1866). Such differentiated aspects of impressions are all considered by Peirce to be representational outputs of the same specialized mental faculty– the faculty of "Feeling" and differ from the inferential process of the faculty of "Understanding". Peirce articulates this difference between the inference of Feeling and the aspect of the inference of Understanding with which it overlaps.

> There is…this difference between an emotion and an intellectual hypothesis, that we have reason to say in the case of the latter, that to whatever the simple hypothetic predicate can be applied, of that the complex predicate is true; whereas, in the case of an emotion this is a proposition for which no reason can be given, but which is determined merely by our emotional constitution…this corresponds precisely to the difference between hypothesis and reasoning from definition to definitum….
>
> (W2:229, 1868)

Consequently, while the inference of the faculty of Feeling – which Peirce calls "reasoning from definition to definitum", is in many ways different from a similar inference associated with the faculty of Understanding– "Hypothesis"; the two remain distinct kinds of inferences.

The representational outputs of the specialized mental faculty, “Feeling” – sensations, emotions, and instinctive motions– are the result of a particular kind of inference by the mind. This particular kind of inference associated with the mental faculty of Feeling establishes similarity or resemblance between two forms, including forms in cognition and those external to cognition but still present to the mind as impressions. This inference establishes a relation of resemblance that separates, through abstraction, like from unlike elements in the impression. It furthermore associates the like elements, which are feelings (i.e. instantaneous states of the nervous system), with other feelings in the mind according to associative patterns among feelings that are inherited through evolution and natural selection. In this way, resemblance, results in a “dismemberment and recomposition which is totally foreign to the immediate” (W6:184, 1887-8).

Moreover, the elaborations of sensations, emotions and instinctual motions can continue to infer sensations of sensations, and emotions of emotions, motions of motions, etc. leading to sophisticated mental representations, which are nevertheless *not* knowledge. For example, Peirce describes this elaborative process with sensations– in this case, with the sensation of beauty.

> The sensation of beauty arises upon a manifold of other impressions…Secondly, all these sensations are in themselves simple, or more so than the sensations which give rise to them.
>
> (W2:228, 1868)

In addition, as we saw, Peirce is clear that perceptions of colors also fall in this category of representations (see also W2:228, 1868). The inference of the mental faculty of “Feeling”, therefore, while it shares aspects in common with the inference of the mental faculty of “Understanding”, seems to nevertheless be its own distinct kind of inference; which runs in some ways *parallel* to the inferential mechanism of the Understanding.

I argue that the mental faculty of “Sensibility” similarly has its own distinct kind of inference despite sharing aspects in common with the inferential mechanism of the Understanding. In the next section, I

discuss the process through which Sensibility infers its representations, and the role that the representations of the mental faculty of Sensibility play in cognition. We see that they are strongly related to the presentation of impressions in the first place.

Peirce's second specialized mental faculty (Sensibility or Sensation of reactions) and its role in impressions on the senses, memory, and imagination

We've seen how feelings– instantaneous states of the nervous system– play an important role in the inference of sensations and even in the inference of conceptions. However, both the inference "from definition to definitum" associated with the specialized mental faculty of "Feeling", and "Hypothesis" – one of the inferences associated with the specialized mental faculty of "Understanding" – take as their starting point impressions. Impressions are "undifferentiated sensations" and are simultaneously external to the mind and immediately present to it. In other words, impressions are the boundaries between what is in the mind and what is out of the mind. However, the question remains regarding how the mind forms its impressions in the first place. I argue that Peirce turns to the second specialized mental faculty of "Sensibility" also later called "Sensation of Reaction", "Polar Sense" and "Dual Consciousness" in order to formulate such an explanation.

We've already seen some foreshadowing of this move in the 1860s, Peirce's lectures on Kant and letter to Abbot in 1865. There, Peirce makes the case that a priori synthetic judgments that are determined from "within", such as space and time, are the conditions for what is *formally* present to the mind. Peirce argues that such representations are both universal and necessary, and that they are crucial for the presentation of impressions themselves. Such "universality implies that the event would be the same where the things within certain units different from what they are" (W1:217, 1865).

> …Kant admits universals on the ground they are indispensible [sic] for bringing to the unity of consciousness, not facts merely, but the very impressions of sense.
>
> (W1:159, 1865)

Representations of space and time play an important role by being the means by which other kinds of representations can be inferred (W1:250, 1865). In his novel reading of Kant, in which he injects many of his own views, Peirce argues that the "general representations" (W1:250, 1865) of space and time are what allow the mind to capture the *forms* of external ideas.

> That which the world is (abstracted from how it is) is its elementary parts. How the world is (abstracted from its experience) is the coordination of those parts or their relation to each other as parts; potential or actual. But in the *Critic*….Instead of making the parts and coordination merely subjective he regards them as belonging to the immediate object of perception antecedent to thought, which he calls appearance.
>
> (W1:250, 1865)

Peirce argues that the representations of space and time allow the "parts and coordination of those parts" that constitute, respectively, the *matter* and *form* of external experience, to be captured directly in the mind as an "appearance" an "immediate object of perception" that is "antecedent to thought". This description of "appearance" corresponds almost exactly to Peirce's later description of impressions. Such an impression, or appearance, can be viewed in terms of its matter, or in terms of its form. Both views, however, are only made possible by the general representations of space and time.

Peirce, here, highlights his distinction between matter and form– both being two ways of viewing the same experience. "*Matter* is that which makes things exist. *Form* is that which makes them *as* they are" (W1:250, 1865).

> This approximates to the original meaning again. For as originally *matter* and *form* were the real determinants or causes of the *that* and *how*; so with Kant they become the logical determinants or reasons of the *that* and *how*. The Matter is that in the appearance which corresponds to the impression upon the sense; for without sense no mental representation could exist. The Form is the condition of the possibility of the relations of the elementary parts of the representation.

(W1:250, 1865)

In his discussions about the abstraction of meaning, Peirce focused on the form, or “Function”, of experience– the “coordination of parts”. However, here, Peirce is arguing that understanding how the impressions on the senses are made by external experience requires also a theory about what the parts themselves in the impression are. These parts are the “Matter” of experience, which Peirce argues “is that in the appearance which corresponds to the impression upon the sense”. Moreover, understanding *both* the matter and form of “appearance” or impressions, requires an understanding of the representations of space and time, and how they come about.

Peirce is very explicit that the general representations of space and time hold the parts and coordinations through which the form of an external idea is expressed together, in the impression of it, for the mind to infer.

> Now it is held that space and time are forms of intuition; meaning by intuition not the faculty of that name but its product. In other words they are what render possible the arrangement seen in our representations antecedently to active thought.
>
> (W1:250, 1865)

The representations of space and time “render possible the arrangement seen in our representations antecedently to active thought”. In other words, they make possible the arrangement and coordination of parts in the impression that make the inference of form possible.

Peirce stresses that the general representations of space and time are “antecedent” to “active thought” and make possible the presentation of the impression of the senses in a way that preserves the coordination of parts (or matter) that make inference possible. Peirce for this reason calls space and time the “conditions of appearance”, or, to use his later terminology, the conditions of impressions.

> We have already seen that they are antecedent to active thought, because they are not class-conceptions. We have seen also that they are units so that they cannot be part of the matter of appearance, for that resides in the parts; third they are not themselves appearance but the conditions of appearance, hence they are clearly the conditions *sine qua non* of the coordination of the parts.
>
> (W1:250-1, 1865)

As we saw, Peirce – in his novel reading of Kant– considers space and time, as a priori synthetic judgments determined from "within", to also be "material inferences" – in other words, inferences working up the "matter" of experience the only way in which it can be registered by the mind– as feeling. Peirce expands on this view when he grounds his theory of cognition in a self-crafted neuroscience. He makes it very clear that the "matter" of appearance, or of impressions, are feelings, or excitation of nerve-cells – "[a] feeling, therefore, as a feeling, is merely the *material quality* of a mental sign" (W2:228, 1868).

Peirce, in an intermediary phase, comes to associate this function of the mental faculty of Sensibility, "attention".

> That universal conception which is nearest to sense is that of the present, in general. This is a conception, because it is universal. But as the act of attention has no connotation at all, but is the pure denotative power of the mind, that is to say, the power which directs the mind to an object, in contradistinction to the power of thinking any predicate of that object, – so the conception of what is present in general, which is nothing but the general recognition of what is contained in attention, has no connotation, and therefore no proper unity.
>
> (W2:49, 1867)

At this point in time, Peirce defines attention as follows. Peirce, as we will see shortly, amends this definition of attention to more closely reflect his work on the physiology of mind, before abandoning the term altogether.

> Attention is a definite conception or supposition of one element of consciousness, without any positive supposition of the other.
>
> (W1:518, 1866)

Peirce makes the case that it is our conceptions of space and time which enable us to experience impressions– or immediate consciousness– as continuous.

> In short, the Immediate (and therefore in itself unsusceptible of mediation– the Unanalyzable, the Inexplicable, the Unintellectual) runs in a continuous stream through our lives; it is the sum total of consciousness, whose mediation, which is the continuity of it, is brought about by a real effective force behind consciousness.
>
> (W2:227, 1868)

The representations of space and time are the "mediation" between the "unanalyzable" stream of immediate impressions and the presentation of these impressions as continuous in time (and space). As we saw, it is a representation of feelings as continuous that enables the act of comparison that establishes resemblance to occur (W3:69, 1873). Peirce sees the representations of time and space as the "pure denotative" power of mind (W2:227, 1868) and as the "effective force behind consciousness".

> Thus, we have in thought three elements: 1st, the representative function which makes it a *representation*; 2d, the pure denotative application, or real connection, which brings one thought into *relation* with another; and 3d, the material quality, or how it feels, which gives thought its *quality*.
>
> (W2:227, 1868)

We have so far covered two of these three elements– the mental faculty of Feeling and the material quality of feeling as the excitation of nerve cells; and now, the mental faculty of Sensibility and he denotative application, or power, of what Peirce has introduced to us as "attention". We will start to cover

the third element– the representative function and its implementation in the mental faculty of Understanding in the next section.

For Peirce, space and time – the representational outputs of the mental faculty of Sensibility– work directly on immediate feeling and mark it up– a process that, we will see, Peirce calls "emphasis" (EP1:46, 1868)– so that feelings (which would otherwise be unanalyzable) have a relation to one another in consciousness. Otherwise, there would be no way to relate feelings as they are, for Peirce, "incomparable" in themselves "with another", and are "absolutely *sui generis*" (W2:226, 1868).

> What we must mean, therefore, by saying that one concept is contained in another, is that we normally represent one to be in the other; that is, that we form a particular kind of judgment….No thought in itself, then, no feeling in itself, contains any others but is absolutely simple and unanalyzable….Every thought, however artificial or complex, is, so far as it is immediately present, a mere sensation without parts, and therefore, in itself, without similarity to any other, but incomparable with any other and absolutely *sui generis*….Hence every thought, in so far as it is a feeling of a peculiar sort, is simply an ultimate, inexplicable fact.
>
> (W2:226-7, 1868)

Immediate feeling, consequently, must be brought into relation to other feelings through an act of inference in order to be connected to other feelings at all. The relation of feelings is done, according to Peirce, through the mind's "denotative application" or its power to mark singular feelings through an act of "emphasis".

> By the force of attention, an emphasis is put upon one of the objective elements of consciousness. This emphasis is, therefore, not itself an object of immediate consciousness; and in this respect it differs entirely from a feeling.
>
> (W2:231-2, 1868)

It is due to the marking up, or emphasis, of immediate feeling through the representations of space and time that inference can occur *in time* and give to the mind its *virtual* quality (W2:227, 1868). This is because placing an emphasis on immediate feeling is a representational act that "can exist only so far as it affects our knowledge"; that is, it is a representation that is interpreted only in the context of the inference of conceptions. Peirce argues that the effect of emphasis operates through memory– and as we will see, this has an important effect on the process of imagination which is critical to the inference of knowledge.

> …since the emphasis, nevertheless consists in some effect upon consciousness, and so can exist only so far as it affects our knowledge; and since an act cannot be supposed to determine that which precedes it in time, this act can consist only in the capacity which the cognition emphasized has for producing an effect upon memory, or otherwise influence subsequent thought.
>
> (W2:232, 1868)

Peirce is even more clear that such effects are effects on the nervous system which establish associations among nerve cells.

> Attention produces effects upon the nervous system. These effects are habits[18], or nervous associations.
>
> (W2:232, 1868)

Peirce, at this point, updates his definition of attention from 1866 to reflect the role attention plays in memory and the inference of conceptions.

> …attention is the power by which thought at one time is connected with and made to relate to thought at another time; or, to apply the conception of thought as a sign, that it is the pure demonstrative application of a thought-sign.

[18] Peirce at around this time calls the representational outputs of the mental faculty of Sensibility "habits: (see W2:232-3, 1868). However, he soon reserves the term for the representational outputs of the mental faculty of Understanding (W6:191, 1887-8)

(W2:232, 1868)

In addition, Peirce makes clear that attention is itself an *inference* of a particular kind, and describes the process that initiates this kind of inference.

> Attention is roused when the same phenomenon presents itself repeatedly on different occasions, or the same predicate in different subjects…thus attention is an act of induction which does not increase our knowledge, because our "these" covers nothing but the instances experienced. It is, in short, an argument from enumeration
>
> (W2:232, 1868)

There are two important aspects of this passage. First, just as he associates the mental faculty of Feeling with its particular kind of inference– adjacent to one of the inferences of the mental faculty of Understanding; Peirce associates the mental faculty of Sensibility (or Sensation of Reaction, as we will see) with a particular kind of inference adjacent to one of the inferences of the Understanding. Peirce argued that the inferences of the mental faculty of Feeling are "reasoning[s] from definition to definitum". This reasoning, he maintained, was adjacent to the inference of "Hypothesis" associated with the mental faculty of the Understanding. While the two kinds of inferences shared much in common, the predicates, or hypotheses, being proposed in Feeling were not arrived at through reason, but instead were associations bequeathed through evolution. In the case of the mental faculty of Sensibility, or Sensation of Reaction, Peirce in this passage is making the case that it too is associated with a particular kind of inference, in this case, to "Induction". However, just as with Feeling, the inference of Sensibility is not a full induction, but rather is an "argument from enumeration".

Sensibility's version of induction, "argument from enumeration" is one that lacks an understanding of its subject, of the "these" that it is organizing vis-a-vis one another. Consequently, the induction that it implements does not "increase our knowledge". As a comparison point, I've included below a non-technical definition of induction by Peirce from around this time.

> Induction may be defined as an argument which proceeds upon the assumption that all the members of a class or aggregate have all the characters which are common to all those members of this class concerning which it is known, whether they have those characters or not; or, in other words, which assumes that that is true of a whole collection which is true of a number of instances taken from it at random. This might be called statistical argument.
>
> (W2:217, 1868)

Peirce also distinguishes induction from hypothesis.

> In the former case, the reasoning proceeds as though all the objects which have certain characters were known, and this is induction; in the latter case, the inference proceeds as though all the characters requisite to the determination of a certain object or class were known, and this is hypothesis.
>
> (W2:216, 1868)

By arguing that the mental faculty of Sensibility is involved in an induction that is missing an understanding of its subjects, Peirce is arguing that it is performing an induction where all the members of a class have a "character" in common that is not understood. Induction being defined as "the assumption that all the members of a class…have all the characters which are common to all those members of this class…whether they have those characters or not" (W2:217, 1868). All the "objects" possessing a character are known, but the character itself being assumed of those objects remains "unanalyzed" feeling, i.e. unknown. We can come to a similar view of the special kind of hypothesis being undertaken by the mental faculty of Feeling. In this case, all the characters "requisite of the determination of a certain object or class" are known, but the object or class to whom those characters are being assumed remain unknown.

I return to this important distinction between the kinds of inferences being conducted by the mental faculties of Feeling and Sensibility, and the kinds of inferences being conducted by the mental faculty of

Understanding later in this chapter and in this dissertation. The key takeaway from this present discussion, however, is that in the special kind of induction – the "argument from enumeration" – being conducted by the mental faculty of sensibility, the character being assumed of the subjects is a mere association of a particular kind. We are not assuming any qualitative attribute of those subjects, merely that they are related to one another in a particular way, which the mind is then left to implement in later inferences. It is this relation between the three mental faculties and inference that leads, I argue, Peirce to write in 1868: "We have thus seene that every sort of modification of consciousness– Attention, Sensation, and Understanding– is an inference" (W2:233, 1868)

Secondly, Peirce's description of attention here links it clearly to his work on a priori synthetic judgments determined from "within" such as the representations of space and time in 1861. There, Peirce made clear that such judgments, or representations, are considered as determined from "within" because they could be inferred from any and all experience. In other words, their representational object was ubiquitous in their environment. This means that the inferences which give rise to the representations of space and time are not inferences that work up a particular aspect of experience, but operate on "every and any experience".

> All the principles a priori are in his view, not it is true logical inductions, nor yet partial scientific inductions, but material inferences from every and any experience.
>
> (W1:159, 1865)

This means that *every* experience will give rise to the inference of the representations of space and time. It is the ubiquity of the feelings over which their inference is conducted that differentiates judgments "determined from within" such as the judgments (i.e. representations) of space and time, from the judgments of sensations, emotions, and instinctual motions.

Let us now take a look at how the "emphas[es]" placed by the mental faculty of Sensibility on immediate experience, which are antecedent to any cognition, affects how immediate experience is put together in

the mind in later inferences. Peirce later describes this experience of putting things together according to the representations of time and space, which he argues are of a contiguous nature– i.e. relate to putting things together next to, or adjacent, to one another according to a particular understanding of the term. He offers this description in terms of "nerve-energy" according to a neurological account of the operation of Sensibility that we will soon see. In this neurological framework, Peirce refers to the function of Sensibility as the "polar sense".

> When we find ourselves under a compulsion to think that two elements of experience which do not particularly resemble one another are, nevertheless, really connected, that connection must, I think, be due in some way to discharge of nerve-energy….If the contiguity is in time, it is by the polar sense directly that we are conscious of a dividing instant with its difference on the two sides. If the contiguity is in space, I think we have at first a completely confused feeling of the whole, as yet unanalyzed and unsynthesized, but afterward, when the analysis has been made, we find ourselves compelled, in recomposing the elements, to pass directly from what is on one side of the boundary to what is on the other.
>
> (W6:190, 1887-8)

This is why Peirce goes on to argue of this faculty that in its representational outputs of space and time, it exerts a compulsive force on cognition, such that "[w]e cannot choose how we will arrange our ideas in reference to space and time, but are compelled to think certain things as nearer together than others" (W6:186, 1887-8). Peirce stresses this point.

> It would be putting the cart before the horse to say that we are compelled to think certain things together because they are together in time and space; the true way of stating it is that there is an exterior compulsion upon us to put them together in our construction of time and space in our perspective.
>
> (W6:186, 1887-8)

Due to the “emphas[es]” placed on immediate feeling by the faculty of Sensibility, through attention, in the reconstruction of experience in memory (and as we will see in the imagination), we are “compelled” to put feelings in a certain arrangement that corresponds to our representations of time and space. Memory, then, and (as we will see, the imagination) works through emphasis, attention, and reconstruction of feelings according to a universal and necessary arrangement– as Peirce called this in 1861, according to a *field*.

Peirce, from this perspective on attention, comes to a particular view of memory and imagination. Peirce argues that memory does not include the saving, wholesale, of instantaneous states of the nervous system. Rather, memory, for Peirce, only involves a saving of the *emphases* of attention. For this reason, Peirce argues that in memory “we carry away absolutely nothing” of the sensation of a feeling “except the consciousness that we could recognize it” (W2:234, 1868). Peirce maintains because of this that there are no “images” – or instantaneous states of the nervous system associated with hypothetical sensations of these feelings (W2:235, 1868)– in the memory. Memory is not immediate consciousness, but rather a “worked over product” (W6:184, 1887-8) associated with the inferences of Sensibility.

> “Singular” and “individual” are equivocal terms. A singular may mean that which can be but in one place at one time…when an image is said to be singular, it is meant that it is absolutely determined in all respects. Every possible character, or the negative thereof, must be true of such an image….In fact, the image of a triangle must be of one (obtuse, right-angled or acute), each of whose angles is of a certain number of degrees, minutes, and seconds. That being so, it is apparent that no man has a true image of the road to his office or any other real thing. Indeed, he has no image of it at all unless he can not only recognize it, but imagine it (truly or falsely) in all its infinite details. This being the case, it becomes very doubtful whether we ever have any such thing as an image in our imagination.
>
> (W2:233, 1868)

This informs a particular view of memory.

> …my memory does not consist in any vision but in a habit by virtue of which I can recognize a newly presented color as like or unlike one I had seen before….
>
> (W6:185, 1887-8)

Memory, for Peirce, operates by the effects of the emphases of attention on future inferences.

> …that what is present one instant should have an effect upon what is present during the lapse of time which follows that instant. This effect can only be a reproduction of a part of what is present at the instant…This effect is memory, in its most elementary form.
>
> (W1:71, 1873)

Such emphases give rise not to an image– an inference over immediate consciousness or feelings– but one that reconstructs the conclusions, judgments, or representations following such inferences (W6:187, 1887-8). However, until such a reconstruction, based on emphases, is completed, memory consists simply of the sense that one could "recognize" a new immediate feeling as "like or unlike one I had seen before".

Peirce sees imagination as working very similarly to memory.

> …the process of imagination is accompanied throughout an inhibitory volition, which not only diminishes the energy of the action of the nerve-cells, but also altogether prevents relation upon the voluntary muscles.
>
> (W4:43, 1879)

Consequently, in the imagination, there is a judgment made to interpret what is not an image (i.e., instantaneous state of the nervous system) but a string of emphases. In other words, recollection and imagination both involve inferences over something very different from immediate feeling, but over a product of Sensibility, which simply annotates the sequential organization of unknown characters,

feelings, or predicates. These outputs of Sensibility, Peirce argues, are experienced as “the ability to recognize” a feeling, and not the feeling itself.

> It is important to remember that we have no intuitive power of distinguishing between one subjective mode of cognition and another, and hence often think that something is presented to us as a picture, while it is really constructed from slight data by the understanding…Many dreams, of which the waking memory makes elaborate and consistent stories, must probably have been in fact mere jumbles of these feelings of the ability to recognize this and that which I have just alluded to.
>
> (W2:235, 1868)

Peirce, in addition to his example of the reconstruction of experience from dreams, also gives an example of the reconstruction of experience in imagination.

> It has usually been said…that we can call up any concept without making any judgment…but…in order to conceive the number 7,....I arbitrarily make the hypothesis or judgment, that there are certain points before my eyes, and I judge that there are seven.
>
> (W2:237, 1868)

In this example with numerosity, Peirce argues that we imagine the number “7” by making a judgment that represents what is only a set of emphases– the sensation that we have “the ability to recognize” the number “7” – as a reconstruction of an image akin to what we might infer from immediate feeling – “that there are certain points before my eyes”. From this reconstruction of a representation of feelings, that does not start from immediate feeling, we then make a second judgment that counts from a reconstructed image of “certain points before my eyes”. This articulates a view of imagination that can reconstruct the representations of feelings from emphases, and become the basis of subsequent judgments on the represented image. This is an important theme in Peirce’s theory of cognition, and his description of the learning mechanism of the mental faculty of the Understanding to which we will return in chapter 3. For now, it is enough to recognize the fact, that for Peirce, representations of feelings can be generated not

just from the immediate consciousness of those feelings themselves, but also from a data of a very different kind, the “slight data” or emphases that the mental faculty of Sensibility outputs.

In an echo of what he said in 1865, Peirce argues that we do not experience the representations of space and time directly, but as “hints” that structure the organization of other kinds of representations, including the representations of sense – i.e. in sensations.

> …show relations between elements which before seemed to have no necessary connection. The realities compel us to put some things into very close relation and others less so, in a highly complicated, and to the sense itself unintelligible matter; but it is the genius of the mind, that takes up all these hints of Sense, adds immensely to them, makes them precise, and shows them in intelligible form in the intuitions of space and time.
>
> (W6:187, 1887-8)

To the extent that we experience space and time at all, we experience them as “intuitions” – here used to mean that we regard something that is very abstract in a “concrete form”.

> Intuition is the regarding of the abstract in a concrete form, by the realistic hypostatization of relations. That is the sole method of valuable thought.
>
> (W6:187, 1887-8)

After working to elaborate the concept of attention, Peirce, however, soon discards the term and subsumes under one new concept– the “polar sense” – both functions he previously attributed to “attention”. Peirce finds the term “attention” to be too “unscientific” (W8:14, 1890), in part, perhaps, due to a different use of the concept in psychology. Peirce subsumes under his more mature term, the “polar sense”, the function of attention in “supposing of one element of consciousness, without any positive supposition of the other” (W1:518, 1866). This is a key function that allows the initial comparison which leads to resemblance, and starts the mind’s process of meaning abstraction. And also, attention’s role in

connecting feelings according to a field– for example, the extensive (i.e. continuous) fields of space and time.

Peirce first introduces the “polar sense” under the name of “will”. Then, after arguing that “we ought to substitute the polar sense” for the term “will”, and making the case that will is a subset of the polar sense; he relegates attention to simply a “form” of will (W6:185, 1887-8). He attributes a number of functions to the polar sense, which he argues “splits into two…in two ways”.

> …the polar sense splits into two, and that in two ways, for first, there is an active and a passive kind, or Will and Sense, and second, there are External Will and Sense, in opposition to Internal Will (self-control, inhibitory will) and Internal Sense (introspection).
>
> (W6:186, 1887-8)

Peirce considers the polar sense to be “the sense of action and reaction”, and continues to refine his description of it over the next few years, before discarding the term and adopting another term, that of “dual consciousness”(W6:214, 1887-8) to express the world of experience represented by the outputs of the polar sense, or the functions of the mental faculty of Sensibility. In developing his ideas on the second mental faculty– Sensibility; Peirce also elaborates a neurological theory of how the polar sense comes to possess its numerous cognitive functions– including the function of attention.

> On the other hand, the sense of action and reaction, or the polar sense, as we agreed to call it, is plainly connected with the discharge of nervous energy through the nerve-fibres. External volition, the most typical case of it, involves such a discharge into the muscle cells. In external sensation, where the polar sense enters into a lower intensity, there is a discharge from the terminal nerve-cell or cells in the brain. In Internal volition, or self-control, there is some inhibitory action of the nerves, which is also known to involve the movement of nervous force; and in internal observation, or visceral sensation, there are doubtless transfers of energy from one central cell to another.

(W6:189, 1887-8)

> Remembering that the Polar Sense is the sense of the difference between what was before and what is after a dividing instant, or the sense of an instant as having sides, we see clearly that the physiological concomitant of it must be some event which happens very quickly and leaves a more abiding effect, and this description suits the passage of a nervous discharge over a nerve-fibre so perfectly, that I do not think we need hesitate to set this phenomenon down as the condition of dual consciousness.
>
> (W6:189, 1887-8)

Peirce defines dual consciousness– the world of experience produced by the faculty of Sensibility alone, through the polar sense– as follows.

> Dual consciousness is a sense of another, not present, a sense of hitting and getting hit, of action and reciprocal reaction, of energy…Dual consciousness includes will, but the consciousness of hitting and that of being hit have been shown by conclusive experiments not to differ, and sense in its direct reference to an object is likewise consciousness of action and reaction.
>
> (W6:214, 1887-8)

Peirce uses this neurological view of the functions of polar-sense and the mental faculty of Sensibility to offer an explanation of how nerve-cell excitations (i.e. feelings) can give rise to emphases– or feelings which have been marked so that they are inferred in a particular sequence by later cognitions.

> I suppose then that we are compelled to think the two feelings as contiguous because the nerve-cell whose excitation produces the feeling of one recalled sensation discharges itself into the nerve-cell whose excitation makes the feeling of the other recalled sensation.
>
> (W6:190, 1887-8)

In his articulation of the polar sense, the function of the mental faculty of Sensibility, Peirce is particularly clear about how Sensibility, polar sense, and dual consciousness affect cognition.

> Dual consciousness…has two degrees, the dynamical and the statistical or degenerate form. Dynamical dual consciousness consists of outward action and reaction, External Sense and volition; statistical dual consciousness consists of inward action and reaction, self-consciousness and self-control.
>
> (W6:215, 1887-8)

We saw how Peirce leveraged this neurological explanation of the polar sense and of the mental faculty of Sensibility to describe the effects of the emphases of space and time on later cognitions.

In 1890, Peirce a makes it explicit that he still retains his view of three specialized cognitions. This time, under the names of: Feeling, Sensation of reaction, and General Conceptions. It is clear that Peirce has maintained most of his thoughts on the three mental faculties and their representational outputs, which I have shown he has been consistently developing since the late 1850s. Beginning with the mental faculty of Feeling, Peirce writes:

> Passing to psychology, we find the three elementary phenomena of mind fall into three categories. First, we have feelings, comprising all that is immediately present….A feeling is a state of mind having its own living quality, independent of any other state of mind….A feeling is necessarily simple, *in itself*….
>
> (W8:103, 1890)

Then, passing on to the mental faculty of "Sensation of reaction". In this description, Peirce makes clear the relation between memory and a version of attention as polar sense.

> Besides Feelings, we have Sensations of reaction; as when a person blindfold suddenly runs against a post, when we make a muscular effort, or when any feeling gives way to a new feeling. Suppose I had nothing in

> my mind but a feeling of blue, which were suddenly to give place to a feeling of red; then, at the instant of transition there would be a shock, a sense of reaction, my blue life being transmuted into red life. If I were further endowed with a memory, that sense would continue for some time, and there would also be a peculiar feeling or sentiment connected with it. this last feeling might endure (conceivably, I mean) after the memory of the occurrence and the feelings of blue and red had passed away. But the *sensation* of reaction cannot exist except in the actual presence of the two feelings blue and red to which it relates.
>
> (W8:103-4, 1890)

Peirce makes clear that his new term "Sensation of reaction" describes an aspect of Sensibility– that it is a *sensation*, i.e. a hypothetical predicate; but one that only arises in the presence of *two* feelings, and expresses the "peculiar feeling" – or meaning– associated with such a state of the nervous system. This leads Peirce to conclude that "[w]henever we have two feelings and pay attention to a relation between them of whatever kind, there there is the sensation of which I am speaking" (W8:104, 1890). Moreover, Peirce makes it very clear that the polar sense is involved in the comparison between something in feeling (i.e. in the mind) and out-of-feeling (i.e. out of the mind) that leads to the initial judgment of resemblance that begins the process of inference– both for the mental faculty of Feeling and that of Understanding. This is an idea that he has spent several years developing, ever since his distinction among the different functional forms of the polar sense in the late 1880s.

> But the sense of action and reaction has two types: it may either be a perception of relation between two ideas, or it may be a sense of action and reaction between feeling and something out of feeling. And this sense of external reaction again has forms; for it is either a sense of something happening to us, by no act of ours, we being passive in the matter, or it is a sense of resistance, that is, of our expending feeling upon something without. The sense of reaction is thus a sense of connection or comparison between feelings….
>
> (W8:104, 1890)

Both feelings and feelings of transitions of feelings are apprehended immediately, for Peirce. This is most likely why Peirce argues in 1865 that we know both "our feelings" and "what is before us in space" – i.e.

the sense of reaction– "immediately" (W1:167, 1865). As we saw, experience of both is a sensation associate with feelings. In the case of sensations, these are automatic hypothetical predicates associated with immediate feelings. In the case of sensations of reactions, we are dealing with an automatic hypothetical subject – one to which no character or quality of feeling– has been associated; which is associated with the transition between feelings, or "two sides" of a feeling, in a continuous mind that is able to represent two sides of an instant.

Moreover, Peirce argues that in a mind with memory, the "peculiar feeling" associated with the immediate sensation of two sides of an instant can "continue for some time" and affect future cognitions. This "peculiar" feeling of two abstractions (whether both or only one is "in" mind) has, for Peirce, its own peculiar character which consists, most likely, in the feeling of the ability to recognize a similar occurrence again. Peirce has thus offered an explanation of "emphasis" that does not rely on the specialized role of attention, and is articulated in neurological terms.

This aspect of Sensation of reaction is very different from that of the faculty of Feeling. While representations of the faculty of Feeling are inherited – relying on evolutionarily bequeathed connections among feelings – the representations of the faculty Sensation of reaction are *learned* from our environment. They are learned from transitions in feelings that are enabled in reality. Moreover, they are *only* learned from transitions that are ubiquitous in our environment. This distinction between the representations of the faculty of Feeling being inherited or ***innate***, and those of the faculty of Sensation or Reaction (or Sensibility) being ***learned***, map onto Peirce's views of ***determined*** and ***undetermined***[19] in an interesting way. While the representations of the mental faculty of Feeling are inherited, or *innate*, they are also *determined* by experience, because the representational output of Feeling changes with every experiential input. The opposite is true of the mental faculty of Sensation of Reaction. The representations of the mental faculty of Sensation of Reaction are both *learned* from the environment, yet *undetermined* by experience, because the condition of its being learned is the *ubiquity* of the pattern of transition from one feeling to the next in the environment. These are important attributes of the mental faculties of

[19] Note that Peirce's views on determined and undetermined a priori judgments differ from his views on *indeterminacy* and *spontaneity*, such as can be found on (W6:181, 1887-8).

Feeling and Sensation of Reaction that I will be returning to later in this dissertation in discussion of group and core cognition.

In his physiological phase, in which he puts together a self-crafted neurological explanation of mind, Peirce gives a physiological explanation of how the representations of space and time could come to be learned as a result of the behavior of nerve-cells. He starts from a series of premises, or "facts of physio-psychology" — Peirce's self-crafted neuroscience.

> For this purpose, we must bear in mind the following facts of physio-psychology:
>
> 1. The excitation of a nerve does not of itself inform us where the extremity of it is situated…
> 2. A single sensation does not inform us how many nerves or nerve points are excited
> 3. We can distinguish between the impression produced by the excitations of different nerve-points.
> 4. The differences of impressions produced by different excitations of similar nerve-points are similar.
>
> (W2:198, 1868)

From these premisses, first, that a nerve cell being in a state of excitation does not tell us where in our bodies it is situated; second, that a sensation (e.g. the sensation of color) does not tell us how many nerve cell excitations are being summarized, or subsumed, by the hypothetical predicate; third, that while we cannot distinguish which sensations are associated with which nerve excitations, we can do so for immediate impressions; and lastly, that as an impression, so-to-speak, moves across cells of our nervous system, and excites contiguous nerve-points, we perceive the different impressions that this gives rise to as being similar to one another.

The fourth premiss is a bit difficult to grasp without an example. Peirce gives one with the similar impressions that arise when we close our eyes and open them again.

> When two ideas resemble one another, we say that they have some- thing in common; a part of the one is said to be identical with a part of the other. In what does that identity consist? Having closed both eyes, I open first one and then shut it and open the other, and I say that the two sensations are alike. How can the impressions of two nerves be judged to be alike? It appears to me that in order that that should be- come possible, the two nerve-cells must probably discharge themselves into one common nerve-cell.
>
> (W6:189, 1887-8)

From there, Peirce proceeds to offer a neurological account of how we learn the representation of the continuous extensive field of space. This too, he argues, occurs as the result of an inference requiring time and relative instants.

> It is not conceivable that the momentary excitation of all the nerve-points of the retina should immediately or mediately produce the sensation of space. Suppose, however, that the image moves over the retina. Then the peculiar excitation which at one instant affects one nerve-point, at a later instant will affect another. These will convey impressions which are very similar by 4, and yet which are distinguished by 3. Hence the conditions for the cognition of a relation between these impressions is present.
>
> (W2:198-9, 1868)

Peirce, here, establishes that, according to his self-crafted neuroscience, it is possible for a "relation between…impressions" to be cognized because it is possible to distinguish among different excitations of individual nerve-point impressions. Peirce makes the case here that we can distinguish *change* in impressional states, as well as which changes are similar. In other words, according to Peirce, we cannot have a singular, fully determined, image; according to a definition of singular as "that which can be but in one place at one time" (W2:233, 1868). However, we can have a singular, fully determined, *impression* of a nerve-point. It is the placing of emphases on such singular impressions that Peirce argues allow for the working over of the stream of external experience for re-assemblage according to a field in memory or in later inferences. Peirce has argued that the singular impressions that need to be marked up in this way, in

order for the mind to learn universal and necessary attentional concepts ubiquitous in an environment, are the impressions associated with a *transition* between feelings.

It is at this point that Peirce suggests a learning mechanism for these singular transition points between feelings that seem to be at odds with his consistent description of the inferential mechanism associated with the faculty of Sensibility or Sensation of Reaction elsewhere. Peirce describes here a learning mechanism that seems at odd with his description of an inductive mechanism that he describes in that same year, and in that same work. Peirce describes here a learning mechanism for a "theory of space" that involves the application of a predicate to "reduce the phenomena" of these marked-up transitions between feelings "to unity." I argue that this is not a contradiction, but rather anticipates a discussion in chapter 3 on the relationship between the faculty of Sensibility or Sensation of Reaction, and the faculty of Understanding.

> There being, however, a very great number of nerve-points affected by a very great number of successive excitations, the relations of the resulting impressions will be almost inconceivably complicated. Now, it is a known law of mind, that when phenomena of an extreme complexity are presented, which yet would be reduced to order or mediate simplicity by the application of a certain conception, that conception sooner or later arises in application to those phenomena. In the case under consideration, the conception of extension would reduce the phenomena to unity, and, therefore its genesis is fully accounted for. This theory of space is confirmed by the circumstance that an exactly similar theory is imperative demanded by the facts in reference to time.
>
> (W2:199, 1868)

Peirce reserves the term "theory" and the idea or reduction to unity for the learning of general conceptions (see EP2:105, 1901). Such conceptions, we will see, differ in specific ways from the representations of space and time, and of sensations. A conceptual "theory" of space differs from an unreasoned "intuition" of space and time. Its acquisition does not involve an induction with no understanding of the characters of its subject. But instead involves an inferential process with both a firm grasp on the nature of the subject–

the marked-up transitions between feelings– *and* on the nature of the predicates, or characters, associated with such transitions. Here, I maintain, Peirce is describing a learning mechanism for a "theory" or conceptual knowledge of space and time that is possible through the faculty of Understanding; while maintaining in the same piece that a difference learning process is required for the learning of the representations of space and time through the faculty of Sensibility or Sensation of Reaction.

The mental faculty of Sensibility or Sensation of Reaction, through its elaboration of feelings of transitions between states, gives rise to higher-level representations which are *fields*. However, while Peirce's prime examples of such fields– the extensive fields of space and time are continuous– it is clear that the fields or representational outputs of Sensibility do not have to be continuous. To jog our memory on this subject, here is Peirce's description of the continua of space and time:

> Every mind which is capable of logical criticism of its inferences, must be aware of this determination of its ideas by previous ideas. But is it pre-supposed in the conception of a logical mind, that the temporal succession in its ideas is continuous, and not by discrete steps? A continuum such as we suppose time and space to be, is defined as something any part of which itself has parts of the same kind.
>
> (W3:69, 1873)

As we saw in 1865, Peirce considers such continua such as those of space and time as extensive fields (W1:158, 1865). At the time, he defines them in terms of determination– every part of a field is fully and necessarily determined vis-a-vis other parts of the field. Peirce repeats a definition of the continuum of time in the 1890s that is very similar to his definition of time and space as fields in 1865.

> Time is a system among relations…every space of time is separated from others by two instants, or temporal individuals; and every instant is wholly determined in its time– relations to every other.
>
> (W8:130, 1892)

I argue that Peirce maintains the view of space and time as fields, but that he also comes to accept that they are a particular kind of field that are distinguished in that they form a continuum. However, even among other continuous fields, Peirce argues that the continuous field of time, for example, is in addition a “hyperbolic” continuous field.

> Time as so defined is a “hyperbolic” continuum; that is to say, the infinitely past and the infinitely future are distinct and do not coincide.
>
> (W8:134, 1892)

Such a definition captures the behavior of the continuous field of time at its ideal endpoints. It is clear that Peirce considers a number of different kinds of fields, organized in different ways. I argue that all such fields are representational outputs of the inferential process of the faculty of Sensibility or Sensation of Reaction. As a specialized faculty, Sensibility or Sensation of Reaction has a specialized input, conducts a specialized computation, and has a specialized output. We’ve seen the specialized input of the faculty of Sensibility or Sensation of Reaction– singular transitions between feelings. We’ve also seen the specialized computation, or inference, of this faculty – a specialized induction which Peirce calls “argument from enumeration”. And now, we are considering its specialized representational output. I argue that these are fields. Moreover, just like the faculty of Feeling can have different kinds of outputs– sensations, emotions, and instinctual motions, for example– the faculty of Sensibility or Sensation of Reaction can also have different kind of outputs, and these are different kinds of fields, organized according to different logics. Peirce names at least two such possible outputs– fields that are continua (such as the continuum of time and the continuum of space); and fields that are discrete, which he calls “quantum” fields (W3:69, 1873).

Differently organized fields have different behaviors. Peirce finds the behavior of continuous fields such as the fields of space and time to be indispensable to the mind’s ability to perform cognitions. As we’ve seen, for Peirce, the mind relies on the continuous representations of space and time for inference.

> If the succession of images in the mind is by discrete steps, time for that mind will be made up of invisible instants. Any one idea will be absolutely distinguished from every other by its benign present only in the passing moment. And the same idea cannot exist in two different moments, however similar the ideas felt in the two different moments, for the sake of argument, be allowed to be.
>
> (W3:69, 1873)

Without the continuity of space and time, and the compulsion on the mind to put feelings together continuously, there could never be two sides of an instant, and sensations of reaction would not be possible. For this reason, Peirce is making a *metaphysical* point about space and time– we have the intuitions of space and time as continuous because they *are* continuous. We've *learned* that space and time are continuous– this is not a representation that is innate to the mind. We've been able to do so because we immediately perceive not only feelings but also *transitions* among feelings (W1:167, 1865).

> …it is impossible we should so much as think we think in time unless we do think in time; or rather, dismissing blind impossibility, the mere imagination of time is a clear perception of the past…an immediate, intuitive, consciousness of time clearly exists wherever time exists.
>
> (W8:80, 1890)

Peirce argues that our representations of fields are *learned* because of the ubiquity of an organizational logic in our environment. However, space and time are not the only ubiquitous organizational logics of our environment. Peirce, for example, describes the representations of discrete quantum fields.

> A discrete quantum, on the other hand, has ultimate parts which differ from any other part of the quantum in their absolute separation from one another.
>
> (W3:69, 1873)

If such a field representation were to be learned, according to Peirce's theory of cognition, it would be because there *really was* an organizational logic in our environment separating certain aspects of the

world, systematically and ubiquitously, from the other. Peirce does not deny that such fields could be learned if ubiquitous in an environment. Peirce only maintains that the continuous, extensive, fields of space and time are necessary for the mind's process of cognition. This is a very important nuance to Peirce's system, and to his views on the faculty of Sensibility and Sensation of Reaction, that I return to later in this dissertation. I particularly address the possibility of discrete fields in Peirce's theory of cognition, and the implications of discrete fields for the cognition of social groups.

The collaboration of the mental faculties of Feeling and Sensibility (Sensation of Reaction) in the inference of conceptual knowledge

We've seen so far that Peirce's three mental faculties of Feeling, Sensibility (Sensation of Reaction), and Understanding seem to have an interconnected nature. This is an idea that Peirce alludes to from early on in his philosophy. Peirce expresses it, for example, in his discusses of the different representational outputs of the three mental faculties; i.e. at around the time when he was engaging in his early discussions on the "I-impulse" the "it-impulse" and the "thou-impulse"(W1:8, 1859). In an essay in 1861 introducing his "Three Persons" (W1:174, 1865), Peirce writes:

> Though they cannot be expressed in terms of each other, yet they have a relation to each other, for THOU is an IT in which there is another 1.1 looks in, It looks out, Thou looks through, out and in again. I outwells, It inflows, Thou commingles. I is self-supported, IT leans on a staff, THOU leans on what it supports.
>
> (W1:45, 1861)

We can now begin to unravel these words, which appeared cryptic in 1861. That is, if indeed there is striking consistency in Peirce's thoughts from his early years to his mature years– as I argue there is. Firstly, we can interpret this passage in light of the distinction between the faculty of Feeling whose representations (the "I" impulses) are innate; and the faculty of Sensibility whose representations (the "IT" impulses) are learned. In this way, the "I" representations are "self-supported", while the "IT" representations lean on an external organizational logic of reality– on a "staff". In this section, we begin to

look at other aspects of the dynamic among “I”, “IT” and “THOU” representations, and how this dynamic can help shed light on this early passage. A full understanding of this passage, however, will not be possible until chapter 3.

We can also begin to have an interpretational lens through which to view this other passage from 1860.

> I have come to the conclusion that our primary conceptions are not simple but complex; that our elementary conceptions are not independent but linked complexedly together; that nevertheless properly speaking we have no *a priori* synthetical propositions, and that axioms are only definitions.
>
> (W1:9, 1860)

We have now seen Peirce’s distinction between simple and complex predicates. Peirce follows up on this idea to make a distinction between “complex” thoughts which are conceptions, and “incomplex” thoughts which are sensations (W2:230-1, 1868). We’ve also seen Peirce’s view of feelings which are “linked complexdly” in networks of associations, some evolutionarily bequeathed. We’ve also seen Peirce’s rejection of the ideas of innate propositions, or innate knowledge, even in the form of axioms. Even as Peirce acknowledges that some *a priori* synthetical judgments, while not innate, are *determined* from within. These ideas, consequently, expressed in Peirce’s early years are quite consistent with his ideas as they developed in later years.

The first step towards understanding the relationship between the faculties of Feeling, Sensibility (or Sensation of Reaction), and Understanding, we have already made. We now understand that the faculty of Sensibility is essential for the presentation of impressions, or immediate feeling, to the mind in a way that enables two feelings to occupy two sides of one instant and be compared. The continuity of the representation of impressions is thus a condition for the act of comparison upon which the faculty of Feeling relies to establish resemblance in the form of a “common character” or “common abstraction” (“Analysis of Creation” fragment in Murphey 1961:50). However, the relation between the faculty of Feeling and Sensibility becomes more complex when we introduce the faculty of Understanding and the

inference of conceptual knowledge. I dedicate chapter 3 to unpacking this complex process. In this section, I focus on gaining a broader view of how the three faculties relate to one another in the elaboration of knowledge. I focus on establishing a high-level understanding of what each faculty contributes to conceptual knowledge, and how the representations of Understanding differ from the representations of Feeling and Sensibility.

I argue that the relationship between Feeling, Sensibility, and Understanding is generally that of compositionality. In my reading of Peirce, the representational outputs of the faculty of Understanding bring together the cognitions of the representations of Feeling and those of Sensibility. Conceptual knowledge, consequently, must partake of both feelings and sensations of reaction. Moreover, on a more technical level, the faculty of Understanding also combines the two *inferences* associated with Feeling and Sensibility.

> …we found that there were 3 kinds of inference: 1st intellectual inference with its three varieties– Hypothesis, Induction, and Deduction; 2nd Judgments of sensation, emotions, and instinctive motions which are hypotheses whose predicates are unanalyzed in comprehension; and 3rd Habits which are Inductions whose subjects are unanalyzed in extension. This division leads us to three elements of consciousness: 1st Feelings or Elements of comprehension, 2nd Efforts or Elements of extension, and 3rd Notions or Elements of Information, which is the union of extension and comprehension.
>
> (W1:491, 1866)

This is a very important passage, so let's take the time to break it down. First, Peirce makes the case that there are not one, but three, kinds of inferences associated with the faculty of Understanding– i.e. that there are "three varieties" of "intellectual inference". Two of these three kinds of inferences of the Understanding, however, overlap with the inferences associated with Feeling and Sensibility, respectively. The inferences of Feeling and Sensibility are a *variant* of one of the inferences practiced by the Faculty of the Understanding. The faculty of Feeling practices an inference that is a variant of Hypothesis– one of the three inferences of the Understanding. The faculty of Sensibility practices a variant of Induction, which

is also an inference of the Understanding. This, we've already seen. What is new here, is that Peirce is very explicit about how the inferences of Feeling and Sensibility differ from their "full" version as implemented by the Understanding.

The way in which distinguishes among the full versions of the inferences in the Understanding, and their variants in Feeling and Sensibility, is within the framework of propositional knowledge– the idea, that we've seen, that knowledge is articulated as a proposition with a subject and a predicate. Peirce argues that the variant of Hypothesis performed by the faculty of Feeling differs from the full version performed by the Understanding because it proposes hypothetical predicates which are "unanalyzed in comprehension". Similarly, the variant of Induction performed by the faculty of Sensibility differs from the full version performed by the Understanding because the subjects it proposes are "unanalyzed in extension". In order to understand this point, we need to understand what Peirce means by "comprehension', "extension", and analyzability.

Peirce argues that every proposition has a subject which "denotes", or has a real connection, to something external to the mind. This subject is a *re*presentation, which has as its object (i.e. the thing it is presenting *again* to something else) a delineation, or "partial subject" (W1:144, 1864) of an extensive field. In other words, the subject of a proposition bounds what would otherwise be a continuous, unbounded, field in space or time. We mean *this* cup, or *this* set of coordinates in space-time. The subject, then, for Peirce, adds to the overall meaning of the proposition a determination of the extensive field– i.e. it adds *extension*. At the same time, the predicate of a proposition, which is also a *re*presentation, has as its object a set of interconnected *feelings*, which are apprehended as having a particular qualitative character by the mind. The predicate, then, points to the abstraction that is the "peculiar" meaning in the mind.

It thus takes a relation between *two* kinds of representations to articulate a propositional meaning. The representational outputs of Feeling and Sensibility, however, are not propositions but representations. They thus lack either an extensive denotation, or a comprehensive meaning. Peirce argues that this is

precisely the case. Feelings, or representational outputs of the faculty of Feeling, contain comprehension, but they lack extension. Conversely, Efforts, or representational outputs of the faculty of Sensibility, contain extension, but lack comprehension. Peirce argues that this can only be possible if the comprehension or extension represented by Feelings and Efforts, respectively, are unanalyzable.

The comprehension captured by Feelings is “unanalyzable”. By this, Peirce means that the comprehension of Feelings are “something resulting from mediation itself” but “not susceptible of mediation” (W1:29, 1859). In other words, the comprehension of Feelings are the result of inference, but cannot be elaborated further through inference. In other words, they are representations that are not articulated as propositions, and cannot lead to a subsequent proposition in an inferential process. Similarly, the extension captured by Sensibility is also “unanalyzable”, a representation that is not a proposition, and cannot lead to further inference involving propositions.

Peirce refers to the extensive denotation of a representation as its “sphere”, and to the comprehensive meaning of a representation as its “content”. However, he also adopts a set of terms from Sir William Hamilton, which makes more clear the overlap between Peirce’s terms and contemporary debates regarding conceptual meaning– these are the terms of “breadth” or “wide”, and “depth” or “deep”.

> Sir William Hamilton has borrowed from certain late Greek writers the terms breadth and depth, for extension and comprehension respectively…Thus, “wide” learning is, in ordinary parlance, learning of many things; deep learning, much knowledge of some things. I shall, therefore, give the preference to these terms. Extension is also called sphere and circuit; and comprehension , matter and content.
>
> (W2:74, 1867)

The relevance to contemporary dual factor theories of conceptual meaning are quite clear (Block 1986). In particular, to contemporary American philosopher Ned Block’s theory that conceptual meaning should be considered in terms of two kinds of content– wide content, which refers to a concept’s extension– and narrow (i.e., deep) content, which refers to a concept’s inferential interpretation by the mind. By arguing

that conceptual representations differ from other kinds of representations in the mind by having both wide and “deep”, or narrow content– articulated as a concept’s content and sphere, respectively– Peirce is in line with contemporary literature on this issue.

What differentiates Peirce, however, from most contemporary dual factor theorists is the consistency of his system. Peirce, as we’ve seen, argues that the mind has three specialized faculties or three specialized kinds of cognitions, each taking in a particular input and having a particular (representational) output. Consequently, for Peirce, there are three *kinds* of representations in the mind. Moreover, Peirce sees a relationship among these three kinds of relations. By defining conceptual knowledge as propositional, and involving the (representational) relation of two different kinds of representations, Peirce sets the field for elaborating a theory of conceptual knowledge, or conceptual representations as propositions, which incorporates the other two kinds of representations in the mind seamlessly. Such that, one kind of representation – the representational outputs of the mental faculty of Feeling – provides the narrow, or “deep”, content of conceptual knowledge; while the other representation – the representational outputs of the mental faculty of Sensibility or Sensation by Reaction – provides the wide content of conceptual knowledge.

Because of this view of conceptual knowledge– the only kind of knowledge the mind can be properly said to have– Peirce writes:

> We have seen that every fact requires two kinds of explanation; the one proceeds by induction to replace its subject by a wider one, the other proceeds by hypothesis to replace its predicate by a deeper one.
>
> (W1:493, 1866)

In other words, Peirce supports this relation between wide and narrow (deep) content in the construction of conceptual knowledge with a theory of the inferential mechanisms that relate the two kinds of representations. Peirce, as we saw, maintains that the faculty of Understanding, whose representational outputs are conceptual representations and conceptual knowledge, involves an inferential mechanism

that makes use of three kinds of inferences: hypothesis (later on known as abduction), induction, and deduction. Two of these inferences (hypothesis and induction) are “synthetic”, amplificatory, or ampliative (W1:247, 1865), and go “beyond the subject—the representation of the fact—to state its correspondence with something beyond itself, the fact” (W1:67, 1861). While the third inference (deduction) is “analytic”, or explicatory, and “is one whose predicate is implied in its subject” (W1:247, 1865).

That is, the synthetic inferences refer to something beyond the representation of their object in order to say something of it. For example, if Abraham Lincoln is defined as a name corresponding to that picture on the wall, a synthetic or ampliative inference involves reaching for an encyclopedia in order to say more of Abraham Lincoln, such as, “Abraham Lincoln was the 16th President of the United States of America– a nation-state on the American continent”. This is as opposed to making an analytic inference based on the picture– which is itself a representation of Abraham Lincoln–that involves taking a closer look at the picture in order to say more of Abraham Lincoln, such as, “Abraham Lincoln had facial hair”.

While the faculty of Understanding makes use of three kinds of inferences – two synthetic; the faculties of Feeling and Sensibility (Sensation of Reaction) only make use of one kind of synthetic inference. Feeling uses a synthetic inference that is a version of Hypothesis (or Abduction), and the mental faculty of Sensibility of Sensation of Reaction makes use of a variant of Induction – Peirce’s second kind of synthetic inference. In other words, Peirce maintains that there is an overlap between the synthetic inferences used by the three mental faculties, such that a kind of synthetic inference systematically provides narrow content or comprehension (Hypothesis or Abduction), and another kind of synthetic inference systematically provides wide content or extension (Induction).

We will take a closer look at the inferential mechanism of the faculty of Understanding in chapter 3, and its relation to the third nested triad in Peirce’s theory of cognition. However, we can establish even now a relationship between the inferential mechanism of the faculty of Understanding and the two other mental faculties. It is that the beginning and end of the inferential mechanism of the faculty of Understanding involve the two synthetic inferences such that the start of the inferential mechanism involves a proposition

that establishes the extension of the concept, while the end of the inferential mechanism involves a proposition that establishes the comprehension of the concept. Peirce describes these two kinds of propositions, respectively, as the conceptual representations (i.e. conception) of “substance” and “being”.

> …the empty conception of being, the interpretant of absolutely undetermined feeling whose comprehension is naught….the blind conception of substance, the interpretant of absolutely undetermined attention.
>
> (W1:502, 1866)

He calls the proposition, or conceptual representation, that *starts* the inferential mechanism of the faculty of Understanding, a “blind conception” that merely interprets (i.e. takes as its input) “absolutely undetermined attention” – which is related to the faculty of Sensibility, or Sensation of Reaction. He calls the proposition, or conceptual representation, that *ends* the inferential mechanism of the faculty of Understanding, an “empty conception” that interprets (of takes as its input) “absolutely indeterminate feeling” and whose “comprehension”, i.e. representational output, is “naught”. I return to this important theme in chapter 3.

2.5 Conclusion

Chapter summary

I made the case, at the beginning of this chapter, that Peirce is Peircean and not Kantian about cognition. That is, that he should be viewed in light of his own theory of cognition and its implications, and not in light of how he maintains, or deviates from, Kant’s theory of cognition. I also made the case that Peirce’s theory of cognition is incredibly modern, and much ahead of his contemporaries. In this chapter, I’ve shown that Peirce takes a view of cognition that maintains that the mind operates using three kinds of *specialized* cognitions, or faculties. That these specialized faculties of the mind interface with the specialized physio-mental faculties of the senses (W1:26-7, 1859), suggesting a connection to the specialized faculty of cognition, and to Peirce’s “special” categories of cognition, which have been a

puzzle to the secondary literature. More importantly, I have covered Peirce's specialized mental faculties in depth– including taking a close look at their inputs, outputs, and inferential mechanisms; as well as at the relationship among the inferences of these faculties in the development of conceptual knowledge.

I have maintained that for Peirce, all knowledge is propositional, and that we have no innate, or "common sense" knowledge. However, this is not to say that we do not have innate representations; and that Peirce does adopt a view of "common sense" representations which is his theory of immediate perception. Peirce maintains that we have an immediate apprehension of external reality through the excitation of nerve-cells which are grasped intuitively. This is the only kind of "intuition" – i.e. cognition that is itself not the result of a previous cognition– that Peirce allows for. Based on this view of immediate perception, Peirce constructs a theory of cognition that involves a process of abstraction from an initial innate meaning. This internal meaning has been activated by the establishment of *hypothetical similarity* between a representational input and the innate internal meaning. What seems to be an early version of Peirce's learning process captured under the term "abstraction" from an *innate* meanings, involves three kinds of inferences, each associated with distinct outputs. One (hypothesis) is involved in the production of sensations, emotions, and "instinctive motions". The other (induction) is involved in the production of the universal and necessary representations of fields – such as the continua of space and time. The last, which involves *both* hypothesis and induction is involved in the construction of propositions, which are for Peirce the only kind of conceptual knowledge.

I showed that Peirce's propositional view of conceptual knowledge– as a representation that involves the unification of two other kinds of representations (a subject and object), bridges his view of specialized mental faculties and their specific kinds of representational outputs. It does so by making the case that each of the two specialized mental faculties of Feeling and Sensibility (Sensation of Reaction) contributes a special kind of representational content to conceptual knowledge. The representations of Sensibility provide content about the delineation of a subject in a field, while the representations of Feeling provide content about the qualitative meaning of the proposition in the form of references to "peculiar" patterns of excitations of nerve cells. In this way, Peirce's theory of cognition edges into a theory of conceptual

content not included in this dissertation, and is pertinent to contemporary dual-factor theories of conceptual content (Block 1986).

Moreover, Peirce also establishes a relation between the representations of Feeling and Sensibility that goes beyond the delineation of a subject, and supports his theory of immediate perception itself. Peirce, I argue, makes the case that the representations of the faculty of Sensibility are *both* learned and "determined from within"; while representations of the faculty of Feeling are *both* unlearned (or innate) and determined from without – i.e. determined by experiential input. This can only be the case in Peirce's system due to a definition of "determined" as meaning "to make a circumstance different from what it might have been otherwise" (W1:245-6, 1865). Consequently, representations of Sensibility are representations learned by being *transitions* between feelings, or states of nerve excitation in the brain, which are *ubiquitous* to an environment. It is this metaphysical relation between the representations of Sensibility and an environment that can be said to be "real" – i.e. to give rise to similar representations in the members of a community (EP1:52, 1868) – which makes them *both* learned representations, *and* representations that are both necessary and universal. Such learned, necessary, and universal representations constitute what Peirce calls "fields", and govern the ordering of feelings in cognition according to a learned organizational logic. Such fields, including the continuous fields of space and time, play an important role in cognition. The fact that space and time are continuous, leading to *representations* of space and time as so, is the only way in which cognition and inference can occur in the mind in the first place, according to Peirce. Without continuous representations of space and time, and the representation of feelings as continuous, there would be no hope of having two feelings be *comparable*– something that is only possible through the sensation of two sides of an instant. Lastly on this point, I showed that learned fields do not have to be continuous for Peirce, and that Peirce maintains the possibility of discrete "quantum" fields, in addition to the continuous fields of space and time. This last point is a central one for this dissertation, and for my argument that the representations of Sensibility (Sensation of Reaction) – that what Peirce calls "efforts" are what I call "group" representations.

Connection to core and group cognition

I have thus laid out in this chapter, the basic infrastructure for following my argument in chapter 4, which is that Peirce's theory of cognition, and its upholding of two kinds of specialized cognitions in addition to the general cognition of conceptual representations (or conceptual knowledge), maps onto a distinction that I would like to add to the contemporary literature on concepts and cognition. This is that core and group representations are distinct and different kinds of representations. I make the case in chapter 4, that Peirce's specialized mental faculty of Feeling maps onto the contemporary theory of "core cognition" (Carey 2009), with the important exception that Peirce does not maintain the possibility of core "knowledge". Consequently, Peirce's theory of "core cognition" is one that denies the idea of core, propositional, common sense "knowledge", per se. Secondly, I argue in chapter 4 that Peirce's specialized mental faculty of Sensibility (Sensation of Reaction) maps onto what I call a theory of "group cognition", which shares much in common with a sociological literature on cognition that has maintained the view that social concepts are attentional concepts – very much in keeping with Peirce's view of Sensibility.

In this chapter, however, I already began to establish that Peirce's theory of cognition addresses an important problem in the literature on core cognition, aside from the question of common sense knowledge. This is about the way to distinguish core representations from other kinds of representations in the mind. This area in the literature has typically maintained that, in addition to two traditionally upheld kinds of representations (perceptual and conceptual representations), there is also a third kind of representation called "core" representations (Carey 2009). In this framework, core representations occupy a fuzzy position halfway between perceptual and conceptual representations. My analysis of Peirce's theory of cognition stands to make an important contribution to this conversation because it establishes a clear delineation between core representations and other kinds of representations in the mind. For Peirce, there are three kinds of representations in the mind – feelings (what I maintain are akin to core representations), efforts (what I maintain are akin to "group" representations), and general conceptions

(what I maintain are akin to conceptual representations). The distinction between all three of these kinds of representations is quite clear.

General (or conceptual) representations are representations that unify two other kinds of representations– a feeling (or core) representation and an effort (or "group") representation. Feeling (or core) representations are representations that have comprehension, i.e. narrow or deep content, but have no no extension, i.e. wide content. Similarly, Effort (or "group") representations are representations that have extension, i.e. wide content, but have no comprehension, i.e. narrow or deep content. All three kinds of representations– general (conceptual), feeling (core), and effort ("group") representations– involve inferential mechanisms that are related to one another in a systematic way. Consequently, Peirce avoids the potential ambiguity that would arise from distinguishing among kinds of representations by whether they involve the presence of more or less inferential mechanisms (a view that Susan Carey (Carey 2009), who popularized an influential theory of core cognition, maintains). Instead, for Peirce, core cognition and core representations differ from other kinds of cognitions and representations because of the *kind* of inferences involved. And, similarly, what I call "group" cognition and "group" representations differ from other kinds of cognitions and representations because of the kind of inferences used. I return to this important theme in chapter 4.

Reclaiming Peirce's theory of cognition from Murphey's logical and metaphysical objections

Lastly, I claimed, at the beginning of this chapter, that the significance of my novel interpretation of Peirce's theory of cognition lies in the contribution it makes to a literature that has held a very narrow view of what constitutes Peirce's theory of cognition. I argued that part of this narrow focus may lie in the view that Peirce's theory of cognition is (mostly) limited to his responses to Kant, which reveal a misunderstanding of Kant's key claims. One early, and influential, proponent of this view is Murray Murphey's 1961 work, "The Development of Peirce's Philosophy" which levied two key objections to Peirce's early work, including his early work on a theory of cognition.

One of these objections is logical, and relates to confusion around Peirce's theory of abstraction and what he means by the predication of a quality. Murphey argues that Peirce makes a logical error which consists in conflating two very different kinds of predication (Murphey:48, 1961). One kind of predication is that of class inheritance or membership– the idea that a qualitative attribute is inherited as a result of being the member of a class. For example, we know that Cassey has four legs because she is a dog. A predicative relation of class inheritance is one that can only exist between an abstraction, e.g. the class "dog", and a concrete thing, e.g. this bounded object in space-time. The other kind of predication of characteristics is that exists between "entities of the same logical type" (Murphey:48, 1961), or "inclusion" (Murphey:88, 1961) – and expresses the idea that something has a qualitative attribute because they lie at the intersection of two things which themselves have qualitative attributes. For example, this ball has motion because motion was transferred to it by another ball which has motion. The quality "motion" is an attribute, or qualitative state, that can only be transferred from something that can have motion to another thing that can also have motion.

Predication plays a central role in Peirce's system, and in assessing Peirce's view of predication, Murphey finds that Peirce uses the two kinds of predications interchangeably. Peirce argues that a quality is predicated of a thing because that thing already has qualities of its own that allow it to take on the predicated quality. Murphey, correctly, identifies this as Peirce's theory of "expression", which maintains that an abstraction must be expressed in something with its own material quality, it is at this point that it becomes a quality. Murphey, also correctly, identifies that Peirce's theory of predication – of how something comes to have the qualities that it has to a mind– involves the inheritance of a character from an abstract class. How can predication be both? I argue, however, that in my interpretation of Peirce's system, this does not constitute a contradiction. This is because Peirce maintains the view that the mind is *both* representational and material (i.e. biological), and that the two are simply both sides of the same underlying process. This is a view that can only be supported in light of Peirce's representational-physiological view of the neuro-cognitive process of *comparison*.

We begin with a mind which has innate connections among nerve-cell excitations– these innate connections, however, cannot be actualized except in the presence of an experience. This experience, in order to *be* experienced, must be able to form an immediate impression on the nervous system, which is itself a complex set of nerve excitations. Consequently, the impression of external experience, and our categorization of it as something innate and meaningful to the mind, occur through a comparison that requires that *both* things being compared share the same material quality– which is feeling, i.e. their identification with a state of the nervous system. However, at the same time, predication occurs *through* this comparison. That is, it occurs through a process that establishes likeness or resemblance between an aspect of the impression (a set of connections among nerve cells), and a set of innately connected nerve cells. Predication of an abstract character, thus takes a very concrete form. For Peirce, something possesses a quality if the impression it makes on the mind is similar, or resembles, a pre-existing set of neural associations. Predication of an abstract quality thus involves the comparison of two things of the same type – excitations of the nerve cells– through a process of comparison that is both representational (i.e. creates a new representation) *and* is biological (i.e. involves, according to Peirce's definition of comparison, an identification of one or a set of nerve cells present in both the impression and the pre-existing neurological hypothesis).

Murphey's second objection is that Peirce's system suffers from a metaphysical problem, which is the relations that it establishes among Peirce's three "worlds" of consciousnesses– that of the "I", the "IT", and the "THOU". Murphey's objection here is that Peirce seems to begin his work on his system with three categories: I, IT, and THOU, and end this work with three other categories (which we will see in depth in chapter 3) that do not align in a consistent way with the first set of three categories (Murphey:88, 1961). However, I have shown that there is a very different way of reading Peirce's work on his categories than that which Murphey suggests, which is to read Peirce as *not* speaking of only one set of categories.

Instead, I begin to show that the different sets of triads in Peirce's theory of cognition are distinct. The three mental faculties (Feeling, Sensation of Reaction or Sensibility, and Understanding) cannot be reduced to their three kinds of representational outputs – the three impulses of I, IT, and THOU, or

feelings, efforts, and general cognitions. Nor can those representational outputs be reduced to the three categories involved in the inferential mechanism of the faculty of the Understanding, which we will see next— Quality, Relation, and Representation.

I argue that the metaphysical problem in Peirce's categories that Murphey points out is less of a problem on Peirce's part, than on the part of those who have interpreted him as speaking of only one set of categories. I continue this discussion in chapter 3, and show that Peirce himself maintains this distinction among three nested categories of cognition systematically throughout his intellectual life. Moreover, reading Peirce in this way greatly helps to elucidate his theory of cognition and resolve points of contention and confusion in the secondary literature. This is a contribution that stands independently to the implications for a contemporary literature on cognition that a reading of Peirce's theory of cognition read in light of a nested view of his different triads provides.

Chapter 3: Representational and Inferential Views of Peirce's Learning Mechanism

3.1 Introduction

We've now begun to see that Peirce's theory of cognition can be viewed as a theory of *specialized* cognition. That is, it can be viewed in terms of three layered triads that describe the specialized inputs, specialized outputs, and specialized computations performed over the specialized input. The highest level triad, which we covered in chapter 2, describes the specialized mental faculties, or cognitions, of Feeling, Sensation of Reaction (or Sensibility), and Understanding and their input. The second, middle, triad describes the representational outputs of these three specialized cognitions as: 1) representations that have depth or comprehension but no extension – associated with the specialized cognitive faculty of Feeling. 2) Representations that have breadth or extension but no comprehension – associated with the specialized cognitive faculty of Sensation of Reaction (Sensibility). We saw that Peirce also associates the representations of Feeling to qualities or predicates of propositions, and the representations of Sensation of Reaction (Sensibility) to indices or subjects of propositions. Lastly, 3) Representations that have both depth or comprehension, and depth or extension and are called "general conceptions". They are the only kinds of representations that articulate conceptual knowledge in terms of a proposition that involves both subject and predicate. Peirce's articulation of conceptual knowledge in terms of two kinds of contents – depth and breadth; I argued, is equivalent to the contemporary view in philosophy of cognition that conceptual content is dual factor and must be described in terms of both wide and narrow content (Block 1986).

The specialized cognitive faculty of Feeling takes as its input instantaneous states of the nervous system, which are "immediate" impressions on the nervous system. It assumes that these impressions are put together in the mind according to some order. The input of Feeling thus involves a kind of immediate perception, however, it is not one that maintains immediate, or common sense, knowledge. The specialized cognitive faculty of Sensation of Reaction (or Sensibility) also takes as its input a state of the

nervous system in an immediate perception, however, what it perceives immediately is not *one* instantaneous state of nerve cells but the *transition* between two states taken as instantaneous – as two sides of an instant. This is only possible in a mind that not only puts together its percepts (immediate perceptions) as continuous and contiguous in space and time, but in a mind where a continuous space and time are *metaphysically real*. The specialized cognitive faculty of Sensation of Reaction (Sensibility) outputs learned representations that are *fields* – universal and necessary organizing principles– over which the impressions of Feeling are articulated. This begins to establish one of the first distinctions between the specialized cognitive faculties of Feeling and Sensation of Reaction (Sensibility) – which is that the representational outputs of Sensation of Reaction are *learned*, while the representational outputs of Feeling are *innate*.

I began to discuss in chapter 2 both the specialized computations, or inferences, conducted by the specialized cognitive faculties of Feeling and Sensation of Reaction (Sensibility); as well as the nature of the inputs, outputs, and inferences associated with the third specialized cognitive faculty– Understanding. I continue this discussion in this chapter, and describe the last – lowest level– triad in my reading of Peirce's specialized theory of cognition. This is the triad embedded in the inferential mechanism associated with the specialized faculty of Understanding, and gives rise to propositional, conceptual, knowledge. This learning mechanism, as we will see, also plays an important role in the inferences of Sensation of Reaction (Sensibility) and Feeling.

My interpretation of Peirce's theory of cognition also has implications for the language of thought– the logical language in which the mind proposes new meanings for experiences, and through which it thinks or reasons. The notion of a language of thought was introduced and popularized in the philosophy of mind and language by Jerry Fodor (Fodor 1975). This theory argues that the mind has its own language with a linguistic structure. Peirce's work on a learning mechanism is relevant for a discussion on the language of thought because it offers a view of a language of thought that is a series of "abstractions" (although we will see shortly that by this term Peirce means a series of *hypotheses*) from an innate neurological character, through which mind arrives at a set of "peculiar" idiosyncratic meanings ("Analysis of Creation"

fragment in Murpley 1961:50). The regular aspects of such a language that gives it its structure are, for Peirce, not linguistic, but hypothetical. I argue that the language of thought, for Peirce, is a structure of hypotheses that propopel the mind's learning mechanism forward. Peirce articulates this theory of language in terms of "marks" of the external relations of abstractions that give them their "peculiar", grammatical, meanings in thought.

Peirce's hypothetical language of thought can be thought of in terms of a family of hypotheses related to what is akin to a psychological essentialism (Gellman 2004)– the idea that something seen is matched by something unseen. The various grammatical aspects of Peirce's language of thought hinge on this hypothetical reasoning, and add a new hypothesis at each step of his abstraction-based learning mechanism through which the mind reasons. The hypotheses added at each step are implemented as "marks", which are representations with a given number of "blanks" of a particular kind, asking to be filled in. Such "marks" not only represent a particular hypothetical structure in reasoning, but also articulate the structure of a language of thought, whose meaning is constructed through the abstraction and synthesis of characters.

After describing this last aspect of my reading of Peirce's work of cognition as a *specialized* theory of cognition, I engage in a discussion of how Peirce's work addresses and bridges two contemporary literatures on specialized cognition situated in the cognitive sciences and the sociology of cognition, respectively – the literatures on core and what I call "group" cognition. I choose to engage in this discussion directly following my exposition of what I take to be Peirce's specialized learning mechanism because I take the position that it is only through understanding the nature of the specialized inferential mechanisms that give rise to Peirce's three kinds of mental representations that we can come to understand what Peirce's equivalent to core, group, and conceptual representations are, and how they behave in cognition. That is, it is only in this way that we can come to a definition of these representations that can stand up to a comparison to contemporary literature.

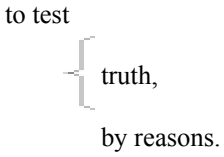
This interpretation of Peirce's theory of cognition as offering a *specialized* theory of cognition, sustained over his intellectual career from the late 1850s to the late 1900s, differs from how Peirce is typically viewed in the literature. It not only expands his theory of cognition to encompass more than just a brief period in the 1860s during which he engaged with, and refuted, a Cartesian theory of cognition; but it also challenges the view that Peirce's theory of cognition is an erroneous interpretation of Kant. Viewing Peirce in light of a broader, more contemporary, view of cognition, and reading him as offering a specialized theory of cognition advances important contributions to the literature on Peirce. This includes offering coherent interpretations for what have been considered to be some of the most confusing pieces of Peirce's intellectual life– the Modus of the IT (1861), SPQR (1861), and his derivations of his universal categories between 1865 and 1867. In light of my reading of Peirce, these works are not only explicated, but also connect to Peirce's work in his later careers on "degeneracy" and degenerate learning mechanisms.

3.2 Representation and the inner triad of THOU: Peirce's re-articulation of the Modus of IT as universal categories

Representation and the psychological essentialism of Peirce's hypothetical language of thought

I begin by looking more deeply at Peirce's definition of representation. Representation plays an important role for Peirce because he holds a representational view of mind. For Peirce, all that can be cognized, i.e. enter into consciousness, must be a representation. Moreover, not only are the outputs of cognition also representational, the *process* or learning mechanism of the mind itself takes the form of one big representation. Peirce describes this representational view of his learning mechanism in his early years as "logic".

> We are now ready to assign logic its definition. For this purpose, it must be granted that logic is
>
> a symbol
>
> whose essential end is



(W1:328, 1865)

As we will see later in this section, a "symbol" is a particular kind of representation which is determined by its object. Because of this explicit relation between the representation and the object, Peirce argues that we can speak of it as having some kind of truth (W1:80, 1861). Consequently, in this passage, Peirce is very explicit in considering logic to be both a concept learning mechanism – a mechanism through which the mind learns something truthful of its object; and a representation. Peirce's concept learning mechanism, which he here calls logic, is thus a "symbol" or a representation.

> Now we have seen that logic comes under the genus symbol…we must already have defined logic in saying that it is the symbol which classifies symbols in general in reference to the reason of their reference to their object.
>
> (W1:329, 1865)

I return at the end of this section to the "reason" with reference to which logic classifies symbols, and how this reference distinguishes among different kinds of representations.

Peirce takes the view that a thing in itself is representational. For this reason, all is representational and what we can become aware of in immediate perception – even as something "absent" and in need of explanation– are representations aimed *at us* due to inherited associations of nerve cell excitations that make them *comparable*. These representations of the thing, are thus the very instances of the thing itself. An individual table is itself, in the correspondents of its parts, the very *representation* of what it means to be a table in general. No two tables are thus identical, yet, to the extent that they express the properties of what it means for something to *be* a table– the very *purpose* or *function* of tableness as we saw in the "Analysis of the Ego" – they are both instances of a table and a representation of tableness.

Consequently, to speak of cognition– from beginning to end– we must be able to speak intelligibly about representation.

> We must thence also admit that a thing in its attributes is a representation of the same thing in itself.…Whatever is immediately present to us, will be instances of what is. These instances have two characters.
>
> 1. They are representations
>
> and 2. They are addressed to us
>
> That they are addressed to us, is only the limitation of our selection, and therefore must be abstracted from. That they are representations arises from their being taken as instances. Hence, we presume that whatever is is a representation.
>
> (W1:324, 1865)

Peirce makes the case that because mental representations are simply representations of what is, in its very instantiation outside the mind, already representational; we cannot think of distinguishing representations in terms of their "internal constituent characters" (W1:324). As we saw in chapter 2, meaning is *peculiar* to the representation that expresses it. Meaning can only ever be *conveyed* through experience. We know what HOT is because we *experienced* something that is hot and inferred hotness from it. HOT will forever only mean that experience conveyed to us. In a similar way, we know what a PHOENIX is because we encountered descriptions of the phoenix in our context that conveyed the experience of others with an imagined experience that synthesizes various aspects of experience, such that the experience with a bird, with a color, with fire, with death, birth, and a host of other experiences (EP2:295, 1903). Consequently, HOT or PHOENIX will only ever mean *this* experience; which must be experienced, either in life, or in the imagination, in order for the meaning of the representation (e.g. the letters "H"-"O"-"T", the picture in the book, the uttered sound "/hät/") to be acquired.

If a representation, then, cannot be described in terms of its "inward constituent characters" – the peculiar representational experiences that make it what it is and give it its peculiar meaning in the mind– how can representations be distinguished so that we can talk about them meaningfully? I argue that Peirce advances a theory in response to this question in 1865 that he had begun to develop several years prior in the context of chemistry– his other intellectual passion. Peirce argues that a representation could not be distinguished in terms of its "inward" characters – the representational attributes it came to have for a mind that could experience it – but it could be experienced in terms of "essential external relations" that indicate *its relation to other representations in the mind's process of conceptual acquisition*.

> It would be impossible to analyze representation into its inward constituent characters since only elements into which it might seem to be separated would be, themselves, representations. Representation implies contrast; hence it has an inward character only so far as that can be contrasted with something. Now, as all things are representations alike, they can only be contrasted in their relations. Hence the only inward character of representation is the relation of anything to itself, – identity. But the different essential external relations of representation can be distinguished very well, because all things do not stand in essential relation to any one representation.
>
> (W1:324, 1865)

Peirce calls these "essential external relations", "marks" (W1:325); which are representations that establish a relation between a set of representations – the representation being acquired by the mind, and other representations vis-a-vis which it is distinguished. This passage, I argue, plays an important role in understanding Peirce's articulation of a concept learning mechanism. I argue that there are two important points we need to grasp in order to understand what Peirce is about here. Peirce is attempting to find a way to distinguish among representations. However, this is not only a way to distinguish representations writ large, but also to distinguish among representations that are being processed by the mind's concept learning mechanism which is itself representations. In other words, Peirce is attempting to distinguish representations by the role they play in a *re*presentational process.

For what do these “marks” or "essential external relations” stand? And what role do they play in the mind’s representational concept learning mechanism? Starting from his earliest derivations of this system, Peirce makes clear that he is toying with a view of representation in which these “marks” are *hypothetical* (W1:331), starting with, and building on, the “universal hypothesis” that everything seen is matched by something *unseen*. Peirce argues that experience treated as evidence for a hypothesis, or as a “trial”, is augmented with such hypotheses that place it in certain relations vis-a-vis other representations as required of the hypothetical learning mechanism itself.

> Whenever we make an observation for the sake of trial, we clearly assume that the observed result will be an induction of something not observed. It is difficult to find a warrant for such an assumption, yet to assume without warrant is to beg our conclusion… A warrant for inferring something not observed, is in itself an inference of something not observed. These assumptions, therefore, originate *a priori*.
>
> (W1:152, 1864)

Peirce sees his “marks” as hypothetical assumptions which are added to a representational input in order to lubricate the inferential process that gives these representations meaning to the mind. In a sense, the inferential process *itself* can be described in terms of the hypotheses that it adds to its input for further elaboration. This begins to give us a sense of the *hypothetical* inferential learning mechanism that Peirce has in mind.

> Every judgment consists in referring a predicate to a subject. The predicate is thought, and the subject is only thought of. The elements of the predicate are experiences or representations of experiences. The subject is never experienced only assumed. Every judgment, therefore, being a reference of the experienced or known to the assumed or unknown, is an explanation of a phenomenon by an hypothesis, and is in fact an inference.
>
> (W1:152, 1864)

Peirce describes the process of acquiring the meaning of a representation being conveyed by immediate perception in the course of experience as involving a series of hypothesis about something unknown in order to make it something known. It involves the predication of "experiences or representations of experiences" to a subject which is not only unknown but also "assumed" for the purpose of inferring something of it. For this reason, the *first* hypothesis that begins the inferential process that is Peirce's learning mechanism is the hypothesis that there there is something unknown or unexperienced that must be explained. This, for Peirce, is the assumption, or "universal hypothesis" of something that *is* a substance.

> The universal hypothesis which we are forced always to make is of a substance, that there is something which *is*.
>
> (W1:331, 1865)

Each mark is thus what Peirce calls a "fiction" (W1:306, 312), or something that is assumed of the input in order to further elaborate it. Peirce maintains that, in addition to the universal hypothesis of something that *is*", there are three more such "fictions", hypotheses, or assumptions involved in the mind's concept learning mechanism, and that they are all a variant of what in the contemporary psychological literature would be called a "psychological essentialism" (Gelman 2004) – the idea that something seen is matched by an underlying, unseen, essence that explains its exhibited characteristics and behaviors.

> There are three aspects under which every phenomenon may be considered and which may be regarded also as three elements of the phenomenon….Corresponding to these three elements of actual cognitions or phenomena; there are three corresponding elements of those possibilities of cognition or substrata of phenomena which are supposed for the purpose of explaining the regularities of cognition. These hypotheses amount to this; that every phenomenon is matched by some noumenon, or that to every actual cognition there corresponds to a possible cognition.
>
> (W1:307, 1865)

As we will see, these three hypotheses of psychological essentialism, or the assumption that "to every actual cognition there corresponds a possible cognition", map onto Peirce's three kinds of "external essential relations" or "marks" by which representations are distinguished vis-a-vis the mind's concept learning mechanism. They are accompanied by a "universal hypothesis" of the same kind, which is the hypothesis of something that *is*. This universal hypothesis of something that *is*, we will see, while it overlaps to that of the "noumenon" differs in one important way. Moreover, both the assumptions of something that *is* and of the noumenon have an important relation to the phenomenological assumptions of external essential relations that compose Peirce's concept learning mechanism.

There is an interesting relationship between hypothesis and the role that it plays in Peirce's learning mechanism and language that Peirce does not miss. Peirce makes the distinction between meaning and language clear as far back as the "Analysis of Creation" in 1861. While, as we saw, he advances in that piece the idea that meaning is "peculiar" to its "expression" in an abstraction – a term he later associates with representation (W1:247:1865); Peirce also articulates that the elaboration of this meaning is not possible without language.

> 1 Whence is expression? That is what are the conditions of its existence?... Meaning to become expression needs to be combined with that which expression is before it has any meaning, or Language. This Language is not matter but is a partial form which permits the existence of that ideal form Meaning to become a realizable form. The means therefore by which meaning enters into language, is the determination, the *regulation* of language.
>
> (W1:86, 1861)

This language is what "permits" peculiar meanings, which is only "ideal" and involves only the faculty of Feeling, to become "realizable" in the mind as embodied knowledge. This language, consequently, belongs to neither the faculty of Feeling nor of Sensation of Reaction (Sensibility). Instead, it belongs to the faculty of the Understanding. In his work on the external essential marks of representation, and their

role in elaborating a concept learning mechanism associated most particularly with the faculty of Understanding, Peirce is articulating a view in which the language of thought – or of the phenomenon– is hypothetical. I argue that the hypotheses of something that *is* some kind of substance, the hypothesis of the noumenon, and the three phenomenological hypotheses (which we will see shortly) fulfill the role of *language* in Peirce's theory of cognition. They are representational *hypotheses* which allow for the elaboration of peculiar meanings. In this way, I maintain that Peirce is elaborating a *hypothetical language of thought*. I return to this point in the conclusion of this chapter one, as the question of what constitutes a language of thought is an important one from the standpoint of articulating a concept learning mechanism.

The hypothesis of psychological essentialism, Noumenon, and Phenomenon: Peirce's continuation of his alternative to Kant's theory of cognition

Peirce lists three "essential external relations", or "marks", by which to distinguish among representations. These relations, which are also representations that denote "without connoting" (W1:308), distinguish a representation being acquired by a mind vis-a-vis its relation to other representations in the mind's learning mechanism. These different marks correspond to three hypothetical assumptions made about a thing in order to predicate meaning to it. The process of concept learning begins with a "universal" hypothesis of something that *is* – i.e. that there is something external to the mind that needs to be explained in the first place. These hypotheses are linked together in a chain of representations that work together to construct conceptual, representational, knowledge. Peirce first names these important hypothetical assumptions, or "marks", in a number of places. I argue that he is consistent with the order in which he names them, the differences among these marks, and their role in the concept learning mechanism.

I begin with one of Peirce's earliest references to these three hypothetical assumptions, and the universal hypothesis. I articulate the contours of my proposed interpretation of Peirce's description of a concept learning mechanism at around this time, before diving into more detailed and focused discussions later on in Peirce's career. In this instance, in 1865, following a set of lectures in which he introduced a

"unpsychological" view of logic and concept learning, Peirce associates three hypothetical assumptions with "thought", or the phenomenon; and a more general, perhaps even "universal", assumption with the "thought-of", or the noumenon. These terms should be familiar from chapter 2, since they refer to Peirce's original proposal of an alternative to Kant's theory of cognition based on the idea of a continual determinator of cognition, which he argued had a relation of "influx", or that of "substance" to "accidents" (EP2:39, 1898). Peirce also called this relation of influx by the name, "synthesis".

> Every phenomenon has three aspects which may be called its elements. In the first place it may be differentiated from other phenomena and considered in its qualities; the phenomenon considered as having qualities may be called the phenomenal form. In the second place the phenomenal form may be objectified that is thought of – reproduced in the imagination; until this is done we do not make it the subject of a thought, we do not say *it is*. Considered as a subject of thought the phenomenon may be called the phenomenal matter. Finally, as the phenomenon in the first aspect is regarded subjectively and so as within us, and in the second aspect objectively and so as without us, these aspects give rise to a third, that in which the phenomenon is regarded as a representation of something not present– the noumenon.
>
> (W1:313, 1865)

The noumenon – the "something not present" – itself breaks up into: first, a third phenomenal aspect – phenomenal "accidents" – which are viewed as representing the noumenon directly; and, secondly, another hypothesis– which is a set of expectations. In an earlier draft of this work, calls the third aspect of the phenomenon "image" – meaning by this, I believe, not a picture, but an act of the *imagination* (W1:307, 1865)– an act that we have seen involves the mental faculty of the Sensation of Reaction. In this draft as well, imagination plays an important role, since the objectification of phenomenal form as phenomenal matter occurs as a rearticulation of phenomenal form as the "subject" of thought, or *as things in the imagination*; or more precisely put, as representations of the faculty of Sensation of Reactions. It is in this process, between phenomenal matter and phenomenal accidents that phenomenal form, or qualities, come to be articulated as external "accidents" of the noumenon.

> A thing (matter) then and an external representation of it stand to each other in the very relation of matter and its accidents or rather of a thing (matter) and an object (accident).
>
> (W1:314, 1865)

In it third aspect, "the phenomenon", or thought, "is regarded as a representation" of "the noumenon" – an expectation of the recurrence of the "forms of regularities" (W1:313, 1865) of the universal hypothesis of something that *is* that the phenomenon seeks to explain. This passage begins to lay out the kind of inferential relationship Peirce is starting to establish between the phenomenon, the noumenon – the hypothesis of something not present, and the universal hypothesis of something that *is*.

Peirce describes a process in which the phenomenon concludes in a representation of the noumenon that comes to *explain* the thing that *is*, here called "substance", in terms of a representation of the phenomenon as noumenal, or external, "accidents". Somehow, the representation of the noumenon as "accidents" of the phenomenon come to offer an explanation of the thing that *is* some kind of substance that is "representative" of it.

> It is the regularities of the form which induce the objectification of the phenomenon, as will be explained in the appendix of this book. The notion of the noumenon is nothing more than the expectation of a recurrence of these regularities– a hypothesis that everything seen is matched by something not seen. It results from the similarity between phenomenon and noumenon that the latter is analyzable into the same elements of the former. Corresponding to the phenomenon considered as a representation we have *accidents* of the noumenon; for they are external and therefore noumenal and yet representative of the substance or the thing itself.
>
> (W1:313, 1865)

Peirce here begins to establish a relation between "the thing itself", articulated as a universal hypothesis of something that *is* some kind of substance, and how it is apprehended by mind as thought (i.e., as

phenomenon). This is essentially the relation between the unknown representational thing that is out of consciousness, and the known representation of that thing in consciousness. This relation is, for this reason, describing a process of knowledge, or concept, acquisition. Peirce writes here of an equivalence between the assumption of a thing that *is* (the "the thing itself") and the "noumenon" – the assumption of something unseen (the thought-of) that is nevertheless explainable in terms of the phenomenon (thought). Both the thing assumed as being something that *is* and the noumenon are represented by the "accidents" of the phenomenon, and are thus made equivalent.

I argue that Peirce here is intimating that the hypothesized something that *is* is considered by the mind hypothetically as something governed by an underlying process that can be known due to the "regularities of the form" which the hypothesized thing that *is* or "thing itself" – is considered to be exhibiting. In this way, both the hypothesized thing that *is* and the noumenon are hypotheses, and may in fact be the *same* hypothesis considered from different points of views. One (the hypothesis of the thing that *is*) is the hypothesis viewed as *internal, explainable, but as of yet unexplained*; the other (the hypothesis of the noumenon, or the thing unseen) is the hypothesis viewed as *external, unexplainable yet explained*.

In the interpretation that I propose and support in this section, the hypothesis of the thing that *is* is articulated as a phenomenon in a process that involves the coordination of three aspects of the phenomenon – form, matter, and accidents; which I argue are three hypotheses, assumptions, or "fictions" that are added to the hypothesis of the "thing itself" or the thing that *is*, which is considered hypothetically in order to make it known. These three aspects of the phenomenon are also called "qualities", "thing", and "object" by Peirce, respectively: "...the following terms may be used: instead of *accidents*, *object*; instead of *matter*, *thing*; instead of *form*, *qualities*" (W1:314, 1865).

I argue that Peirce's phenomenal accidents are a way of articulating the "regularities of form" of the hypothesized thing that *is*, which have been apprehended as phenomenon (thought). This is done in such a way that the aspects of the thing that *is*, considered as a phenomenon, are once externalized *hypothetically* as something unseen – as the noumenon. In other words, the "regularities of form" of the

hypothesized thing that *is* are taken in as phenomenon, then articulated as the accidents of the noumenon – which is the hypothesized thing that *is* considered from the inside out (or as "internal"), rather than from outside in (or as "external"). This would explain the correspondence that Peirce establishes between phenomenon and noumenon (see below), and why he would consider the noumenon to be "analyzable into the same elements" as the phenomenon.

> Corresponding to the matter of the phenomenon we have the substantial matter of the noumenon and corresponding to the form of the phenomenon we have the substantial form of the noumenon.
>
> (W1:313, 1865)

Both the hypothesized thing that *is* and the noumenon are analyzable into the "accidents" of the phenomenon which are "prescinded" or abstracted from regularities of form considered as being associated with the hypothesized thing that *is* (W1:313).

We thus begin to have a very definite shape to the altered relationship between the noumenon and the phenomenon that Peirce described in 1861. The biggest change from 1861 is that Peirce in 1865, in his derivations of the universal categories, has introduced the idea of *hypothetical* reasonings – including the crucial hypothesis of something that *is* some kind of *substance*, as well as the three aspects of the phenomenon, which are also articulated hypothetically.

I make the case in this chapter that the critical relations between the hypothesis of something that *is* a substance, the substance, the hypothesis of the noumenon, and the three aspects of the phenomeon – phenomenal form, phenomenal matter, and phenomenal accidents remain constant in Peirce's philosophical system. Moreover, I argue that they articulate a consistently upheld view of how the mind's concept learning mechanism operates. I make the claim, which pushes against much of the literature in this area, that Peirce's "influx" from 1861 is his "logic" of 1865, and, as we will see, also his "synthesis" of the 1900s. Moreover, I argue that as early as 1865, Peirce had already articulated the main aspects of the concept learning mechanism of his mature years. I argue that this general shape for his concept learning

mechanism, offered in 1865, is sustained and fleshed out well into the 1900s. Consequently, while Peirce never gets close to finishing his book from 1865 on an "unpsychological" view of logic, let alone write an appendix to it that he alludes to in 1861 (see W1:313); I argue that he does not abandon the inferential relation that he began to establish between the noumenon and phenomenon in this work. Instead, I make the case that it becomes the template for Peirce's concept learning mechanism which he continues to develop, and which he sustains throughout his intellectual life.

A definition of representation that establishes a necessary determinant of the representational process and its outputs

I now return to Peirce's work on "marks, or the "external essential relations" of representation. We've now seen that as of 1865, Peirce was considering a concept learning inferential mechanism grounded in a number of hypotheses. This hypothetical view of his learning mechanism also included a hypothetical view of three collaborating aspects of the phenomenon (i.e. thought). These aspects of the phenomenon are distinguished in terms of their hypothetical marks. Peirce makes the case that these hypothetical "marks" are the only way to distinguish among different kinds of representations. I argue, in this section, that Peirce describes the three aspects of the phenomenon, which are representations, in terms of marks or essential external relations; and uses marks to distinguish one more representation important to his concept learning mechanism.

I take Peirce as arguing that all *mental* representations – the only kind of representation which Peirce considers in depth – imply three kinds of relations or references due to their involvement in the mind's inferential learning mechanism (referred to in the passage below merely as "induction").

> Certain points are implied in representation, because they result from the induction by which it was prescinded. Representation implies first an object represented; 2nd a mind or rather abstracting from the personal element, a representation. I call this the subject. 3rd a Ground or Reason which determines it to

represent that object to that subject. We have nothing else implied in the representation as representation. Hence representation has three marks only namely –

1 Reference to an Object

2 Reference to a Ground

3 Reference to a Subject.

(W1:326-7)

In other words, representation can be thought of as a set of *four* representations, where one representation which is the nexus of the representational dynamic brings with it the implication of three other representations as its object, ground, and subject. I depict this dynamic below.

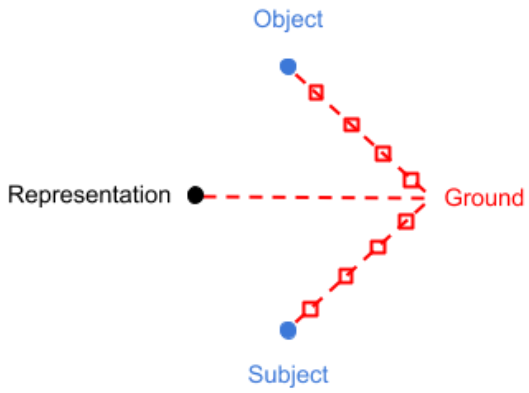


Figure 3: Representation, object, ground, subject. Diamonds refer to as of yet undetermined second order marks (relations) between the Ground and the Subject, and the Ground and the Object. The mark relating the Representation to the Ground (dashed line) belongs not to the Ground but to one of the constituting representations of the representation.

A representation, then, brings with it the hypothesis of three other representations. These hypotheses manifest as three assumed kinds of references. Each of these references, since they are themselves a

kind of representation, can be articulated in terms of marks, or essential external relations. These marks, since they are themselves representations, involve an object, ground, and subject of *reference*; which may, in cases, differ from the object, ground, and subject of *representation* – i.e. of the representational learning mechanism.

> Accordingly, the differences of representation are differences of one or more of these marks. As these marks are references they are determined first by the Object of reference, 2nd by the Subject of reference, and 3rd by the Ground of reference.
>
> (W1:327, 1865)

Moreover, Peirce argues that differences among these marks and their references distinguish among different kinds of representations *from the point of view of the concept learning mechanism*. Unsurprisingly, as we've already anticipated, Peirce argues that there are three kinds of representations that can result from variations in the concept learning mechanism. They correspond to the different representational outputs of the three specialized mental faculties.

With this in view, I now turn to an articulation of how Peirce derives the different kinds of mental representations by the kinds of *hypothetical* references they make to the object, ground, and subject of the conceptual representational process. The object, ground, and subject *of representation* are also, from the point of view of the concept learning mechanism, the object, ground, and subject of *logic* – Peirce's conceptual learning mechanism considered as one large representation.

The concept learning mechanism considered as one big representation, i.e. as logic; establishes a relationship between its object, ground, and subject *of representation* that trickles down to have implications in the objects, grounds, and subjects *of reference* of the representations that compose it. Peirce calls this kind of higher level, determining differences, in representations "proximate difference of representation" (W1:327, 1865). These proximate differences in the references of the representational learning mechanism, consequently, correspond to differences in the references of the lower-level

representations that compose the learning mechanism in the first place. This in turn leads to observable differences in the behavior of the concept learning mechanism, and results in three different kinds of representations with different kinds of content and different kinds of behaviors in cognition.

Peirce argues that it is only differences in the ground *of representation* that necessarily gives rise to different behaviors of the representational learning mechanism by affecting the references of the representations that compose the learning mechanism (W1:327). This is because the subject *of representation* is always determined by the object and ground *of representation*. And the object *of representation*, as we will see, can be the object, ground, or subject *of reference*. If the object *of representation* is the subject *of reference* in the learning mechanism, it will not necessarily lead to a difference in the behavior of the learning mechanism since the subject is always a determined entity. Consequently, it is only the ground *of representation* which always *necessarily* implies a difference in the references of the representations that compose the representational learning mechanism.

Peirce runs through this reasoning, but from the perspective of one of the representations that compose the learning mechanism and their object, ground, and subject *of reference* considered as hypothetical marks.

> Accordingly, the differences of representation are differences of one or more of these marks. As these marks are references they are determined first by the object of reference, 2nd by the subject of reference, and 3rd by the Ground of reference. Hence, their differences (the subject of reference or representation being already determined) are either differences of the object of reference – i.e. Object, Ground, or Subject of the Representation– or of the Ground of Reference. Now the ground of reference of each of these references is the Ground of the representation. Hence, a difference in the ground of representation is the only difference which necessarily implies a difference in all three of the marks of representation.
>
> (W1:327, 1865)

This view of proximate differences of the representational mechanism from the point of view of the representations that comprise it, is the same as a view of the proximate differences of the representational learning mechanism from the point of view of the learning mechanism that I gave earlier.

The ground of a representation is itself a representation. It is a relation that relates the representation to all of its references – to the object, the subject, and the ground itself. Consequently, the ground is a representation that can be distinguished in terms of its hypothetical marks.

> Now the ground of a representation has three marks
>
> 1st It determines a certain representation to refer to a certain Object
>
> 2nd It determines that representation to refer to it
>
> 3rd It determines that representation to refer to a certain subject
>
> (W1:327, 1865)

Because differences in the ground *of representation* (i.e. of the concept learning mechanism considered as one big representation) are “proximate” or “highest” differences, and necessarily result in differences in all the representations that compose the representational learning mechanism, Peirce calls the three marks of the ground *of representation* “marks of determination” (W1:327, 1865). It is the relation among the three hypothetical marks, or references, of the ground that come to determine differences in the behavior of the representational concept learning mechanism, and consequently, come to determine differences in the kinds of representations that this concept learning mechanism outputs.

As a representation itself, the ground’s three hypothetical marks refer to an object, ground, and subject *of reference*. Moreover, the ground is the only one of the four representational elements involved in the act of representation that is a relation (W1:330, 1865). This means that it is a representation that is involved in an act of inference that establishes resemblance through a comparison. Similarly, all the hypothetical

marks, or *references* to their objects, grounds, and subjects, that distinguish representations are similarly acts of inference that involve comparison and resemblance. As acts of inference, they are "virtual", as we've seen (W2:192, 1868), and must roll out in time. However, as a simplification of this explanation, Peirce abstracts away from the inferences needed to establish the relations marked by the hypothetical essential external relations. However, he does not wholly abstract away from this inferential process of comparison and resemblance when it comes to the ground – the only one of the marks of determination that is a relation. This is because the relation that is the ground is fundamental to Peirce's learning mechanism.

The ground is a relation that must roll out in time, however, at time t_o, it is a representation that has three hypothetical marks, as we saw. In the representation that is the learning mechanism itself, the ground *of representation* and the proximate, or highest, difference determining the behavior of the inferential mechanism, uses one of these marks to refer to itself. Its effect on the learning mechanism then comes from the relation between the object and subject *of representation* that it relates. The ground *of representation* (of the learning mechanism), establishes a relation of resemblance between itself and the object or subject *of representation*. As we saw from our discussion on resemblance, that resemblance takes the form of the copy of a character, i.e. of an abstraction or a feeling. This character that the ground *of representation* now comes to have in common with the object or subject *of representation* is what Peirce calls "the reason" (W1:327, 1865) why the representation which refers to this ground represents its object (the object, ground, or subject *of representation*) to its subject.

This process is a complex one that becomes difficult to grasp purely abstractedly. Here, I give an example that draws on an incomplete example that Peirce himself began in 1865 (see W1:332, 1865). Imagine you are a painter who sets out with his tools to paint a scene – these tools include some recently purchased oil paint. You settle on an object for the painting, which is that of a young couple sitting on a bench in the park. The portrait which you set out to paint will be a representation– but a representation of what? There are three determinants of this painting – there is, of course, you, the painter, and all your preconceived notions, artistic training, feelings, and state of mind. You are what Peirce would call the *subject* of the

painting – you are the mind doing the assessment and comparison that leads directly to the creation of the painting and the assessment of it. You are painting if not only for you, then at least for other minds – other subjects– structured like yours. There is also, secondly, the young couple sitting on the bench. They are also a determinant of the painting you create – after all, the painting would not be the painting that it is if the object were different; that is, you were painting instead a tree or a flower. Lastly, the tools with which you are painting– let's focus for simplicity's sake on the fresh set of oil paints that you recently purchased– are also a determinant of the painting. They are what Peirce would call the ground of the painting – they are the character, the material thing, with which you are making the painting. Without this paint, you would be putting dry strokes on canvas, and there would be no *reason* why anyone should see the painting that you make to be a representation of the object of the painting – the young couple sitting on the bench – to them, to you, or to any other mind that can see colors and shapes the way that you, the subject, do. You would look like a madman, painting a painting that has no reason for being a representation of its object at all.

Peirce's view of representation is that the portrait (the representation), is of an object, to some subject, upon some ground (or reason for being a valid representation of an object to a subject). However, the ground, or reason for a representation being a representation, can change depending on which of these three determinants of the representation takes priority. There are, conveniently, many different styles of painting in art that make this analogy a helpful one. The portrait, in the case that it is an expressionist painting for example, is a representation that prioritizes the subject as its determinant. Think of a famous example, *The Scream* by Edvard Munch comes to mind. The portrait, *The Scream*, is a representation of an object – a man standing on a bridge. However, more than that, it is a representation of the *subject* who painted the portrait. The distorted lines that evoke a sense of vertigo to the mind; the stark reddish colors evoking the color of blood, sunsets, and things coming to an end; not to mention the pose of the person on the bridge– palms to cheeks and their mouth stretched out in what any human animal would recognize as the shape of an agonized scream– is very much more determinative of what the painting represents to a human subject which shares some of the cognitions of the painter, than is its object. This painting is not a portrait of a man standing on a bridge. It is a portrait of a subject experiencing an existential crisis and

deep agony. In an extreme case, there might never have been a man on a bridge as such, and if there were, they may never have taken the pose depicted in the painting.

While there remain three determinants of the expressionist portrait in this example, it is the subject which most strongly determines the object of the painting, and for this reason, the ground of this painting – the choice of painting media, colors, and shapes – reflects a common character with the subject and how they see the world. Peirce calls this a kind of representation in which the subject *of representation* comes to determine the object *of representation*, and consequently the ground *of representation* which is a relation of resemblance, or agreement, between the ground and its object or its subject. He names this kind of representation– which is a determination of the subject *of representation*– a "sign" (W1:328, 1865) which he also calls by the name of "index" (W1:334, 1865).

Secondly, the portrait could be a determination of its object. Take for example a classical portrait such as one commissioned by royalty or a wealthy merchant before the invention of photographs. The choice of pose, setting, attire, hair style, facial expressions, colors, and a myriad of other details in the painting are determined by the object who commissioned the painting. Even the subject– the kind of artist and their style of painting– is also determined by the object of the painting. To the extent we learn anything of the artist, that is incidental. The portrait is meant to be a representation of the object of the painting in all its minute details. Consequently, the ground of the portrait – the reason why it is a representation of the object to a subject – is a character it has in common with the object. Peirce calls this kind of representation, in which the subject is a determination of the object, and the ground is a common character with the object a true representation, or a "conception" (W1:328, 1865). It is only this kind of representation that can give us any information about its object that can have any possibility of truth about that object. Note that in this kind of representation, it is important that there is a subject. Otherwise, we would not be dealing with a representation, but a perfect *copy*, as in the case of a photograph or a "picture" (W1:328, 1865). In other words, a representation in which both the object and the subject have been reduced to automatic physical relations. This corresponds to Peirce's last kind of representation.

Lastly, the portrait could be a determination of *both* its subject and its object. Peirce argues that this can only be the case when the common character being expressed by the ground is a character that it holds in common with *both* its subject and its object – and such a commonality can only be the commonality that the ground has with itself. An abstract painting most closely approximate this dynamic. What the ground – the oil paint, for example – can have in common with both its subject (the painter) and its object (the young couple seated on the bench, the tree, the flower or blade of grass) through resemblance, which is a perfect copy of some abstraction or state of the nervous system, is *color*. The common character with the oil paint can have with both the object and the subject is simply the wavelengths of light that are similarly absorbed and reflected by all three entities considered in terms of their material qualities. The laws according to which the wavelengths of light are absorbed and reflected are the same for the paint, the blade of grass, and the retina of the painter.

Peirce thus sees a necessary relation between the differences in the marks of determination of the ground *of representation* and the kind of representations that result from a representational process.

> So the species of representation are three; to wit,
>
> 1. Representations whose object is determined by its subject; that is to say whose Ground is a character of the Subject. If this subject is plural, of course the character must be common. Thus, if two men *agree* to have a certain sign denote certain things, that sign is a representation of this kind. Accordingly, I call this species of representation *Sign*.
> 2. Representations whose subject and object depend immediately upon the ground and not upon any character of either. But the ground in any case must be a character of the representation which connects it with subject and object. Hence such representations are those which agree immediately with both subject and object in some characters. It is this sort of representation which an individual is of itself; and also which a sensation is. For a sensation agrees immediately with the thing in affecting the sense and with the mind in being affected by the thing. It is this sort of representation also which a picture is. Accordingly I call this species of representation *copy*.

3. Representations whose subject depends upon its object. That is which are intelligible to those who can comprehend a certain character of the object – if there are several objects, a common character. It is this sort of representation which a *conception* is; and which a word is, after it has once been acquired as a *sign*. I call this species of representation *Symbol*.

(W1:328, 1865)

Keeping in mind that Peirce's learning mechanism is itself representational, this amounts to saying that Peirce's learning mechanism is capable of giving rise to three different kinds of representations depending on differences in its ground *of representation*. I show next that this is precisely what Peirce argues and that the three different kinds of representations associated with the three specialized mental faculties can be derived from differences in grounds in Peirce's learning mechanism. Peirce in the passage above is explicit that a sensation, which we saw is a representational output of the mental faculty of Feeling, is a "copy" – a representation whose ground agrees "immediately" (as in immediate perception) with both its object and subject. Peirce is also explicit that a conception, the representational output of the mental faculty of Understanding, is a "symbol" – a representation whose ground agrees with its object. This leaves us, logically, with the "sign" and an enhanced understanding of the representational output of the mental faculty of Sensation or Reaction. A "sign" is a representation that denotes certain things without connotation. We now see that this lack of connotation is directly associated with the *conventionality* of the sign – the fact that it results from an arbitrary agreement among subjects that a certain representation will stand to other subjects for a certain object. I return to the relationship between Sensation of Reaction and conventionality later in this dissertation.

I have now set up most of the conditions needed to derive Peirce's pivotal "universal" categories: being, quality, relation, representation, and substance, which are widely acknowledged to be the mark of his mature system of reasoning from the novel perspective of a *specialized* theory of cognition. I bring these parts together in the next section and show how Peirce's hypothetical and representational learning mechanism, which is determined by its ground *of representation*, naturally gives rise to three different learning mechanisms involving Peirce's "universal" categories. I also show that these three different

learning mechanisms output the three different representations that we now associate with the specialized faculties of Feeling, Sensation of Reaction (Sensibility), and Understanding.

3.3 Unpacking Peirce's concept learning mechanism in terms of Peirce's hypothetical language of thought and Peirce's universal categories

Continuity between Peirce's representational view of his learning mechanism in the 1860s and Peirce's virtual view of his learning mechanism in the 1900s

One of the well known aspects of Peirce's philosophical system is his work on the "universal" categories. Peirce himself considered them one of his most important contributions (W6:168-9, 1887-8). However, there is much disagreement about what these universal categories are and what role they play in Peirce's system. I take the stance that they describe Peirce's concept learning mechanism – how we can come to have knowledge about something external to the mind. I view Peirce's concept learning mechanism from the novel perspective of a *specialized* theory of cognition. Departing from common readings of Peirce in this respect, I argue that Peirce's theory of cognition is a much more widespread and deeply-rooted aspect of his philosophical system than previously conceived. I argue that it imbues not only his early work with coherence and meaning, but also work during his middle stage that seems – at face value– to take an arbitrary and inexplicably discarded turn towards a physiological approach to the mind. I show that Peirce's self-crafted neuroscience of the 1870s and 1880s advanced this specialized theory of cognition, and offered a basis for understanding important aspects of his learning mechanism– such as the act of comparison and the nature of resemblance.

In this chapter, I argue that my reading of Peirce's *specialized* theory of cognition also makes sense of his derivation of a logical concept learning mechanism– something that becomes the focus of Peirce's later stages in his career. Peirce's work on a logical concept learning mechanism is usually marked as starting with his derivation of the five "universal" categories (Fisch 1986). This work is seen as setting up much of the infrastructure for his mature work on the three inferential arguments of Abduction, Deduction, and

Induction, and their role in Peirce's work on scientific inquiry and pragmatism – a maxim (or method) for arriving at the definition of a concept. My take on Peirce's work sees both his work on scientific inquiry and pragmatism as stemming from his work on developing a concept learning mechanism – which is part of the much more expanded role that I give to a theory of cognition in Peirce's body of work. In this view of Peirce, I make the case that Peirce's *specialized* theory of cognition underpins much of his more well known work. To understand Peirce's work on scientific inquiry – including Abductive inference– and his pragmatism requires understanding Peirce's theory of cognition and how it treats conceptual knowledge as a kind of cognitive content, and the process of concept acquisition.

I've argued so far that Peirce's *specialized* theory of cognition is one that upholds three different mental faculties with different specialized inputs, outputs, and inferential mechanisms that collaborate in the production of conceptual knowledge. I began to establish Peirce's views on meaning – as peculiar; and language – as hypothetical. I showed how Peirce's views of knowledge as propositional – involving both a subject and predicate, which are two different kinds of representations – allows him to integrate two specialized cognitive faculties into the workings of the third cognitive faculty of Understanding. I also began to show how the different mental faculties operate to give rise to their special kinds of representational outputs, and in what ways the representational outputs of the cognitive faculties of Feeling, Sensation of Reaction (Sensibility), and Understanding differ. Finally, I began to establish the building blocks from which Peirce's concept learning mechanism is built, as well as the general shape of this learning mechanism. In this section, I bring together these various aspects to arrive to my main argument – that Peirce's concept learning mechanism associated with the faculty of Understanding, which involves his five universal categories, is but a more full or robust version of the learning mechanisms associated with the cognitive faculties of Feeling and Sensation of Reaction (Sensibility). Or, conversely, that the learning mechanisms associated with the cognitive faculties of Feeling and Sensation of Reaction (Sensibility) are *degenerate* versions of the full version of the learning mechanism associated with the faculty of Understanding.

I thus begin to treat in this section the topic of “degeneracy” in Peirce’s philosophical system which has received relatively little attention. Peirce defines degeneracy as a “weakened” version of a full thing (EP2:160, 1903). He borrows the term from geometry.

> There is a close analogy to this in geometry. Conic sections are either the curves usually so called, or they are pairs of straight lines. A pair of straight lines is called a degenerate conic. So plane cubic curves are either the genuine curves of the third order, or they are conics paired with straight lines, or they consist of three straight lines; so that there are two orders of degenerate cubics. Nearly in this same way, besides genuine secondness, there is a degenerate sort which does not exist as such, but is only so conceived.
>
> (EP1:253, 1887-8)

Peirce’s notion plays a particularly important role in his view of representation and its involvement of a relation among three representations determined by a ground, or reason for why one representation can mediate between two others. This ground is itself relational, as we saw, and involves a highest level relation among three entities. Peirce thus argues that when speaking of relations, we will encounter cases in which some of the entities involved in the relation will be only a weakened version of what we would expect in the “genuine” version of the relation.

Taking the example of the cone. A cone is a geometric shape that tapers upward from a circular base to a point. If one is to take a cross-section of a *single finite* cone (called a conic section) by intersecting a plane with the cone, most of the time, one will get a “curve” – a circle or ellipse. Sometimes, when the cross-section created by the intersection of the plane with the cone also intersects the base of the cone, we will get a curve connecting the two points of a line which comes from its base. However, at its apex– at the section at which the cone tapers to a point– the cross-section of a cone is either two intersecting “straight lines”, or, in the case that the conic section involves the base of the cone – a triangle which involves three straight lines. The “pair of straight lines” and the triangle– the “three straight lines”, are a weakened version of the curve that we would usually expect as the conic sections of a cone. The cross-section of a *single finite* cone and a plane, although all considered to be “curves” are consequently

of “three orders”, with a new order being distinguished by a loss in dimensionality. The conic sections can be “genuine curves” – involving a “genuine” curve such as a circle or ellipse that reflect the circular base of the cone that gives it its characteristic shape. Peirce calls these circle and ellipse cross-sections curves of the “third order”. However, the conic sections can also be “degenerate”, involving a *loss of dimensionality*.

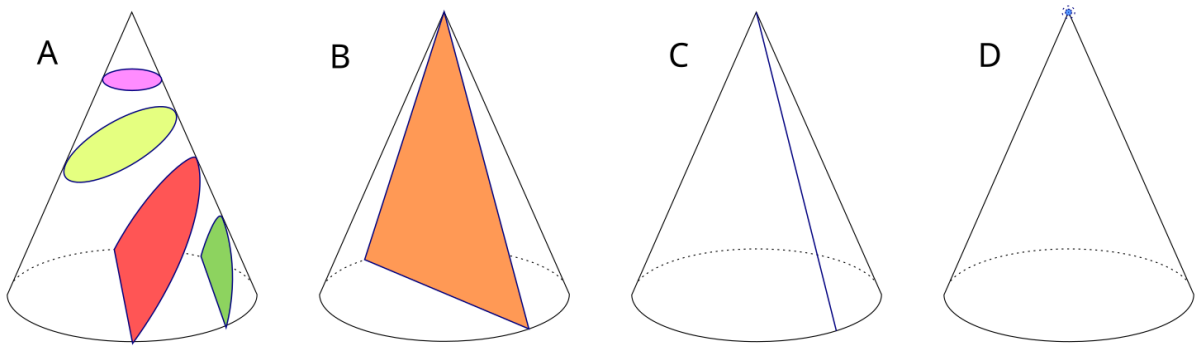


Figure 4: Conic sections of a single finite cone. **A** illustrates all “curve” conic sections (circle, ellipse, parabola, and one branch of a hyperbola. **B** and **C** illustrate conic sections that are lines. **D** illustrates a conic section that is a single point.

In the degenerate conic sections, we lose information about the cone and experience it as a loss of dimensionality. The conic sections, if we did not know they were taken from a cone, could easily have been cross sections of another shape. The triangular, first order, conic section could have easily come from a pyramid and been indistinguishable. However, the degenerate triangular conic sections are still considered to form a cross-section of a cone, and not a cross-section of a pyramid. We cannot tell that the triangular conic section is a cross-section of a cone because of any attribute it has in and of itself – after all, it looks identical to the cross-section of a pyramid. We only say that it is a cross-section of a cone and not that of a pyramid only because we “conceive” it to be a cross-section of a cone – i.e. we conceive it to be a special, weakened, case of a full genuine relation between the single cone, its finite base, and

the plane intersecting it. We have in mind what the full, or genuine, relation would be, and consider the degenerate case as a weakened version of the full thing, and not as a different relation altogether.

I show how the notion of degeneracy is crucial to understanding Peirce as offering a *specialized* theory of cognition, and in acquiring a more holistic view of his concept learning mechanism. Such a view advances the idea that Peirce's learning mechanism comes in different "order[s]" which give it different inferential behaviors as it is exercised by the various specialized mental faculties. Moreover, due to its involvement of relations of the third order involving three different kinds of representations, there are three versions of Peirce's concept learning mechanism available. One genuine version as implemented by the mental faculty of Understanding, and two different degenerate versions as implemented by the cognitive faculties of Feeling and Sensation of Reaction (Sensibility). The notion of degeneracy thus adds much diversity to Peirce's learning mechanism and allows one concept learning mechanism to act as the learning mechanism for vastly different specialized *domains* of cognition.

In light of the notion of degeneracy, we come to a much more elucidated understanding of both Peirce's derivation of his universal categories in his early years, and of his development of his concept learning mechanism in his later years under the guise of the three inferential arguments – Abduction, Deduction, and Induction. Moreover, we get a much better sense of the *continuity* between these two stages. I show that in his derivation of the five universal categories in the 1860s, Peirce had eventually derived his concept learning mechanism which remains essentially the same all the way into the late 1900s and the end of his life. Moreover, I show that his derived five universal categories are strikingly consistent with some of even his earliest work from the late 1850s on the three persons (I, IT, THOU), and the early 1860s on the Modus of the IT. This is a radical claim to make in light of a secondary literature on Peirce that has maintained that Peirce's work on logic and a logical concept learning mechanism is plagued by discontinuity across different stages (Fisch 1986; Murphey 1993). I argue that in light of a *specialized* theory of cognition and of Peirce's work on degeneracy, such appearances of discontinuity vanish, and Peirce's system gains much in terms of consistency and much in terms of explanatory power.

I focus in this section on Peirce's derivation of the universal categories, and the role that degeneracy plays in linking Peirce's work on hypothetical marks of essential external relations and the marks of determination of the ground *of representation*. I show how this gives rise to three representational behaviors of logic – Peirce's learning mechanism viewed as one big representation. I also make explicit the assumption Peirce makes in this derivation for the purpose of simplicity– Peirce treats the external essential relations or hypothetical marks, as well as in same cases, the ground *of representation* (which as we saw is also relational) as if they too are representations which can be attained in an instant (W1:324, 1865). However, as relations, these hypothetical marks as well as the ground *of representation* are *inferences* which must be implemented in time in order to attain their *virtual* role in the process of cognition. In other words, Peirce's learning mechanism cannot be fully articulated without viewing it as developing in time.

In the next section, I make the case that Peirce, fully aware of this *virtual* requirement of his learning mechanism, sets out to give this full account of his concept learning mechanism later on in his career. I argue that he does so by incorporating the idea of representational *arguments*, and that his work on the three arguments of the learning mechanism — Abduction, Deduction, and Induction – are Peirce's re-articulation of the same learning mechanism that he exposed in his work on the derivation of the categories. Abduction, Deduction, and Induction are thus arguments that make explicit the virtual nature of the hypothetical marks (essential external relations) and relational ground of his representational learning mechanism. Moreover, I show that Peirce's ideas on degeneracy remain intact in his mature articulation of his learning mechanism, and that Peirce describes three paths through his learning mechanism supported by different versions of Deduction and Induction. This later work on Abduction, Deduction, and Induction thus replicates Peirce's work from decades prior that he conducted within a purely representational view of his learning mechanism.

Peirce's three orders of hypothetical marks or essential external relations

Peirce's representational view of the mind's concept learning mechanism – logic, treats the inferential mechanism that predicates a meaning, or comprehension, to a thing, or extension, as one big representation. As a representation itself, it has an object, ground, and subject *of representation*. While the representation itself, the object, and subject are all representations, the ground is a *relation* and involves an inferential process carried out in time. The kind of inference that the ground requires is the establishment of *resemblance* through an act of comparison. The representation in question, and any representation whatsoever, is distinguished vis-a-vis the kinds of relations it makes to three other entities (its object, ground, and subject). These are its three "marks" or essential external relations. They are different kinds of hypotheses that it makes about things, which while unseen, are nevertheless there and involved in producing the seen or experienced. These three hypothetical marks are associated with an additional "universal" hypothesis, which itself has no external mark, which is the hypothesis of something that *is* a substance.

> The universal hypothesis which we are forced always to make is of a substance, that there is something which *is*. This necessity is the first law of the understanding and its product is the first category.
>
> (W1:331, 1865)

I argue that Peirce breaks up this universal hypothesis, articulated in an earlier draft of his derivation of the universal categories, into *two* universal hypotheses– or hypotheses "without content" (W2:50, 1867). These are the hypothesis of "being" – of "what is", and the hypothesis of "substance" or of "It". By the end of his derivation of the universal categories, consequently, Peirce has arrived at five categories, which I argue correspond to his earlier work on hypotheses and hypothetical marks.

The five conceptions thus obtained, for reasons which will be sufficiently obvious, maybe termed *categories*. That is,

> BEING,
>
> Quality (Reference to a Ground),

Relation (Reference to a Correlate),

Representation (Reference to an Interpretant),

SUBSTANCE.

(W2:54, 1867)

Peirce articulates these categories in terms of "supposable objects" of thought. In this articulation of the five universal categories that compose his learning mechanism, it becomes more clear how he has split up his original hypothesis of "something which *is*" which he, in that piece, articulated as being equivalent to the hypothesis of "substance" (W1:331, 1865).

What is.

Quale–that which refers to a ground,

Relate–that which refers to ground and correlate,

Representamen–that which refers to a ground, correlate, and interpretant.

It.

(W2:55, 1867)

Peirce's category of "Being" which he articulates in 1867 in a published piece on the universal categories is thus the hypothesis of something that is, if could have an attribute to the mind, it would be a supposable something that *is*. On the other hand, Peirce's 1867 category of "Substance" is a hypothesis of something that is an "It". Peirce links the "It" with his work on attention and with the representational output of the mental faculty of sensibility.

That universal conception which is nearest to sense is that of *the present, in general*. This is a conception, because it is universal. But as the act of *attention* has no connotation at all, but is the pure denotative power of the mind, that is to say, the power which directs the mind to an object, in contradistinction to the power of thinking any predicate of that object,—so the conception of *what is present in general*, which is nothing

> but the general recognition of what is contained in attention, has no connotation, and therefore no proper unity. This conception of the present in general, or IT in general, is rendered in philosophical language by the word "substance" in one of its meanings.
>
> (W2:49, 1867)

Peirce makes this relation between his more constrained definition of substance and attention more explicit in 1868, when he links the act of attention to what determines the *subject* of propositional knowledge (W2:180, 1868). While substance, now in the more constrained sense of an act of attention, remains a universal hypothesis, or conception, the new hypothesis of “being” is not “universal”, although it encompasses much of the meaning Peirce had originally attributed to substance in his early work on the derivation of the categories (W2:231, 1868).

> We do not obtain the conception of Being, in the sense implied in the copula, by observing that all the things which we can think of have something in common, for there is no such thing to be observed. We get it by reflecting upon signs—words or thoughts;—we observe that different predicates may be attached to the same subject, and that each makes some conception applicable to the subject; then we imagine that a subject has something true of it merely because a predicate (no matter what) is attached to it,—and that we call Being. The conception of being is, therefore, a conception about a sign—a thought, or word;—and since it is not applicable to every sign, it is not primarily universal, although it is so in its mediate application to things. Being, therefore, may be defined; it may be defined, for example, as that which is common to the objects included in any class, and to the objects not included in the same class.
>
> (W2:231, 1868)

Peirce thus breaks up his original “universal” hypothesis into the two conception “without content” of “substance” and “being”. The former being only applicable to the subject of propositional knowledge, the latter only to the predicates of propositional knowledge.

> Thus substance and being are the beginning and end of all conception. Substance is inapplicable to a predicate, and being is equally so to a subject.
>
> (W2:50, 1867)

Peirce makes this decision to split up his "universal" hypothesis of substance into the two more constrained conceptions "without content" of substance and being in 1866 (see W1:351), and maintains this distinction throughout his work on the universal categories and his learning mechanism.

Nevertheless, Peirce's three phenomenal categories (quality, relation, and representation) remain virtually unchanged, and I argue that Peirce's separation of substance and being into distinct hypotheses from the one "universal" hypothesis of something that *is* merely clarifies a distinction that was already apparent in the learning mechanism that Peirce attempts to describe in 1865. The hypothesis of "what is" now articulated as the conception "without content" of "being" still constitutes the "first law of understanding" which Peirce attributed to the "universal" hypothesis of something that *is* in 1865 (W1:331, 1865). Peirce argues that the first hypothesis of substance produces the first "category" in the learning mechanism. The second category produces the third, and the third category produces the fourth. The first and fifth categories (substance and being) differ from the other three categories because they lack "content" (see (W1:352) – by this I take Peirce to be arguing (as we will see) that they lack hypothetical marks or external essential relations. Consequently, I take Peirce's five universal categories as articulating to the specialized mental faculty of "Understanding" and its full, or "genuine" version of the mind's learning mechanism. Moreover, I argue that this same learning mechanism of the specialized mental faculty of Understanding is at work in two different degenerate forms in the mental faculties of Feeling and Sensation of Reaction (Sensibility)

Peirce describes the three aspects of the phenomenon in terms of their marks in 1865. The hypothesis of "what is" begins the learning mechanism. Quality, the first aspect of phenomenon in the chain of representations that is Peirce's learning mechanism, is what he calls a mark of the "first order". Next is the second aspect of the phenomenon– Relation, which is a mark of the "second order". Next is the third

aspect of the phenomenon– Representation, which is a mark of the "third order" and which Peirce refers to as the noumenal "accidents" of the phenomenon elsewhere.

> Next we find by induction that whatever is, is of some kind…Thus we attain the notion of Quality, which is the second Category and the First order of mark. What is, must have a *ground* for being. Next we find also by induction, that whatever kind anything is, it is in regard to something else…Thus we attain the notion of Relation, which is the third category and the second order of mark. What is, must not only have a ground for being, but an *object*….Next we find by induction that whatever is of a certain kind in comparison to another, is so for somebody…Thus we get the notion of Representation which is the third order of mark, and the fourth category. What is, must not only have a ground and an object, but also a subject.
>
> (W1:331, 1865)

Lastly, although not given a specific name, is what the third aspect of the phenomenon refers to as its subject – this is both the subject *of reference* of the third aspect of the phenomenon which is a representation, as well as the subject of *representation* for the entire learning mechanism which can also be conceived as one big representation with a ground, object, and subject of representation.

I argue that this articulation of Peirce's learning mechanism in terms of representations (i.e. as having a reference to a ground, an object (correlate), and a subject (interpretant); and in terms of five hypothetical conception with "marks", is all that is needed to derive his learning mechanism not only as it is articulated in 1867, but also as it appears in the 1900s. Moreover, I argue that both the version of the learning mechanism that he offers in the late 1860s, and the learning mechanism Peirce describes in the 1900s have as an integral part of them the idea of degeneracy. I thus offer my own derivation of Peirce's learning mechanism in terms of hypothetical marks. I begin by taking a closer look at what these marks of different "orders" are.

Peirce describes three "orders" of marks that constitute three different kinds of relations that a representation can have with another. These hypothetical marks – or the supposition of something

unseen accompanying something that is seen. The differences in marks are in part differences in how many other things are supposed in addition to that seen.

> To understand representation as mark, we must consider the different orders of marks. By a mark of the 1st, 2nd, 3rd order is meant one which indicates a state of things which essentially supposes one thing, two things, or three things.
>
> (W1:325, 1865)

For Peirce, a mark of the "first order", is a mark of identity between a representation and its own internal character, or ground (W1:333, 1865). It is for this reason, not an "external" mark, but an "internal" one– Peirce writes that "the only inward character of representation is the relation of anything to itself, – *identity*" (W1:324, 1865). This can best be understood in light of Peirce's view of the abstraction of meaning and how meaning is conveyed. The thing that *is* – i.e. a thing with a subjective quality to the mind– is already a representation of itself. Redness is already a function of the reflection of wavelengths. These wavelengths are already representational– involving patterned relations among parts. For this reason, color, no matter how it is represented to a mind, will always be a way of conveying these wavelengths, which is its own material character that makes it fit to represent anything. The perception of color by any visual system will then always be a representation *of* a representation. Even if there was no one to interpret[20] the reflection of certain wavelengths of light on a material, it would still be reflecting a particular wavelength or representational character – it would still have an "internal" relation to itself which any representation of it by any visual system would need to grasp in order to recast it in terms of a different representation.

Consequently, a representation that is a mark of the "first order" supposes a state of things that only involves one thing– its own "internal" representational character or ground. It can have no relations to any other representation and thus its internal character– what it is representatively– remains "wrapped up" in itself (W1:326, 1865). A mark of the first order is thus a relation of a thing (which for Peirce is always

[20] See a similar line of reasoning by Peirce in W1:326, 1865.

representative) with itself. It thus supposes only one thing– the representational character, or ground, or a representative thing.

A representation that is a mark of the second order is a relation that supposes a state of things involving "two things" – its own internal character, or ground; and something which limits the application of this character and offers contrast. Peirce calls this second thing or set of things an "object" (W1:325, 1865). Just as we draw a map by distinguishing where land ends and a body of water begins, and can in this way offer a *relational* articulation of a landscape; a representation that is a mark of the second order offers a relational articulation of a thing. It thus determines its subject purely relationally– in terms of relations of parts, or limitations, of its own internal character. Peirce calls such limitations the "mode" of a mark.

Peirce comes up with an elegant way of defining a mark of second order in a way that builds upon marks of the first order. He defines a mark of the second order as a mark that involves two marks of the first order that "mutually" involve or are "essential" to one another (W1:325, 1865). Such an essential mutual involvement occurs, as I see it, when the two marks of the first order come to determine the same subject. One of the marks of the first order refers to the internal character of the representation, which is being articulated in terms of its marks, and is thus a mark of identity. The other co-determining mark of the first order involved in the relation is what Peirce calls a "mode" of a mark (W1:331, 1865) and serves to distinguish among the different relations among parts involved in the internal character of the mark. In determining its subject, consequently, a mark that is of the second order determines it to "correlate" – or to match up in terms of its relations among parts – with a representational object which is also considered in terms of its relational parts.

> A mark of the second order determines the subject in two ways, viz.: 1st to relate to a certain object and 2nd to relate to it in a certain respect. Hence it consists of two marks of the first order which are essential to each other; viz.: 1st a mark which the subject has in common with the correlate and 2nd the distinction

> which the subject has from the correlate. For example, "on my right hand" consists 1st of being relatively to *me* and 2nd of being at the right hand.
>
> (W1:325, 1865)

Peirce in this passage gives as an example of a second order mark the direction "on my right hand". This is a second order mark because it involves a description of something by determining a subject to refer to a mark of identity (me considered in my internal characters which are not available to anyone else– I am what I am), and a mark of distinction or limitation placed on me articulated in terms of a mode of myself. This mode of myself is a part of myself when I am considered as a series of relations among parts. The mark of distinction here is: "right hand". Thus the direction "on my right hand" offers a relation description of what it is referring to with respect to me. As the subject, in order to understand what is being said, I have to re-articulate these relations in myself– position myself so as to identify the relational position of "right" vis-a-vis my current position, and identify the relation of hand to the rest of the body.

My interpretation here of Peirce's mark of the second order and relation is not the only way in which these concepts have been interpreted. Murphey, for example, takes very seriously the idea that the mode of the mark involved in a second order mark can only be a reference to something that *lacks* the character of the mark of identity and is a *negative* character (Murphey 1961: 78-9). He does so based on this following passage.

> What is, must not only have a ground for being, but an *object*. Is anything blue, there must be something which is not so, so that it is blue relatively to that.
>
> (W1:331, 1865)

However, if we keep reading, the next sentence in this passage disambiguates what Peirce means here.

> A mark of the second order, such as "patriotic" is one wherein this *object* is explicit. It consists of a mark of the first order, as *loving*, and of a mode of a mark, as having reference to country. And these are taken in

> synthesis. A mark of the second order applied to one substance, supposes another, which other shall have an other mark of the same order which supposes the first. But the two *grounds* may be identical and so may the two objects.
>
> (W1:331, 1865)

The example Peirce here of a second order mark is particularly interesting. Peirce refers to a relation which is the relation of being "patriotic". The internal character of patriotic, as he sees it, is that of being "loving" – but as an internal character, it cannot be grasped unless it determines another representation to relate to it in a certain way. The relational limitation on loving placed by the second first order mark involved in the relation is that of being loving relative to a country. As we can see, there is no reference here to a lack or absence of a character. Instead, the second first order mark involved in the second order mark is a *modification* of the first mark or identity in a certain *relational* respect. In this way, the example of a relational articulation of the predicate "blue" or blueness in terms of a relation between what is blue and what is not blue (think for example of a color wheel), is only a special case of the kind of relational description of a predicate that Peirce is talking about.

This modification can be one, as in the example– "on my right hand", where we place a limitation on the mark of identity based on that same internal character that is expressed as a set of relations. That is, the internal character of "my" or myself is considered in terms of relational body parts, and so is the mark of distinction– the relation being on the "right hand" of me. Both the mark of identity ("my"), and the mark of distinction ("right hand"), are defined with respect to me, considered as an expression of related body parts. Both the mark of identity and the mark of distinction can thus be said to have the same ground, or common character. However, the modification added by the mark of distinction can also be articulated with respect to a different ground. This is the case with "loving…with reference to country". The ground, or character, of the mark of identity– "loving", differs from the ground of the mark of relational distinction– "with reference to country".

I offer my own illustration that captures these essential features of Peirce's second order mark below. It represents the mark of identity as a solid line connecting two representations– *A*, the correlate or object expressing the relations among parts that immediately represent *A*; and *C*, the subject which is determined to correspond to *A* in its relation among parts. It represents the mark of distinction as a dashed line.

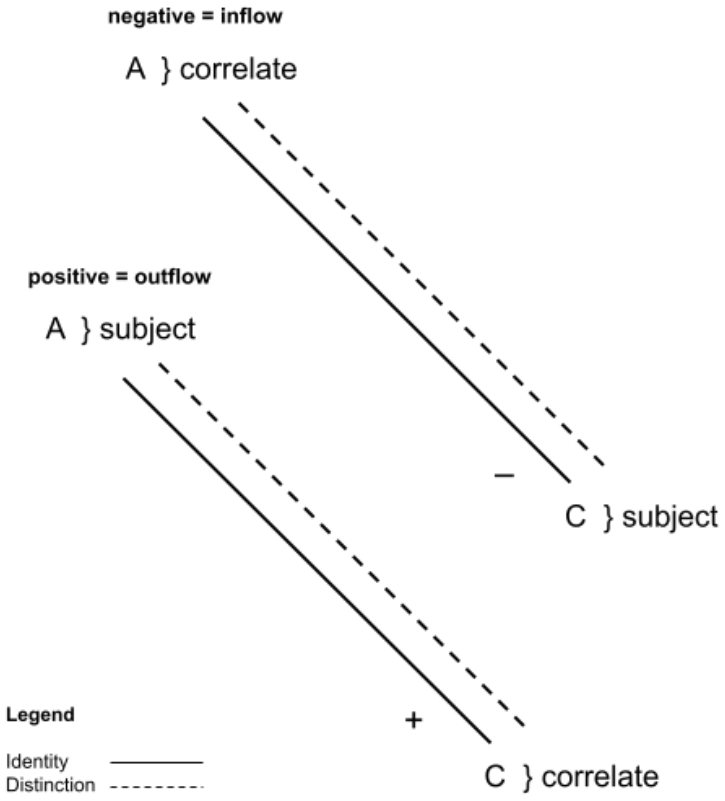


Figure 5. Author illustration of Peirce's mark of the third order.

Lastly, Peirce highlights that the relation between correlate and subject can be articulated from the point of view of the correlate or of the subject. This is because in the relation we are not dealing with just one mark of the second order but *two* such marks involved in a reciprocal relation. Peirce writes that a mark of the second order "supposes another" mark of the same order (W1:331, 1865). For example, the instruction, "on my right hand" is articulated with respect to me, the correlate – i.e. the body expressing in the relations of body part to other body parts the unexplained predicate that is *me*. I am here not

considered in terms of a higher level theory, such as vertebrate, mammal, or human. Instead, I am simply the relation among my parts which is immediately available to any onlooker. However, this same instruction can be articulated with respect to the subject interpreting the instruction. From that subject's perspective, the instructions are indicating that they should look to their *left* side – with the stipulation that the subject should also look upon themselves in terms of related parts.

The two reciprocal grounds of the two mutually involved second order marks that make up a mark of the second order seem to correspond to what Peirce describes as "contrary" grounds (W1:354, 1866). A relation articulated from the point of view of the correlate – i.e. the thing expressing an internal character as a relation among its parts, is termed by Peirce to be "positive". While the same relation articulated from the point of view of the subject is termed "negative" or "suffering" (W1:331, 1865). I mark a relation viewed from the point-of-view of the correlate with a plus sign in my illustration. I mark a relation viewed from the point-of-view of the subject with a minus sign. This illustrates Peirce's stipulation that there are two kinds of marks of the second order– a second order mark articulated positively, in which case the ground of the mark lies with the correlate; and a second order mark articulated negatively, in which case the ground of the mark lies with the subject (W1:334, 1865).

As we will see, relations, or second order marks, play an important role in Peirce's learning mechanism– along with the two other kinds of hypothetical marks, or external essential relations. Second order marks give rise, I argue, to what Peirce calls a "relative quality" (W1:354, 1865) – something that has being or "is" *relatively* to something else which is taken as a relation among parts. Moreover, in light of my interpretation of marks of second order, these marks align with Peirce's later work in the 1890s on his "logic of relatives". Peirce's "logic of relatives" capitalizes on the idea of relational marks of distinction to describe "relatives" – predicates articulated in terms of their "logical subjects"; where these logical subjects are relational descriptions of a meaning, and correspond to Peirce's mark of distinction from 1865 (Peirce 1897: 168).

Lastly, I cover Peirce's third order hypothetical mark before moving on to how these different orders of mark, as they apply to Peirce's universal conceptions "with content" –phenomenal quality, phenomenal matter, and phenomenal accidents– give rise to a learning mechanism that in its genuine and degenerate forms articulates all three specialized learning mechanisms associated with Peirce's three specialized cognitive faculties.

A representation that is a third order mark supposes a state of things that involves three things, or three representations. In keeping with how he defined marks of the second order – which are defined in terms of first order marks; Peirce defines marks of the third order in terms of second order marks. A third order mark is a mark that involves marks of the second order which are essential to one another. Taking a similar interpretation of "essential" relation, I take this to mean that these three second order marks are co-determining a single subject.

> A mark of the third order, implies two things beside the subject; it therefore 1st determines the subject to stand in a certain relation to the first thing, 2nd to stand in a certain relation to the second thing, 3rd to stand in such relations to the two that these relation shall involve each other, for otherwise we would should have merely two marks of the second order and not any of a different order.
>
> (W1:325, 1865)

Peirce, however, only explicitly describes *two* marks of the second order. He does so consistently, listing out the first order marks of identity and distinction that comprise this third order mark later on in this passage. Yet, he describes a relation among *three* things. How can three things be interrelated by only two marks?

> Accordingly the mark of the third order consists of
>
> 1 Being relatively to A

2 Being of a kind *a*

3 Being relatively to B

4. Being of a kind *b*.

(W1:325, 1865)

Peirce also repeats this odd association of three things by two marks in another draft of his derivation of the universal categories (W1:332, 1865).

> A mark of the third order…is one wherein this *subject* is explicit. It supposes a mark of the second order….and also a mode of that mark…. And these are taken in synthesis. A mark of the third order applied to one substance supposes two others, each of which shall have a mark of the same order which supposes the other two, but with perhaps different grounds.
>
> (W1:332, 1865)

In this later draft, Peirce stipulates further that the two second order marks involved in a third order mark act in a way analogous to the marks of identity and distinction in a second order mark. However, he still maintains that there are only two marks– both, ostensibly of the second order; yet at the same time he maintains that there are three things implied, each associated with a second order mark of their own. So where does this third second order mark come from? I argue that the solution to this apparent puzzle is the idea of imputation or of an "imputed" mark, which Peirce mentions in 1866 (W1:475, 1866) and describes in a later draft in 1865.

> The mark of the third order is the mark of *representation*. Representation takes place between three things one of which is related to the other two, one of which is therefore related mediately to the other.
>
> (W1:334, 1865)

Peirce is thus arguing that the third second order mark is one that is *inferred*. I offer an illustration of this kind of mark in Figure 5 that makes the imputed nature of the third second order mark explicit. In my

illustration, representation *C* is the representation that is “related to the other two” (representations *A* and *B*) through two second order marks. Relating *A* and *B* is an *imputed* mark that arises from the fact that *C* is something that *is* relatively to *both* A and B through some kind of transitive property.

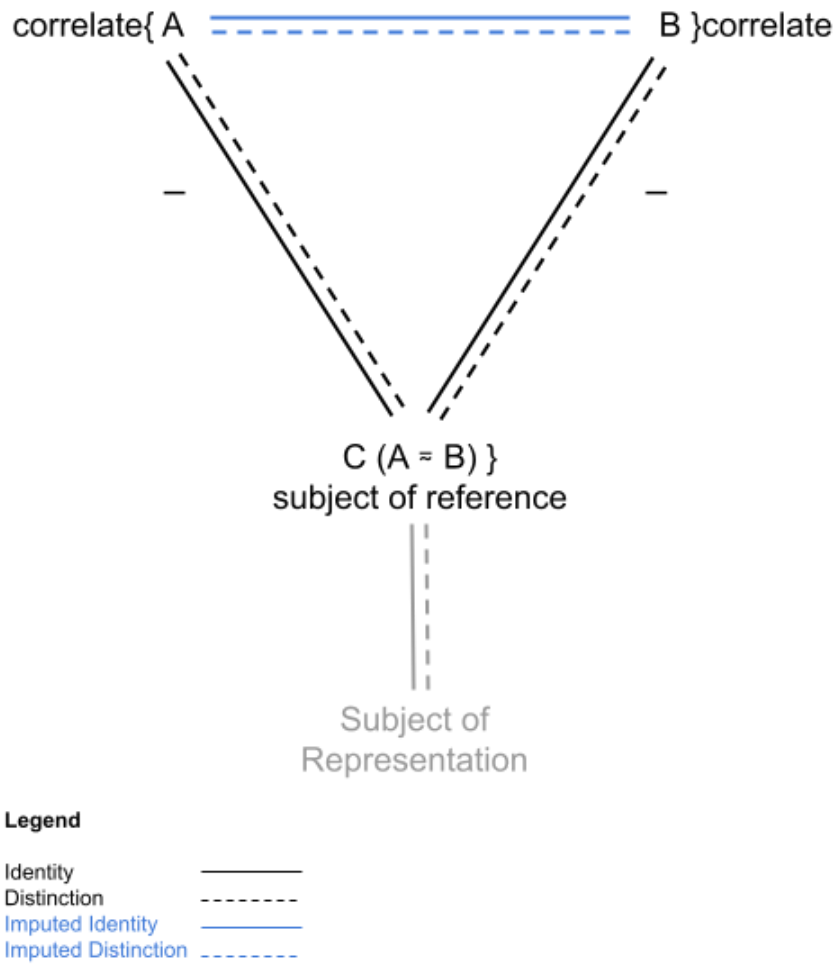


Figure 6. Author illustration of Peirce’s mark of the third order.

Moreover, Peirce makes clear the relationship which this imputed mark establishes between *A* and *B* is made possible because the codetermination of representation of *C* through its relations to *A* and to *B* are “taken into synthesis” (W1:332, 1865). I discuss next more precisely what this means, as I take Peirce to be referring to a particular aspect of his learning mechanism by the term “synthesis”. However for now, it

is enough to think of synthesis in terms of the role it plays in simplifying the manifold of substance, resulting in a unitary conceptual representation. Just as in a mark of the second order, the reliance of relation on the immediate impression of an experience on the senses as parts (or matter) and the coordination of those parts (or form) is made "explicit" (W1:331, 1865). In a mark of the third order, the reliance of representation on a subsequent representation in which the imputed relation implied by *C* can be assessed and separately represented is also made explicit. This leads in the association with a third order mark with an explicit subject of representation.

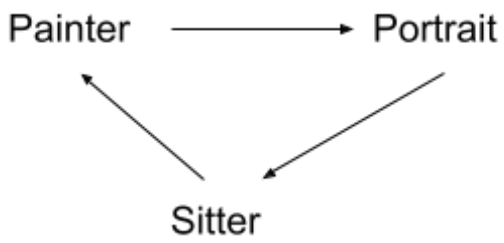
> Next we find by induction that whatever is of a certain kind in comparison to another, is so for somebody; hence we say that comparison supposes that someone makes a comparison…What is, must not only have a ground and an object, but also a subject….A mark of the third order…is one wherein this *subject* is explicit.
>
> (W1:331-2, 1865)

In light of the imputed nature of the double mark between *A* and *B*, the triadic relation between A, B, and C, which includes the "ideal" relation (W1:476, 1866) implied by *C*. However, this ideal relation is only realized in a subsequent representation – the *subject* of representation determined by the representation *C*, which mediates the ideal or imputed relation between *A* and *C* to a subsequent representation. In my illustration, I represent this subsequent representation as the subject *of representation*, and represent the relation between the subject *of representation* and the mediating representation *C* as a mark of the second order. The mark of second order connecting *C* to the subject *of representation* belongs not to *C*, but to the subsequent representation which refers to it as its object.

As with a second order mark, which has two versions– the positive and the negative– depending on where the ground of the representation inheres; Peirce argues that there are three kinds of third order marks. Peirce argues that the ground of a representation which is a third order mark can inhere in *C*, *A* or *B*.

> The ground of the representation, then, may inhere in the mediating thing or in one of the extreme things. In the former case there can be no distinction between the extremes. In the latter case, one extreme contains the ground and the other does not. Hence there will be three kinds of marks of the third order
>
> 1st those whose ground inhere in the subject
>
> 2nd those whose ground goes with the mark itself
>
> 3rd those whose ground inheres in the object.
>
> (W1:334, 1865)

These three varieties of a representation map onto Peirce's unfinished analogy regarding the determination of a portrait that I completed in an earlier section. I reproduce Peirce's unfinished attempt below.



Portrait represents sitter to Beholder

Sitter represents beholder to Portrait

Beholder represents Portrait to Sitter

(reproduced from W1:332, 1865)

Peirce's unfinished illustration of a third order mark makes clear that the same exercise I undertook accounting for the different marks of determination of the Portrait can be done for the Painter or the Sitter, depending on which of these three representative things is playing a representational role and mediating between two other things. However, while Peirce's unfinished illustrative example from 1865 bears much

in common with my reconstruction, it does not make explicit that one of the three relations is imputed. Nor does it faithfully capture the nature of the second order marks that constitute two sides of the triad. Nor, finally, does it make explicit that the imputed, or "ideal", relation is one that needs to be implemented in a subsequent representation which refers to the triad and is the "comparer" implied by the triadic relation (W1:354, 1866).

Let's take again, as we did in the earlier section of this chapter, the case in which the mark of third order belongs to the Portrait. Moreover, let us assume (since Peirce's incomplete example also leaves this unspecified) that the ground of representation lies in the object *of reference*, and that there is a potential truth relation between the portrait and its object. In this case, the Portrait becomes the representative thing which mediates between the Painter and the Sitter. In this situation, the Portrait is representing one of the other two representations *to* the remaining representation. Peirce chooses the Sitter to be the thing being represented *to* the other representative thing. The Sitter is thus the object *of reference*. The Painter is the subject *of reference*. I argue that while Peirce here conflates Painter and Beholder – labeling his diagram with "Painter" but referencing a "beholder" as the subject of a representation centered on the Portrait– this subject *of reference* differs from the subject *of representation*. The Painter, as they are involved in the triadic relation, are distinct from the Beholder which assesses the entire triad– including the Painter's role in the triadic relation, The subject *of representation* is the subsequent representation in which the imputed or ideal relation between the Painter and the Portrait is implemented. The Sitter thus has a real second order relation to the Portrait as its object *of reference*. Similarly, the Painter has a real second order relation to the Portrait as its subject *of reference*. However, the relation between the Sitter and the Painter is not real but ideal, or imputed.

To see the relation between the Sitter and the Painter requires a further act of inference by a subsequent representation– a comparer– who sees that in light of their individual relations to the Portrait, the Sitter has a relation to the Painter. For example, that both of them were probably in the same room together at the same time. Or, more in keeping with Peirce's view of second order marks, that the Painter, considered as a relation of parts – let's say the relation among brush strokes– is a relation of parts that is modified by

its reference to the sitter. It is this imputed relation that is of interested in a representative thing– i.e. in the Portrait acting as the mediating representation. It is an imputed relation that is realized in a subject *of representation* fully aware of the triadic relation (or third order mark) among Painter, Portrait, and Sitter. That is why such a subject, for example, goes to the museum to see a painting *of* this well known person *by* this well known painter. Not because of an interest in either the landscape of the painter alone, but seeking out the interpretation of that well known Figure by that particular painter– i.e., seeking out the relation between the painter and the sitter *implied by* or *imputed from* the portrait. This person going to the museum for this reason is Peirce's subject *of representation*. They differ from the subject *of reference* because they also have the subject *of reference* in view in their assessment. The painter, to the extent that they hold themselves in view, can also become the beholder of the triadic relation and a subject *of representation*. But such an act requires the reflexivity afforded in a subsequent representation of themselves as a painter and as being part of the triadic relation.

Peirce's work on the third order mark begins to make clear the distinction between three different kind sof relational ground, object *of reference*, object *of representation*, subject *of reference* and subject *of representation*. I make this distinction the focus of the next section because it arises from a view of Peirce's learning mechanism that sees it involving not one but *two* nested representational acts. It is from this perspective, gained from taking a detailed look at Peirce's work on hypothetical marks or essential external relations, that I go on to derive his representational learning mechanism or logic. Moreover, I show that viewed in this way, Peirce's representational learning mechanism naturally gives rise to two important aspects of Peirce's work. First, it naturally gives rise to Peirce's mature work on his learning mechanism which involves three kinds of inferences – Abduction, Deduction, and Induction. And secondly, it makes sense of Peirce's articulation of different *kinds* of Abductive, Deductive, and Inductive inferences by making explicit the role of degeneracy in Peirce's learning mechanism and specialized theory of cognition.

The representational view of Peirce's learning mechanism and the role of degeneracy

We are now at a point where we can talk in specific terms about Peirce's representational learning mechanism – his "logic" of 1865. I argue that this learning mechanism has three versions which are the specialized computations associated with Peirce's three specialized cognitive faculties – Feeling, Sensation of Reaction, and Understanding. One version of Peirce's representational learning mechanism is genuine, and associated with the specialized cognitive faculty of the Understanding, while the other two are degenerate and are associated with Feeling and Sensation of Reaction.

I argue that in 1865, 1866 and 1867, in his work on the derivation of his five universal conceptions or categories, Peirce is describing a representational view of his the full, genuine, version of his learning mechanism. We see him state in 1865 that the universal category of something that *is*, is the first "law of understanding" (W1:331, 1865). By this, I take him to mean that the universal categories from being – or the conception of "what is", to substance – or the conception of "it" or something that is immediately present to the mind as an impression of matter (parts) and form (coordination among parts), are all categories involved in the inferential process of the *faculty* of Understanding. I argue that Peirce, in his ordering of the five universal categories, and in related description of different kinds of representations in terms of hypothetical marks, and of the determination of the process of representation itself in terms of its ground and marks of determination, is describing in great detail his learning mechanism.

In this section, I put all these parts together and show that Peirce's learning mechanism, including its two degenerate forms, does indeed fall out of putting these various aspects from 1865 in one coherent picture. I do not introduce any new terms in this exercise, but instead simply implement the definitions that I derived in the earlier sections of this chapter and put them together in the order that Peirce describes.

I begin with Peirce's idea that logic itself, his learning mechanism, is a representation. For this reason, it has a ground *of representation*, an object *of representation*, and a subject *of representation*. Moreover, I capitalize on Peirce's description of the marks of determination of a representations' highest or proximate difference which is the ground. As we saw in an earlier section, Peirce argues that the ground *of representation* is the ground of all the references involved in that representation, and is a *relation* between

the ground and the object *of representation*, between the ground and the *subject* of representation, and the ground and *both* the object and subject *of representation*. In this last case, the ground is really agreeing with its own immediate character to the mind. Peirce is explicit that logic is a representation that classifies other representations to the extent that they have *truth* – that is, to the extent that their ground is a relation or a common character between the ground *of representation* and the object *of representation*.

I thus begin by taking the genuine form of Peirce's learning mechanism, which is based on a ground *of representation* that has a common character with its object. I represent this relational aspect of the ground of the genuine version of Peirce's learning mechanism as a second order mark between the ground *of representation* and the object *of representation*. Then, following Peirce's ordering of the three intermediary categories, I have a representation (*B*) as Peirce's second category – the category of quality or phenomenal form. The category of quality is a first order mark with only a mark of identity to distinguish it. In my representation of Peirce's learning mechanism, this is represented by a single line connecting *B* (quality) to the ground of *representation*. Next, according to Peirce's ordering of the categories, is the category of relation or phenomenal matter. Peirce makes clear that this second category, or second representation involved in the learning mechanism, refers to the object *of representation*. This is reflected in my rendering of Peirce's representational learning mechanism.

Next, according to Peirce's ordering of the categories, is the category of phenomenal accidents. This is a mark of the third order involved in a triadic relation where the third mark is imputed – or perceived as accidental. In my rendering of Peirce's representational learning mechanism, phenomenal accidents or the category of representation (*C*) are represented by two second order marks linking to *B* (phenomenal form or the category of quality) and *A* (phenomenal matter or the category of representation). A third imputed, and thus accidental, mark between *B* and *A* is established.

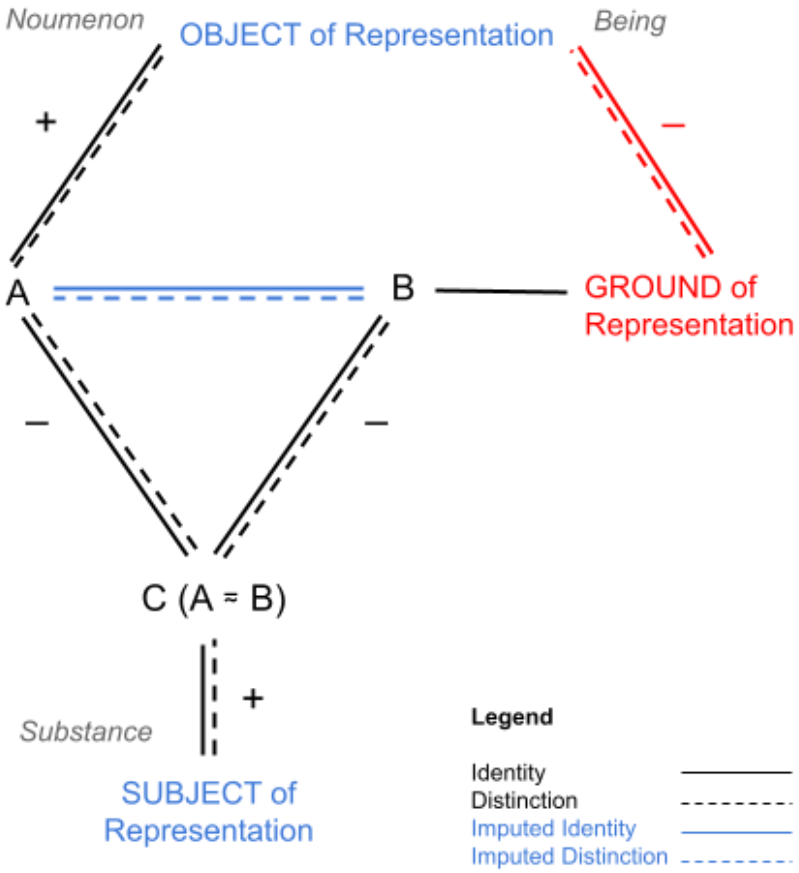


Figure 7: Author illustration of a Peircean concept learning mechanism constructed from first, second, and third order hypothetical marks. This is the full or “genuine” version of the learning mechanism involving all three members of the internal triad (A or quality, B or representation, and C or representation).

Lastly, the subject *of representation* implied by the imputed mark between *B* (phenomenal form or the category of quality) and *A* (phenomenal matter or the category of relation) is included as in-view through a second order mark between the subject *of representation* and *C* (phenomenal form or the category of representation. Figure 7, then, gives us a representational view of Peirce’s learning mechanism based on a completion of his many drafted attempts at deriving the five universal categories or conceptions; which I argue describe a representational view of his learning mechanism as associated with the specialized mental faculty of the Understanding. We see that it forms a connected system.

Figure 7 also includes positive and negative signs for each mark which indicate the flow of information in the learning mechanism. A positive second order mark, as we saw, is associated with a second order mark whose ground lies in the representative thing to which the mark belongs. In this case, the representative thing to which the mark belongs is the correlate of the relation. It becomes the object *of reference* and is expressed as a set of logical relations among parts or "correlatives" (see Peirce 1897) that await actualization in a subject *of reference* that it determines. A negative second order mark is associated with a second order mark whose ground lies in the representative thing to which the mark does *not* belong. In this case, the representative thing to which the mark belongs instead of determining the relation, becomes the thing being determined by it – i.e. the subject *of reference*. I do not consider the imputed mark to be either positive or negative because it does not lie directly with *C* to which the mark belongs but with *A* and *B*, which are effectively two subjects *of reference*. For this reason, information can flow in *either* direction between *A* and *B*. A useful feature for a part of Peirce's learning mechanism which, we will see, involves an interactive process with information propagated forward and back iteratively.

In my rendering of Peirce's learning mechanism, the positive second order marks effectively represent *outflow* of information – a relation through which the representative thing to which the mark belongs determines a second representative thing. On the other hand, the negative second order marks represent *inflow* – a relation through which the representative thing to which the mark belongs is *being determined* by a second representative thing. I have thus derived, through a careful reconstruction and completion of Peirce's drafted efforts of articulating the universal categories of conceptions from 1865 to 1867, what can be characterized as a learning mechanism that takes in makes guesses about the object *of representation*, elaborates those guesses, and outputs the subject *of representation*.

Moreover, note that there is, as part of this system, an additional input-output loop going from the object *of representation* to the ground *of representation* to *A* (phenomenal matter or the category of relation) which outputs back to the object *of representation*. In other words, the object *of representation* is taken into the system through its common character with the ground *of representation*, incorporated as a quality through the mark of identity between the ground *of representation* and *B* (phenomenal form or the

category of quality). This common character between the object *of representation* and the ground *of representation* is propagated from *B* to *A*, which outputs a correlative expression of the object *of representation* back onto itself. In the next section, I discuss more specifically what the purpose of this inner loop involving the object *of representation* means for Peirce's learning mechanism. For now, I propose that it is depicting the hypothetical behavior Peirce associates with the hypothesis of the *noumenon*.

The role of the hypothesis of the *noumenon* is a puzzling one at first glance in Peirce's system. A fundamental aspect of his challenge of Kant's theory of cognition in the early 1860s, it seems to virtually disappear halfway through Peirce's drafted attempts to derive his five universal categories of conceptions of the Understanding. Moreover, while I argue that Peirce's initial "universal" hypothesis of substance – of something that *is* a kind of substance– in his earlier drafted attempts is broken up into the two more modest hypotheses of being (of "what is" or pure form (W1:172, 1865) and substance (of "it" or matter). However, Peirce distinguishes even in his early drafts of the derivations the hypothesis of the noumenon (the hypothesis of something unseen matching something seen), and the universal hypothesis of substance. This suggests that the two hypotheses play a different role in Peirce's system, and that Peirce's modification of his universal hypothesis of substance should have left the hypothesis of the noumenon intact. If that is the case, why does the term virtually disappear from Peirce's system? My rendering of Peirce's representational learning mechanism may give us a clue.

We can see from my rendering of the learning mechanism that the output from *A* that the input-output loop involving the object *of representation* acts as a separate input for the second half of Peirce's learning mechanism. In other words, the input-output loop involving the object *of representation* reprocesses the common character of the object *of representation* that acts as its inputs and outputs a hypothetical re-articulation of it in terms of correlatives– i.e. in terms of a tentative *relational* hypothesis about the nature of the input. I argue that this special relational hypothesis about the object *of representation* from its common character with the ground *of representation* is the noumenal hypothesis. In this part of his

learning mechanism, Peirce is thus using the hypothesis of the noumenon in a way that he ascribes to Kant.

> And it is to overcome the various difficulties to which this gives rise, that he supposes this *noumenon*, which, being totally unknown, the imagination can play about as it pleases, to be the emanation of archetypal ideas. The reality thus receives an intelligible nature again, and the peculiar inconveniences of nominalism are to some degree avoided.
>
> (EP1:100, 1877)

Peirce sees the noumenon to be a hypothesis used for "play" in the imagination. The hypothesis of the noumenon – of the object *of representation* being something "totally unknown" allows "the imagination" to "play about as it pleases". This play takes the "reality" of the object *of representation* as a character – which we saw consists of feeling or an instantaneous state of the nervous system– and makes it "intelligible", allowing for the "emanation of archetypal ideas". In other words, this inner loop of Peirce's learning mechanism involving the object *of representation* represents some kind of play that considers the object *of representation* not as a real instantaneous state of the nervous system, but in terms of "archetypal ideas". By the term "archetypal", I take Peirce to be referring to the meaning of this term as involving the idea of modeling or of patterns. In other words, I take this inner loop to refer to the modeling of the character of the object *of representation* in terms of patterns of relations among parts in the imagination. We thus get two connected views of the object *of representation* at the end of this process– first, a view of it from the point of view of a common character with the ground *of representation*, which is a feeling or instantaneous state of the nervous system. And, secondly, a view of it from the point of view of the imagination and coordination among parts. As we saw in chapter 2, the imagination, for Peirce, involves not the faculty of Feeling or of *representations as representations*. Instead the imagination involves the faculty of Sensation of Reaction (Sensibility) and *transitions* among feelings – that is as *representation as instances* (W1:324, 1865).

Consequently, I maintain that Peirce incorporates his view of the hypothesis of the noumenon in his learning mechanism to the extent that this mechanism includes this feature of play in the imagination to arrive at a relational view of the object *of representation*. As we will see, this feature remains very much in place in Peirce's learning mechanism and becomes a fundamental part of how Peirce thinks about inference. With this in view, I argue that Peirce's representational learning mechanism takes as input the object *of representation* as a common character (or as feeling– an instantaneous state of the nervous system) with the ground *of representation*. This common character is then taken into the cognitive learning mechanism as a quality, which is then given a relational articulation through a process involving iteration, hypothesizing, and play in the imagination. Upon reaching a steady-state, a relational articulation of the object *of representation*, considered as a feeling or instantaneous state of the nervous system, is taken in as input – or into "synthesis" (W1:331:1865)– which seems to involve re-presentation of the two equivalent views of the object *of representation* as the input of a subject *of reference* that views them as being one and the same thing. This synthesized representation of the two views of the object *of representation* is then outputted as a final representation which is the subject *of representation*.

I argue that in this rendering of Peirce's learning mechanism, the two categories or conceptions "without content" of "being" and "substance" are also represented. With the conception or category of "being" mapping onto the node at which the ground of *representation* makes reference to the object *of representation* – constituting the start of the learning mechanism. And with the conception or category of "substance" mapping onto the subject *of representation*. This sustains Peirce's claim later in his intellectual life that substance and subject are equivalent.

> At any rate, whenever we speak of a predicate, we are representing a thought as a thing, as a *substantia*, since the concepts of *substance* and *subject* are one, its concomitants only being different in the two cases.
>
> (EP2:394, 1906)

My rendition of Peirce's learning mechanism makes it clear why Peirce would consider the hypotheses of substance and being to be categories or conceptions without content, as they not only do not have marks

that would distinguish them as kinds of representative things, but they are not discrete representative things at all. They describe, rather, important, but otherwise undistinguished, moments in Peirce's learning mechanism. The hypotheses of the being, noumenon, and substance thus complete the labeling of my rendition of Peirce's representational learning mechanism as it relates to the specialized cognitive faculty of the Understanding.

I argue that Peirce's learning mechanism– involving five universal categories of conceptions plus the ground, object, and subject *of representation* that befit a view of his learning mechanism as one being representation– is the full or genuine version of this learning mechanism. However, it is not the only version possible. There are two degenerate versions of Peirce's learning mechanism that fall out smoothly from Peirce's stipulation that there are three kinds of grounds *of representation*. These differences in ground, as we see, are "highest" or "proximate" differences that necessarily determine the kind of representation we are dealing with. In the case of Peirce's learning mechanism viewed as one big representation– the differences in the ground *of representation* necessarily determine differences in the kinds of representational outputs– i.e. differences in what the subject *of representation* is determined to represent.

The first order of degeneracy is one in which the ground *of representation* is a common character not with the object *of representation*, but with the subject *of representation*. As we saw in the portrait analogy, this is the equivalent of an expressionist portrait, in which the portrait is less about the object than it is about the subject. Peirce argues that this kind of representation cannot be said to be "unsusceptible of truth" because, for Peirce, truth is a relation between a representation and its object.

> In the first place, then, if the ground determines the subject in itself but only in the subject. No quality of the object will be implied by the representation, therefore, since that would be a ground of agreement in the object. The representation will therefore be unsusceptible to truth.
>
> (W1:334, 1865)

Peirce argues that this kind of representation is an “index” (W1:334, 1865) or “sign” which are marked by their conventionality. Peirce stresses that unlike symbols – the representational outputs of the genuine form of his learning mechanism which are also the representations of the mental faculty of Understanding– signs derive their meaning not from a character of the object, but from a character of the subject. In the case of multiple subjects, this kind of representation derives its meaning from a common character among the subjects which can only arise as the result of convention. For this reason, Peirce sees signs as being inherently “conventional” (W1:468, 1866). They result from an agreement between two subjects, or two minds, “to have a certain sign denote certain things” (W1:328, 1865).

I set out to derive this kind of behavior in the learning mechanism that Peirce describes by specifying the highest or proximate distinction – a ground *of representation* which is a character of the subject *of representation*. I represent this kind of ground in my rendering of Peirce’s learning mechanism with a second order mark that refers to the subject *of representation*. This raises a question. If the character that the ground has in common with the object *of representation* is a feeling – an instantaneous state of the nervous system– what is the character that the ground has in common with the subject *or representation*? If the degenerate version of Peirce’s learning mechanism relates to one of the specialized inferences associated with the mental faculties, this could give us a clue about the specialized input involved, and about how such an input would need to be processed. In describing signs, the representational outputs of a version of his learning mechanism with a ground that is a character of the subject, as “conventional”, Peirce associates these kinds of representations with the specialized cognitive faculty of Sensation of Reaction (Sensibility). I give an example of this association in the passage below, and highlight sections that give us a clue about the behavior of the inference we are dealing with here.

In addition to “sign”, “conventional sign”, and “index”, Peirce also refers to this kind of representation as a “disjunctive term”.

> Now a disjunctive term–such as neat swine sheep and deer, or man, horse, kangaroo, and whale—is not a true symbol….Now those who are not accustomed to the homologies of the conceptions of men and words, will think it very fanciful if I say that this concurrence of four terms to determine the sphere of a disjunctive term resembles the arbitrary convention by which men agree that a certain sign shall stand for a certain thing. And yet how is such a convention made? The men all look upon or think of the thing and each gets a certain conception and then they agree that whatever calls up or becomes an object of that conception in either of them shall be denoted by the sign. In the one case, then, we have several different words and the disjunctive term denotes whatever is the object of either of them. In the other case, we have several different conceptions —the conceptions of different men—and the conventional sign stands for whatever is an object of either of them. It is plain the two cases are essentially the same, and that a disjunctive term is to be regarded as a conventional sign or index. And we find both agree in having a determinate extension but an inadequate comprehension.
>
> (W1:469, 1866)

Peirce is clear here that he considers the "conventional sign" or "index" to be a representation with "sphere" but no meaning– i.e. with "a determinate extension but an inadequate comprehension". This is precisely Peirce's definition of the representational output of the cognitive faculty of Sensation of Reaction (Sensibility). This means that we can import much of what we deduced about this faculty in chapter 2 in our discussion of a degenerate synthesis where the ground *of representation* is a character of the subject. The input of this version of a learning mechanism must then be not a feeling taken as an instantaneous state of the nervous system that comes to represent a sensation or a conception, but a feeling that accompanies a *transition* between feelings. Peirce articulates this as the distinction between viewing a feeling as a representation of qualitative attributes to the mind, versus viewing a feeling as *an instance* (W1:324, 1865) – i.e. of a feeling taken quantitatively as meaning simply *this* particular inflection or transition between instantaneous states of the nervous system.

I interpret Peirce as arguing here that a feeling taken as an instance, as representing nothing other than a transition between feelings is a representation with "determinate" extension but "inadequate

comprehension". Such a representation arises from convention – from the "agreement" that a particular extension, a "this" or a specific transition between two feeling states, will come to be distinguished. How it comes to be distinguished in the minds of various individuals is irrelevant and "arbitrary". Different individuals will ascribe different comprehensions, or meanings, to the "this".

An example of this is that of a child learning a musical scale. In order to remember the differences between the notes, they may associate a pneumonic with it, such as "Every Good Boy Deserves Fudge". This is, of course, not the meaning of the notes. Each note is a distinct pitch, and the different pitches in a scale have a particular relation to one another. But an early learner, who is simply trying to learn the *sequence* of notes, which to them seem arbitrary and to have no meaning, may come up with various idiosyncratic ways of representing the scale to themselves. All that matters for this kind of sign is that individuals behave in the same way when they identify it. In this case, the notes on the scale may call up "Fudge" or "Fine", or the mental image of Aunt Fannie. It is irrelevant, all that matters is that when the early learning sees the note on a particular spacing on the scale, they associate it appropriately with a note called "F" which is the note that goes on the fifth line space on the scale.

This kind of representation is important for Peirce, because, as we can see from my rendition of Peirce's learning mechanism – and as we will see in more detail in the inferential view of Peirce's learning mechanism – it is in this way that we learn to make references to extensions or subjects of propositions. However, in the degenerate form of Peirce's learning mechanism, the extension is all the meaning of a representation is. All that a representation is, is that an arbitrary mental mapping leads us to systematically pick out *this* instance among other instances, as the object of *representation*. Such an arbitrary mapping could be the intersection of "neat swine sheep and deer, or man, horse, kangaroo, and whale", or the stipulation that we are referring to "this thing which is in between that thing and this other thing". It is a marking of "this", "this", and "this" in attention, wholly unconcerned with what the meanings of these "this" objects are, other than that they be consistent with a subject's pre-established conventional organizing principle.

How is such a pre-established conventional organizing principle attained in the first place? In the example of a child learning a scale, the scale is given ahead of time at the beginning of the lesson. However, we are not given a sheet ahead of time in life delineating how we are to pick out discrete extensions. Are we? Peirce in fact makes a similar argument, as we saw, in his discussions on the representations of the Sensation of Reaction being necessary, universal, and *learned* from an environment in which they are ubiquitous. As we have already seen in chapter 2, a pre-established organizing principle is learned by a subject by being a pattern of attentional transitions that is ubiquitous in that subject's environment. Peirce argues that this kind of learning gives rise to the *a priori* representation of space and time as fields. I make the case that the pre-established conventional organizing principle that determines the object in this kind of representation is only common to subjects by being ubiquitous in their environment. It is a *field*, like that of space and time, in light of which objects are determined by a character of the subject of representation that views them as already organized according to an underlying principle that compels us, universally and necessarily, to put things–or objects *of representation*– together in consciousness according to a particular *a priori* logic.

Peirce calls this kind of compulsion for the mind to put objects *of representation* together in consciousness according to a particular logic "association by contiguity" (EP1:261, 1887-8). He argues that it is one of three ways in which the mind establishes relations among feelings in the mind and gives rise to representations that come to represent something definite to the mind. A second kind of association – "association by causality" (EP1:50/EP1:261)– we have seen already as it refers to the process by which the mind comes to attribute a meaning to an object according to a *reason* that is a character of the object itself. This is the kind of meaning attributed to a representation by a ground that is a character of the object. In association by contiguity, Peirce argues that there is an "external compulsion upon us to think things together" (EP1:261, 1887-8). This compulsion is "external", I argue, because it is *learned* from our environment. In this way it differs from an "internal" compulsion as Peirce argues is the case with the inherited associations of feelings found in the mental faculty of Feeling. Peirce goes on to give the representations of space and time as special cases of this kind of representation. I argue in chapter 4,however, that it is not only the continuous fields of space and time that have this compulsive

associative effect on our cognition; and that Peirce's specialized view of cognition leaves open the possibility of other learned *a priori* necessary and universal representations that constitute the *a priori* representations of the subject *of representation*.

Peirce is explicit that association by contiguity is a "degenerate" version of his full learning mechanism, which he also calls "synthetical consciousness".

> Synthetical consciousness degenerate in the first degree, corresponding to accidental thirdness, is where there is an external compulsion upon us to think things together. Association by contiguity is an instance of this; but a still better instance is that in our first apprehension of our experiences, we cannot choose how we will arrange our ideas in reference to time and space, but are compelled to think certain things as nearer together than others. It would be putting the cart before the horse to say that we are compelled to think certain things together because they are together in time and space; the true way of stating it is that there is an exterior compulsion upon us to put them together in our construction of time and space, in our perspective.
>
> (EP1:261, 1888)

In my rendering of Peirce's representational learning mechanism, we can see this degeneracy emerge naturally from the effects of a ground which is a character of the subject. In this degenerate version of the learning mechanism, which Peirce deems to be of the "first degree", the ground *of representation* is a second order mark that refers not to the object, but to the subject *of representation*. Consequently its common character with that subject, or with multiple subjects, are *a priori* representations which are representations taken *as instances* and refer to patterns of transitions between feelings. For example, the pattern that if one experiences feeling *x*, it is always followed by feeling *y*. Such a character – understood as a pattern of feelings – could look like a universal law associating every *x* necessarily with *y*, such as: "…*x*–*y*….*x*–*y*….*x*–*y*…". This character, as a feeling, has no character *as a representation*, i.e. as an attribute associated with the mind's inherited connections among feelings that give rise to the qualitative *perceptual* experiences of color, instinctive motion, etc. Such qualitative attributes are inherited, and while

they can be used to construct higher level representations of feelings, they remain representations of immediate perception *as* representations. Instead, we are dealing with the representation of immediate perception *as* instances. This means that the second universal category or conception, *B* (phenomenal form or quality) cannot express an "internal" character of the ground, because there is no such internal character. There is only an external character learned from the ubiquity of a transition between feelings in a given environment.

The second universal category or conception, *B* (phenomenal form or quality) is thus degenerate in Peirce's representational learning mechanism in the case when the ground is a character of the subject. If we recall our earlier discussion on degeneracy, we see that this means that there has been a loss of dimensionality in the learning mechanism. In this case, of the expression of the character of the ground as an internal quality and all the relations involved in such an expression. This means that the second order relation between *B* (phenomenal form or quality) and *C* (phenomenal accident or representation) is also missing. Moreover, this means that the imputed, or ideal, relation between *A* (phenomenal matter or relation) and *B* are also missing. These changes affect the behavior of Peirce's learning mechanism substantially. Reading the flow of information in this system based on the positive or negative signs associated with the second order marks, we see a system in which a character of the subject which is held in common with the ground becomes the input.

I have argued that the genuine, full, version of Peirce's learning mechanism is associated with the specialized cognitive faculty of the Understanding. I have associated the second version of Peirce's learning mechanism, which is degenerate in what Peirce calls the "first degree", with the specialized cognitive faculty of Sensation of Reaction (Sensibility). I now turn to the last version of Peirce's learning mechanism viewed as one big representation, which is degenerate in the "second degree" (EP1:261, 1888). In addition to imputed and relative quality, Peirce describes a quality that is an internal character and stays "wrapped-up" in itself (W1:326, 1865)). It does not make an appeal to a subsequent representation to perform a comparison and arrive at an imputed relation between a representation of an object as it evokes within us internal feelings, or instantaneous states of nervous systems; and the

representation of that object as a relation among attentional states or parts. Nor is it a representation of an object articulated solely in terms of necessary, universal, and *a priori* attentional patterns. Instead, this kind of representation is simply the internal feelings that it evokes in themselves and uninterpreted in terms of the relational language of attention, imagination, and instances.

Peirce refers to this kind of synthesis, or output of his learning mechanism, as “association by similarity” or “association by resemblance”.

> Synthetical consciousness degenerate in the second degree, corresponding to intermediate thirds, is where we think different feelings to be alike or different, which, since feelings in themselves cannot be compared and therefore cannot be alike, so that to say they are alike is merely to say that the synthetic consciousness regards them so, comes to this, that we are internally compelled to synthetise [sic] them or to sunder them. This kind of synthesis appears in a secondary form in association by resemblance.
>
> (EP1:261, 1887-8)

Peirce is evoking the same language of resemblance to talk about this degenerate version of his learning mechanism as he used to talk about the special kind of hypothesis inference conducted by the specialized cognitive faculty of Feeling. I argue this is because he is talking about the same mental faculty and expanding on the same degenerate version of his learning mechanism. Peirce’s third version of his representational learning mechanism is one in which the ground *of representation* is a character of *both* the object and subject *of representation*. Since, for Peirce, the only thing that these two representations have in common is that they are feelings in the biological brain– one being a feeling taken as a representation of some attribute or characteristic, while the other being a feeling associated with a *transition* between feelings, and is thus a feeling taken as an instance devoid of such attributes – the character of ground is what feeling is without representation. A ground which is a character of both the object and subject *of representation* is a feeling with no imputed or external mark, considered purely as an instantaneous state of the nervous system.

Peirce argues that association is possible for feelings considered in terms of their material quality as instantaneous states of the nervous system. Such associations, however, are only the inherited associations among feelings bequeathed by evolution. Such feelings, in order to be compared and to be found to resemble an innate state of the nervous system which has been innately associated with other innate states, require a comparison that takes time and is thus an inference that involves a variant of Peirce's learning mechanism. However, such a variant is degenerate, because it too operates by compulsion. Although, in this case, the compulsion is "internal" and the result of evolutionarily bequeathed associations among feelings.

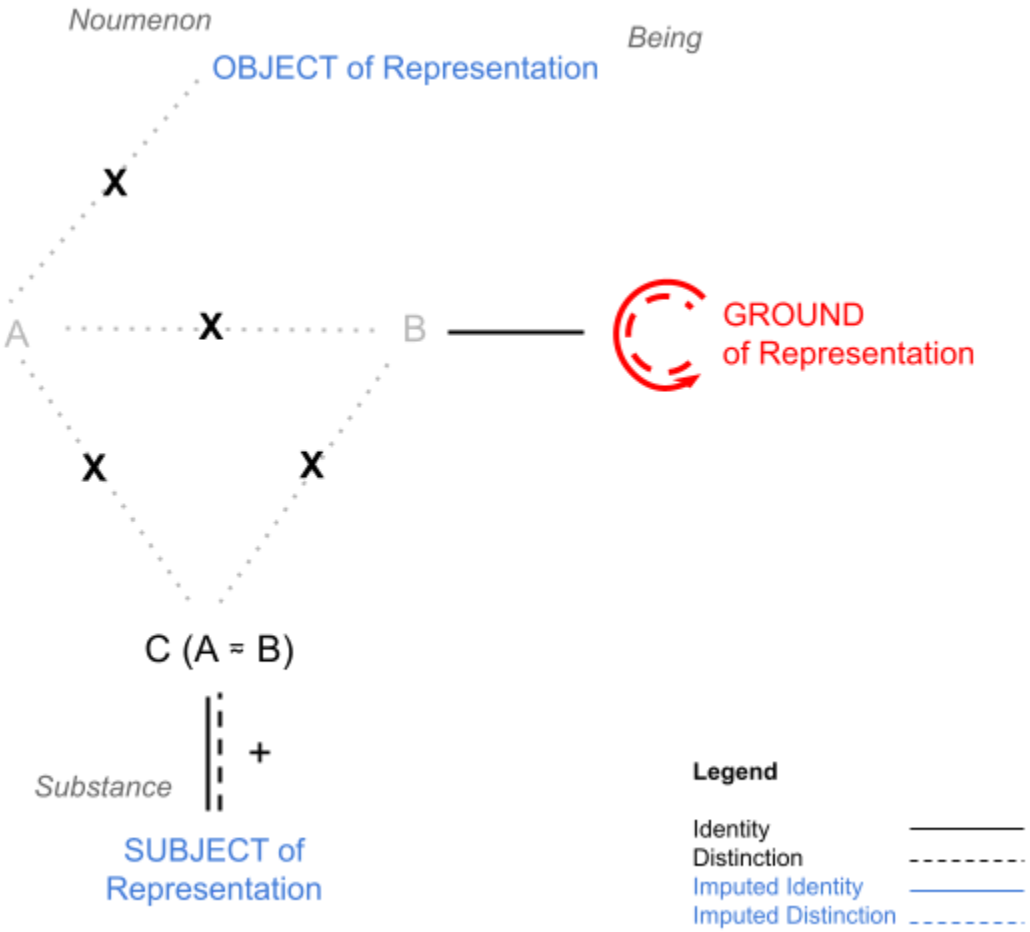


Figure 8: Author illustration of a Peircean concept learning mechanism degenerate in the second degree. Note that *both* A (quality) and B (quantity) are degenerate, and the self-referential character of the ground. Yet, the learning mechanism still yields a representation in C.

In my rendering of Peirce's representational version of his learning mechanism, I show how such a degeneracy arises naturally from Peirce's description of a ground *of representation* that is a character of both the object and subject *of representation*, and is for that reason simply a reference back to itself as an instantaneous state of the nervous system. The ground, in this case, refers back to its own material quality as a feeling. Despite being a relation involving both a mark of identity and a mark of distinction, this self-reference reduces to a relation of identity. In the degeneracy of the second degree, it is *A* (phenomenal matter or relation) and not *B* (phenomenal form or quality) that is degenerate. While the character of the ground here as a feeling is taken in as a representation and not as an instance (i.e. as representing some kind of perceptual attribute for the mind), there is no expression of this internal quality as having a relational articulation that appeals to attention and the picking out of extension. Because *A* is degenerate, there is no imputed mark or ideal relation between *A* and *B*, and thus no explicit appeal to a subject *of representation* to implement the ideal relation. Moreover, there is no reference at all to an object *of representation*.

Peirce describes this state of consciousness, if such a thing could be said to exist, as one undifferentiated qualitative feeling occupying the entirety of mind without a reference to a substance in which this quality resides (EP1:291, 1891). I argue that this degenerate version of Peirce's learning mechanism is associated with his specialized mental faculty of Feeling, and describes the process through which this faculty arrives at its representational output.

The genuine case of Peirce's representational learning mechanism is the only one in which both the subject (*A*) and object (*B*) *of reference* involved in the embedded triadic relation involving *B* (phenomenal form or quality), *A* (phenomenal matter or relation), and *C* (phenomenal accidents or representation) are present. In the two degenerate versions associated with the cognitive faculties of Sensation of Reaction

and feeling, either *A* or *B* are missing. I argue that this gives us in representational form what Peirce is alluding to when he makes the case that conceptual knowledge– the representational output of the cognitive faculty of the Understanding is propositional (involving both subject and object), and differs from the other kinds of representations in the mind in that respect.

I have now shown that Peirce's learning mechanism can be articulated in representation form using his ideas of hypothetical marks or essential external relations. I show that when combined with Peirce's drafted efforts at deriving his well-known five universal categories or conceptions, we see that Peirce at around this time had most likely been describing a representational view of his learning mechanism. Such a view, as I have completed it, makes explicit the idea of degeneracy and of three different kinds of *specialized* paths through the learning mechanism – one genuine and two degenerate. I argue that this is strong evidence that Peirce had a specialized view of cognition in mind and maintained that view into the late 1860s when he derived his universal categories of conceptions which are widely held to mark a turn to Peirce's mature philosophical system (Fisch 1986). However, I have shown that in this turn Peirce does not turn away from his previous work on specialized cognition, but rather deepens and reinforces these ideas by articulating three variants of his learning mechanism that map on seamlessly to his three specialized cognitive faculties. In the next section, I make the case that he maintains this view of three specialized cognitions and associated three variants of his learning mechanism to the end of his intellectual life. I show that Peirce's *representational* view of his learning mechanism as it is articulated in the late 1860s is entirely consistent with his later work on an *inferential* view of his learning mechanism involving different variations of three kinds of inferences– Abduction, Deduction, and Induction.

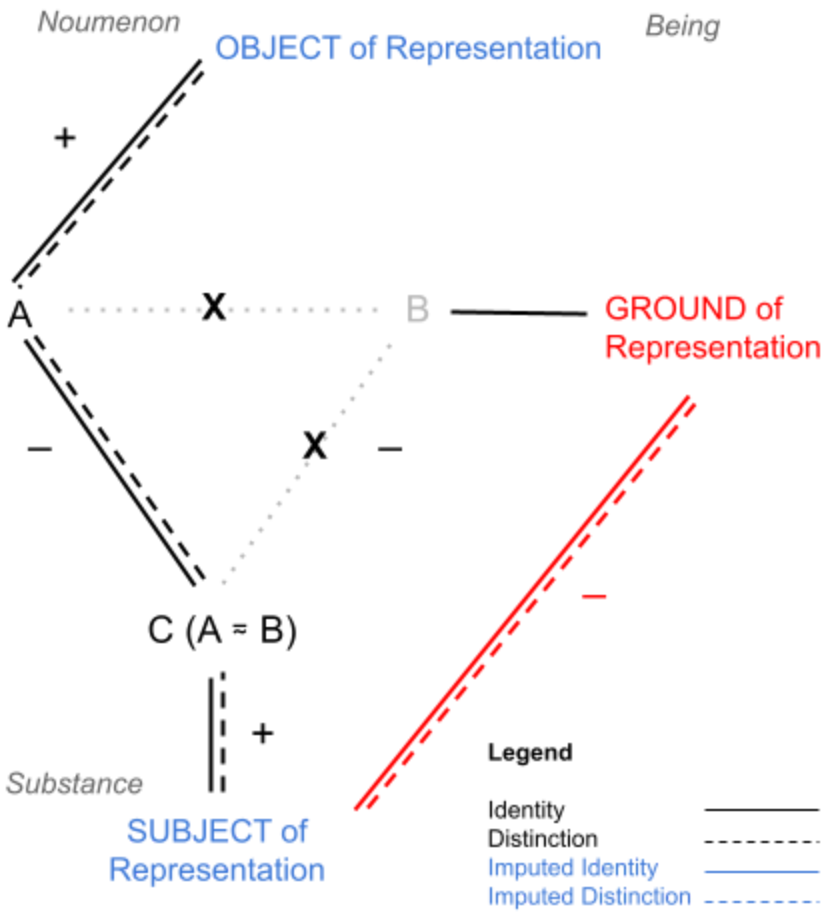


Figure 9: Author illustration of a Peircean concept learning mechanism degenerate in the first degree. Note that A (quality) is degenerate, and the mechanism does not yield a representation of a character of the object of representation, but is rather a determination of the subject of representation.

The missing relation between the object *of representation* and the ground *of representation* severs the relation between the ground *of representation* and object *of representation*. This means that this representation is no longer learning an explanation of a character of the object *of the representation*, but instead is learning a character of the subject *of representation*. Moreover, this disrupts the first loop in my rendering of Peirce's representational mechanism in which play and iteration gave rise to a relational account of the character of the object of representation (an immediate impression and a feeling) *as* a representation. Without the feedback look, there is no longer a process of *discovering* the appropriate

relational account of the object *of representation*. There is rather an *imposition* of a relational account derived solely from the character of the subject *of representation* injected into the representational dynamic by the second order intake relation between the ground *of representation* and the subject *of representation*.

If the learning mechanism truly did not have a quality or phenomenal form (*B*). The inflow-outflow behavior of the learning mechanism would not work. There would be no relation between the ground *of representation* that concludes in representation of the object in the subject *of representation*. It is only because this version of the learning mechanism is *degenerate* and is for that reason conceived as being a version of the genuine learning mechanism that information about the object (a character of the subject *of representation*) flows through it at all. The object *of representation* is thus determined by a character of the subject *of representation* which is an *a priori* universal and necessary representation. This concludes in a subject *of representation* which is a representation that represents a *relative quality* as opposed to the *imputed quality* that the genuine learning mechanism concludes. Moreover, since the subject *of representation* is referenced twice, the second reference to it by *C* (phenomenal accident or representation) is superfluous and no longer determinative of the character of the representational output. It may be abstracted from, or is "prescindible" from the reference to the ground and the reference to the correlate (the hypothesis of the noumenon) made by *A* (W1:354, 1866).

3.4 The inferential view of Peirce's learning mechanism and degeneracy

The difference between a representational and inferential view

I have thus far covered the representational view of Peirce's learning mechanism, which he calls "logic" in 1865. I have made the case that this learning mechanism can be described in terms of the working of three representations of thought, three references (to ground, object, and subject *of representation*) that Peirce takes to define the flow of information in a representational act, and three hypotheses (being, noumenon, and substance) that anchor the representational process as a whole. Moreover, I offered an

exposition of Peirce's work during this period on hypothetical marks, or essential external relations, which offered to distinguish different kinds of representations according to the number and kinds of relations they made to other relations in a representational process. I leveraged Peirce's work in this area to offer my own rendering of what Peirce's learning mechanism would look like from a representational perspective. I showed that this exercise was not only fruitful in giving us a better of sense of Peirce's view of his learning mechanism at around this time– which is only partially and incompletely expressed in his 1867 publication introducing his five universal categories or conceptions of the faculty of Understanding to the world; but in addition, I showed that this exercise makes clear that degeneracy and specialized cognition seemed to have played a central role in how Peirce structured his learning mechanism.

A representational view of Peirce's learning mechanism, as I have offered, makes apparent that Peirce's learning mechanism comes in three variants – a genuine and two degenerate versions. Moreover, it also makes clear that these three versions of Peirce's learning mechanism map precisely onto the three specialized cognitions that I have argued are central to Peirce's work on cognition and his philosophical system as a whole. Peirce's theory of cognition, then, seems to be one that maintains three specialized kinds of cognitions. Each with a specialized input, a specialized computation, and a specialized output. Moreover, while Peirce maintains a specialized view of cognition, and a view of the learning mechanism that allows it to take on three different specialized forms, Peirce is offering what is fundamentally a domain *general* learning mechanism. What is essentially the same mechanism works on all inputs, adjusting its mode of operation to match its input. I return to this question of whether Peirce offers a domain general or domain specific learning mechanism in chapter 4. In the last section of this chapter, I focus on taking an inferential, rather than statically representational view, of Peirce's learning mechanism.

As we've seen, Peirce is clear about his view that inference involves development over time and is "virtual" (W2:192, 1868). For this reason, it is a dynamic system that cannot be fully captured in one instant. Peirce's representational view of his learning mechanism attempts to circumvent this problem by representing what are dynamic events as hypothetical marks. However, these hypothetical marks are describing inferential *processes* that occur *in time*. Moreover, Peirce writes that what he expresses in

1865 and 1866 as external essential *relations* are truly *representations* (W1:324, 1865). For this reason, Peirce's representational view of his learning mechanism involves chains of representations end to end – from being to substance and back again. I argue that in his later work, Peirce categorizes these different chains of representations and gives them names.

Peirce invests much time and energy in bridging representations and inference. Much of this work forms what is commonly considered to be Peirce's "semiotics" – his classificatory system for signs. I do not focus on Peirce's semiotics in this dissertation, although their relevance to this topic is evident. Instead, I focus on one kind of representation that can help us understand why, and how, Peirce's learning mechanism, which is a chain of representations, can be thought about as developing over time. To do so, I focus on a particular kind of representation that Peirce calls an "argument".

In his semiotics, Peirce defines an argument as a representation which implies its next representation (EP2:296, 1903) according to a rule. Arguments are the only representations which can be said to be inferential according to Peirce's definition of inference as a representation (or judgment) following a previous representation in a chain (W1:339:1865). Peirce articulates three main kinds of arguments— Abduction, Deduction, and Induction; each with a different rule determining the subsequent representation in the chain, and each exhibiting a different inferential behavior in cognition.

I do not undertake to go through a technical description of these arguments and the ways in which they transition from argument to argument. This work can be found in Peirce's early work on syllogisms and his later work on existential graphs and probability. Instead I cover Peirce's more general descriptions of the inferential behaviors of his different kinds of arguments in cognition. I argue that Peirce's description of his later inferential arguments map onto his descriptions of the different kinds of activities involved in the genuine and degenerate forms of his learning mechanism. Moreover, Peirce's more mature descriptions of what I argue is the same learning mechanism goes a long way in further elucidating our understanding of it and Peirce's three specialized cognitions.

Degeneracy in Peirce's arguments: Abduction, Deduction, Induction

I begin by showing that Peirce's mature work on arguments– on Abduction, Deduction, and Induction– comes together to offer a re-articulation of his work on a learning mechanism with degenerate degrees from the late 1860s. In this way, a representational view of Peirce's learning mechanism, as I have provided in this chapter, goes a long way to elucidate Peirce's work on Abduction and the logic of discovery, which has been a contemporary point of interest in his work (Harman 1965, Lipton 2004, Magnani 2001).

Peirce describes a learning mechanism in his later years that relies on a handshake between three different kinds of arguments.

> I now proceed to consider what principles should guide us in abduction, or the process of choosing a hypothesis. Underlying all such principles there is a fundamental and primary abduction, a hypothesis which we must embrace at the outset, however destitute of evidentiary support it may be. That hypothesis is that the facts in hand admit of rationalization, and of rationalization by us…We are therefore bound to hope that, although the possible explanations of our facts may be strictly innumerable, yet our mind will be able in some finite number of guesses, to guess the sole true explanation of them…Animated by that hope, we are to proceed to the construction of a hypothesis. Now the only way to discover the principles upon which anything ought to be constructed is to consider what is to be done with the constructed thing after it is constructed. That which is to be done with the hypothesis is to trace out its consequences by deduction, to compare them with results of experiment by induction, and to discard the hypothesis, and try another, as soon as the first has been refuted, as it presumably will be.
>
> (EP2:106-7, 1901)

Similarly to his 1865 articulation of the universal hypothesis of substance (which he later breaks up into the two distinct hypotheses of substance and being), Peirce argues that the mind is guided by a "fundamental and primary" hypothesis that there is something which we are experiencing that is capable

of “rationalization”, or explanation in terms intelligible to the mind. Peirce argues that the argument of Abduction offers a hypothesis, or “theory” (EP2:1903) explaining the facts of experience. Such facts, as we have seen, are feelings (EP2:166, 1903) which are experienced as “immediate perception” (EP2:155, 1903).

Peirce refers to Abduction as a process of construction that involves proposals, or “guesses” (EP2:107, 1902), about an object of experience, explicating that proposal into more specific predictions about the experiential (EP2:441, 1908) consequences of the Abductive hypothesis. Peirce writes,

> Deduction produces from the conclusion of Abduction predictions as to what would be found true in experience in case that conclusion were realized.
>
> (EP2:288)

This explicative step is taken by Deduction. The Deductive predictions are then tested in experiments conducted by Induction, which also compares the results of the experiments with the predictions of Deduction. A decision is then made to refute and discard the Abductive hypothesis and try another if the experimentational results fail some metric (EP2:235, 1903). Thus, according to Peirce’s 1903 description, Abduction is an inferential process for “choosing a hypothesis” (EP2:107, 1903) which is a construction of some kind, and offers that hypothesis to Deduction for explication into predictions, which are then submitted to Induction for experimental testing.

Abduction, Deduction, and Induction collaborate in a process that involves experimentation in the *imagination* as part of the effort to elucidate the experiential consequences of the Abductive hypothesis.

> The only way of attaining any satisfactory general knowledge of experiential truth is by the inductive testing of theories. This is, therefore, the only way to ascertain the meaning of a current concept…Remembering that a concept has meaning only as it is predicated, one need only create in the imagination as great a variety of examples of objects to which would be applicable the supposed meaning

> as may seem desirable, and then try whether or not the concept would be applicable to each of them. One thus pursues a strict experimental method.
>
> (EP2:432, 1907)

Peirce argues that various supposed "objects" are created in the imagination to ascertain whether "the supposed meaning" being explicated and considered is applicable to them. This supposed meaning which is to be experimentally tested by induction is behavioral in nature. It involves the preparation to "act in a certain way" "under certain circumstances" (EP2:432, 1907). It is this behavioral prediction which is being experimentally tested by induction. However, in my reading of Peirce, it is the *construction of these predictions* rather than their experimental testing which requires the supposition of objects in the imagination. This construction of predictions involving experimentation in the imagination is an act of Deduction and not Induction.

Peirce begins to adopt this line of reasoning around 1901 when he lands upon the idea that one important version of *Deduction* involves experimentation upon "an image" or in the imagination.

> Theorematic deduction is deduction in which it is necessary to experiment in the imagination upon the image of the premiss in order from the result of such experiment to make corollarial deductions to the truth of the conclusion.
>
> (LCS:75)

As we've seen earlier in this dissertation, by "image" and "imagination" Peirce is referring to an action by the specialized cognitive faculty of Sensation of Reaction (Sensibility).

Consequently, in 1907, I argue is describing two different activities. First, the "strict experimental method" of Induction – which we will see also involves the faculty of Sensation of Reaction (Sensibility) – which carries out fairly straightforwardly the experiential predictions of Deduction. And, separately, an act of

creation “in the imagination” of “as great a variety of examples of objects to which would be applicable the supposed meaning as may seem desirable” through which we arrive at an explication of the supposed meaning.

Lastly, Abduction and Induction are, for Peirce, at “are the opposite poles of reason” (EP2:106, 1901), or at opposite ends of his learning mechanism. Each relies on different kinds of associations which we have seen before. Abduction relies on resemblance or similarity, while Induction relies on contiguity.

> The mode of suggestion by which, in abduction, the facts suggest the hypothesis is by resemblance,—the *resemblance* of the facts to the consequences of the hypothesis. The mode of suggestion by which in induction the hypothesis suggests the facts is by *contiguity*,—familiar knowledge that the conditions of the hypothesis can be realized in certain experimental ways.
>
> (EP2:106, 1901)

As we’ve seen, association by resemblance or similarity and association by contiguity are two degenerate versions of Peirce’s “synthetical consciousness”, or of his genuine learning mechanism. They are associated, respectively, with the specialized cognitive faculties of Feeling and Sensation of Reaction (Sensibility).

In general, the process that Peirce describes in the 1900s sounds a lot like the process he describes in the 1860s. I argue that not only are Peirce’s learning mechanism of the 1860s and his learning mechanism of the 1900s similar, they remain aligned in key aspects that I argue define his learning mechanism overall. These are the ideas of a hypothetical language of thought that involves the hypotheses of substance, noumenon, and being, as well as the phenomenal hypothetical marks of phenomenal form (quality), phenomenal matter (relation), and phenomenal accidents (representation). Moreover, I argue that Peirce maintains his view of a learning mechanism that comes in a genuine and two degenerate forms that correspond to the specialized inferences of the cognitive faculties of Understanding, Sensation of Reaction (Sensibility), and Feeling. What has changed, I argue, is that

Peirce has now assigned dedicated names to the chains of representations in this mechanism – taking seriously his view that the hypothetical marks that distinguish among the different representations involved in his learning mechanism are themselves representational.

I make this argument by first describing the different versions of Peirce's three kinds of arguments, and then offering a theory about how these different versions of Abduction, Deduction, and Induction come together in genuine and two degenerate forms of Peirce's learning mechanism. At the end of this exercise, I argue that we have a much better understanding of Peirce's three arguments, and also a more detailed understanding of the different version of Peirce's learning mechanism than we did before.

Abduction

Peirce argues that there is only one kind of Abduction. It is an inferential argument that makes guesses or suggestions about the meaning of an object based on "resemblance". Moreover, it is concerned with "truth", which we have seen can only occur to the extent the representation involved is that of a character of the object *of representation*.

> Abduction is reasoning which professes to be such that in case there is any ascertainable truth concerning the matter in hand, the general method of this reasoning, though not necessarily each special application of it, must eventually approximate to the truth.
>
> (1901:74)

As we will see, the fact that there is only one kind of Abduction is consistent with Peirce's view of his learning mechanism in light of degeneracy. Only one of Peirce's learning mechanisms is concerned with finding the "truth" in the only way truth is defined in Peirce's system which is as it pertains to an object *of representation*. The other versions of the learning mechanism, such as the degeneration in the first degree, are "unsusceptible" to truth (W1:334, 1865). This is not to say that there are no hypotheses to be

tested in these other versions of Peirce's learning mechanism. However, as we will see, these hypotheses about the nature of an experience do not involve guesses or Abduction.

Deduction: Conscious Deductions (Necessary) vs. Unconscious Deductions (Probable and Natural Concomitants)

Peirce then describes two broad kinds of Deductions, which subdivide further into two additional classes each. In addition, Peirce describes a third kind of reasoning which, while Deduction adjacent, is not considered Deduction per se because it is not an *inference* involving a controlled and conscious process.

First, we have the distinction between Necessary Deduction on the one hand, and Probable Deduction on the other. Necessary Deduction infers the experiential consequences that necessarily follow from a hypothesis. Probable Deduction infers the experiential consequences that necessarily follow from a hypothesis as well, however, it conducts this kind of inference over "probability" (EP2:97, 1901).

> Probable deduction is necessary inference concerning probability, in the strict statistical sense. What makes it very distinct from necessary inference proper is that while the latter has no concern with the realization of its hypothesis, and reasons about its premisses as expressing a conceivable state of things, regardless of actual existence, probability, on the other hand, is essentially limited to the *course of experience*.
>
> (EP2:288, 1903)

The two kinds of Probable Deductions thus conclude a "ratio of frequency" and are quantitative.

> Deductions are either *Necessary* or *Probable*. Necessary Deductions are those which have nothing to do with any ratio of frequency, but profess (or their Interpretants profess for them) that from true premisses they must invariably produce true conclusions. A Necessary Deduction is a method of producing Dicent Symbols by the study of a diagram. It is either *Corollarial* or *Theorematic*.
>
> (EP2:298, 1903)

By contrast, Necessary Deduction does not conclude ratios of frequency, or operate over probabilities. However, as we will see, it still has a relation to a quantitative treatment of representations through the reliance on imagination and instances involved in one of its deductions – Theorematic Deduction.

There are two kinds of Necessary Deductions – Corollarial and Theorematic. While Corollarial Deduction is an inference in which the conclusion is "immediately" perceived to be true, Theorematic Deductive inference involves experimentation in the imagination.

> Corollarial deduction is where it is only necessary to imagine any case in which the premisses are true in order to perceive immediately that the conclusion holds in that case. Ordinary syllogisms and some deductions in the logic of relatives belong to this class. Theorematic deduction is deduction in which it is necessary to experiment in the imagination upon the image of the premiss in order from the result of such experiment to make corollarial deductions to the truth of the conclusion.
>
> (LCS:75)

> Corollarial reasoning is that in which it is only necessary to consider what the premisses mean in order to find that the conclusion is as true as they. Theorematic reasoning is reasoning in which this is not enough, but it is needful to perform experiments in the imagination in order to assure ourselves that the conclusion is true.
>
> (LCS:76)

Peirce stresses that in terms of implementation, his "logic of relatives" exposed to the world in 1897 is more relevant to Theorematic Deductive inference than it is to Corollarial Deduction.

I do not offer an in depth look at the mechanics of Peirce's Deductive inferences in this dissertation. However, I take a moment to offer a slightly deeper view of these two kinds of Necessary Deductions in order to highlight the role of experimentation, imagination, and Peirce's "logic of relatives" in Theorematic

Deduction, and how it differs from what Peirce describes as the "immediate" inference of Corollarial Deduction. I begin with Peirce's description of Theorematic Deduction and its use of the relational descriptions of his "logic of relatives".

> …in the logic of relatives, treated let us say, in order to fix our ideas, by means of those existential graphs of which I gave a slight sketch in the last lecture, /we/ begin a deduction by writing down all the premises. Those different premises are then brought into one field of assertion, that is, are *colligated*, as Whewell would say, or joined into one copulative proposition. Thereupon, we proceed attentively to observe the graph. It is just as much an operation of *observation* as is the observation of bees. This observation leads us to make an *experiment* upon the graph. Namely, we first duplicate portions of it; and then we erase portions of it, that is, we put out of sight part of the assertion in order to see what the rest of it: is. We observe the result of this experiment, and that is our deductive conclusion. Precisely those three things are all that enter into the experiment of any deduction,— colligation, iteration, erasure. The rest of the process consists of observing the result.
>
> (EP2:44-5, 1898)

Peirce describes a process for Theorematic Deduction that relies on the relational descriptions of his "logic of relatives" and its use of correlatives and logical subjects. He discusses here a graphical articulation of his logic of relatives called his "existential graphs", which he viewed as a system in which the inferences of his Theorematic Deduction could be implemented. Peirce, thus, by developing a graphical model that could model the inferences of Theorematic Deduction may have been attempted to articulate a graphical view of imagination – which, as we saw, due to its relation to the mental faculty of Sensation of Reaction involved treating feelings as instances rather than as representations. This kind of Deduction, for Peirce, allows Theorematic Deductive inference to introduce hypothetical "subjects" (EP2:96, 1901) – akin to the logical subjects we saw at work in Peirce's 1897 work on the logic of relatives.

Peirce argues that Corollarial Deduction operates without the need for such experimentation in the imagination, and the introduction of hypothetical subjects. Moreover, he maintains that Theorematic Deduction after its experimentation in the imagination continues along the course of Corollarial Deduction (EP2:502, 1909). Theorematic Deduction is thus an additional step involved in Deductions that cannot be done solely via Corollarial Deduction. Finally, while the conclusions – i.e. predictions – of Corollarial Deduction are "immediately" perceived to hold true in the case under consideration. There is still inferential work involved in arriving at its conclusions. Such work involves controlled and conscious reasoning such as the substitution of terms (EP2:96, 1901). I argue that this kind of deduction differs from an "immediate inference", which we will see pertains to a different kind of Deduction in Peirce's system.

While Corollarial Deduction concludes only one conclusion, Theorematic Deduction, due to its use of experimentation in the imagination and iteration, concludes *numerous* conclusions (EP2:45, 1898). It thus presents numerous hypothetical predictions to Induction. I discuss later how Peirce's Induction addresses this challenge.

> It is not, however, in every deduction that all the three possible elements of the experiment take place. In particular, in ordinary syllogism the iteration may be said to be absent. And that is the reason that ordinary syllogism can be worked by a machine. There is but one conclusion of any consequence to be drawn by ordinary syllogism from given premises. Hence it is that we fall into the habit of talking of the conclusion. But in the logic of relatives there are conclusions of different orders, depending upon how much iteration takes place. What is *the* conclusion deducible from the very simple first principles of number? It is ridiculous to speak of *the* conclusion. *The* conclusion is no less than the aggregate of all the theorems of higher arithmetic that have been discovered or that ever will be discovered.
>
> (EP2:45, 1901)

Peirce's distinction between the two types of Probable Deductions is similar to that between the two types of Necessary Deductions. While Probable Deduction Proper deals with probabilities, i.e. a quantitative

view of its input, it does not reach conclusions about them that it maintains to be certain – i.e. to be the case universally and necessarily. Instead, it establishes a *probable* claim about certain cases such that *analogous*[21] cases to the one being inferred from will also, probabilistically, lead to the same conclusion.

> A Statistical Deduction is a Deduction whose Interpretant represents it to reason concerning ratios of frequency, but to reason concerning them with absolute certainty. A Probable Deduction proper is a Deduction whose Interpretant does not represent that its conclusion is certain, but that precisely analogous reasonings would from true premisses produce true conclusions in the majority of cases, in the long run of experience.
>
> (EP2:298, 1903)

This is not the case with Statistical Deduction. Instead, Statistical Deduction draws conclusions from a premiss that it holds to be *absolutely certain*. That is, it arrives at a conclusion which is a prediction from a hypothesis that it maintains to have consequences that will hold universally and necessarily.

This kind of deduction, I argue, is akin to what Peirce describes as a deduction that is an "immediate inference". It is for this reason a deductive inference whose "ideal" hypothesis (EP2:96, 1901)– its starting premise– is a *universal law*.

> Take the "immediate inference," which is as truly a deduction as any other, from "There is a woman whom any Spaniard there may be adores," to "Any Spaniard there may be stands to some woman or other in the relation of adoring her." This inference may be drawn by a "rule of thumb"; that is, a habit may act to cause a feeling of confidence in the conclusion, without any deliberation or control. This, however, may happen even if the inference is not of the kind termed "immediate" (that is, a deduction from a relatively simple premiss, not a copulative proposition). But such inference, not being self-controlled, is not *Reasoning*. Yet even in that case, the habit is a universal rule in itself, although its operation may be hindered sometimes.

[21] I do not cover in this dissertation Peirce's views on analogy– which he considers to be a fourth type of argument that is a "mixed" type of argument (LCS: 95), involving something of all three main types of argument.

> But if the inference is drawn deliberately, the reasoner will consider that if the woman can be specified in advance of knowing what Spaniard is to be adduced, it can only make it easier to find such a woman if the Spaniard is fixed upon first; or in some other way, the case will be brought under a known or evident universal truth. Thus, the argument sets out from a law represented to be known actually to hold throughout the universe of the hypothesis, and in the conclusion interprets the effect of this law. As Professor Mitchell* profoundly said, the whole operation virtually consists in *erasure*.
>
> (EP2:287-8, 1903)

This kind of Deduction, much like the deductive inference of "natural concomitants" which we will see shortly, is one that is done "without any deliberation or control". It is for that reason not conscious (EP2:211,1903). It is for this reason, not properly reasoning or truly an inference (W5:327, 1886). It may be for this reason that Peirce often fails to mention Probable Deduction (Statistical or Probable Deduction Proper) and (as we will see) Deduction by "natural concomitants" as he lists the different kinds of deductive inferences. These two kinds of Deductions, not being conscious, are not part of Peirce's process of *concept* learning which must be controlled and deliberate, and most of all, *conscious*.

In the passage above, Peirce argues that Statistical Deduction is merely the application of a "universal rule" or a "habit" to what is a "simple" premiss, and not a "copulative proposition". It "sets out from a law presented to be known actually to hold throughout the universe of the hypothesis, and in the conclusion interprets the effect of this law". These are two very differentiating features of Statistical Deduction from the two types of Necessary Deduction. Let's take a moment to look at them more closely.

Statistical Deduction starts from a universal law that applies universally, and necessarily, to certain "simple" premises. By this distinction between "simple" and "copulative", I take Peirce to be referring to an important distinction between a feeling being taken *as an instance* of what it is– without any attempt of representing it as something intelligible to the mind; and a feeling taken *as a representation* – or as something with a meaning intelligible to the mind (W1:326, 1865). Such a representation that predicates a

meaning in the mind to a thing, or extension, must involve both subject (extension or wide content) and predicate (intension or narrow content). It is thus a *proposition* and represents *conceptual knowledge*, which, as we've seen, must be propositional. As we've also seen, such propositional knowledge can only be the output of the mental faculty of Understanding.

Peirce argues that unlike Qualitative Deduction which starts out from a hypothesis that *is* a theory or law, Statistical Deduction is the *application* of a universal law to an instance or "simple" premise. So, where does this universal law come from if it is not derived from the premise that prompts the inference? This is a crucial question, and gets at the relationship between a degenerate process of discovery and degenerate inference, which can best be studied in light of Peirce's work on arguments. I will address it later on in this section. For now, I focus on what these differences mean for the premise that can be said to start Statistical Deduction.

I argue that as an *un*controlled and thus *un*conscious reasoning, Statistical Deduction does not have a starting premise that is a representation taken *as* a representation – i.e. as a theory that treats the data as evidence. This is in line with Peirce's work on the difference between conscious and unconscious reasoning, where there is no "first" in cognition for uncontrolled and unconscious reasoning (EP2:211,1903). Peirce captures this idea in his references to Zeno's paradoxes of Achilles and the tortoise– one of a set of ancient Greek paradoxes about infinity that have inspired philosophers and mathematicians alike for hundreds of years. This paradox is set-up as follows. Fleet-footed athlete Achilles is pitted against a slow-troding tortoise in a race where the tortoise gets a head start. Who wins at the end of the race? Does Achilles overtake the hare? At first, the answer seems obvious, Achilles. However, when considered purely through a mechanical understanding of the infinite, we hit a wrinkle. Achilles has to travel through space, and space is infinite. Consequently, he travels from space 1, space 2, etc. at a faster rate than the tortoise, but since there are infinite points in space between starting points A and B, does Achilles ever overtake the tortoise?

Aristotle's answer to this paradox is that Achilles overtakes the tortoise because time is measured as a difference between instances, and not as a measure at an instant. Peirce distills this answer to one regarding the difference between continuous and discrete systems. In short, Peirce argues that because Achilles is going from point A to point B, he moves through time continuously and does not make every one of the infinite possible stops between A and B, which would require effort. A continuous process, such as the movement of Achilles from A to B, has no first point, nor does it have any discrete points in between. This is the manner through which an infinite number of possible instants fit in a finite increment of time (EP2: 227, 1903). Unlike a continuous system which is "not required to make an infinite series of distinct efforts" (EP2:211, 1903), a discrete system makes distinct efforts. However, in a discrete system, there must be a first point, and every point in between, because such a system must exert effort at every step to perform some kind of discrete action.

The sophist paradox of Achilles and the Tortoise helps Peirce couch his distinction between unconscious and conscious reasoning, as well as the relationship between the two. Peirce argues that the unconscious mind is a continuous system and is constantly making perceptual judgments; i.e., inferences that represent a precept– the impression, or sense-image, of what is on the mind–as a discrete representation. This impression occurs through the common character that the mind and the representational-what-is share. These perceptual judgments are the first judgments that our minds have access to for their discrete reasonings– the only kind of reasoning of which we can become conscious.

Consequently, I argue that saying that there is no *"first" representation* in Statistical Reasoning – or in uncontrolled and unconscious reasoning, is *not* the same as saying that there is no *prompting material feeling*. Here, I draw more explicitly on a distinction that has underpinned the way I have been talking about the difference between dealing with a feeling (which for Peirce is *representative* in and of itself) as an *instance* (i.e. quantitatively), and dealing with that feeling as an *instance* (i.e. qualitatively). This second way of dealing with a material feeling– i.e. of dealing with an instantaneous state of the nervous system; is analogous to viewing that feeling as representing an intelligible theoretical explanation of an experience. This way of viewing the feeling, as we've seen, involves the articulation of it as pertaining to

specific subjects, and thus views the feeling as propositional knowledge. However, even when there is no first representation, and we are instead dealing with an *a priori* necessary and universal representation, there must still be a prompting *feeling* to initiate the inference (W1:159, 1865). Such a feeling is taken as an *instance* of the *a priori* representation.

Feelings taken as instances of *a priori* necessary and universal representations, feelings are taken as "instances of a class" (W1:326, 1865). In my discussion on Statistical *Induction* I return to this idea and show how the induction that Statistical Deduction leads to treats the feelings taken as instances as well as the universal and necessary *a priori* representation or universal law, which is seen as applying to the "universe" of the hypothesis. The prompting premise of Statistical Deduction is consequently distinct from a "first" representation which does not exist in this type of uncontrolled and unconscious reasoning. Instead of a "first" representation, we are thus dealing with a *universal* representation, which, as we've seen, is an *a priori* representation– a universal and necessary representation inferable from any instantaneous state of the nervous system.

If we take this stance on Statistical Deduction, as I do, we come to see Statistical Deduction – and potentially its fellow Probable Deduction – as articulating a very different kind of reasoning from Necessary Deduction. It is a reasoning that is uncontrolled and thus unconscious, and thus cannot be strictly said to be an inference in Peirce's view of the matter. Moreover, it involves a distinction between the material feeling that prompts the process of unconscious inference, and the representation from which this inference begins. In Necessary Deduction, an "ideal" abductive hypothesis (EP2:96, 1901) is abstracted from the feeling that prompts the inferential process. Such a feeling is then *both* the feeling that prompts the inference, and the general representation or law that acts as initiates and governs the inference. These two functions –prompting and first representation in a chain leading to an explanation– are pulled apart in Statistical Deduction (and possibly also in Probable Deduction Proper). Instead, the material feeling that prompts the unconscious and immediate deductive inference is treated as an instance of a class, where such a class is an *a priori* necessary and universal representation.

In my reading of this passage, Peirce maintains that this prompting representation in Statistical Deduction is “simple” in the sense of not being a composite representation – i.e. in the sense of not being a proposition (EP2:295, 1903). This means, given the interpretation of Peirce’s work on cognition that I have been elaborating, that this “simple” premise must be one of the representational inputs of the two specialized cognitions of Feeling or Sensation of Reaction. That is, it must be either a feeling or an effort. Both feelings as feelings and feelings as efforts are taken as representative only of their own material quality as excitations of nerve cells, in Peirce's theory of cognition. However, feelings are the material quality of an instantaneous state of the nervous system that articulates one undifferentiated qualitative state; while efforts are the material quality of an instantaneous state of the nervous system that captures a *transition* between such qualitative states. I make the case that the prompting feeling of Statistical Deduction, which is taken as an instance of an *a priori* universal and necessary representation, is an effort– a feeling that captures a *transition* between qualitative states of consciousness as two sides of an instant. I thus argue that the prompting representation of Statistical Deduction is the same kind of representation as that which acts as the representational input of Peirce’s specialized mental faculty of Sensation of Reaction (Sensibility). This is thus the “universe of hypotheses” that Statistical Deduction deals with. *Statistical Deduction deals with hypotheses which are efforts, or two sides of an instant.*

In my reading of Peirce’s system, a Statistical Deduction takes an input that is an effort– a feeling that marks a transition between qualitative states– and treats it as an instance of an *a priori* necessary and universal representation, which acts as a universal law over a universe of such efforts. Its deductive inference consists in “interpret[ing] the effect of this law” for a particular case. Take for example a transition: {x–y}, that can be inferred from every transition between qualitative states. For example, in a transition from an immediate perception of a feeling taken to be a collection, such as: {a, b, c, x, y, z}, to another immediate perception: {q, r, s, t, x, y}, the transition {x–y} can always be inferred. This universal law, because it is defined over a field in which every element necessarily implies the other, translates to a necessary rule that whenever an x can be inferred from an input (which is always), a y must necessarily follow. Now, imagine that we have in our input a set of two collections of different stimuli {a, b, c, x, y, z} and {q, r, s, t, x, y}, which act as the two sides of an instant from which x can be inferred. Then, Statistical

Deduction takes the form of interpreting what the effects of the law {x–y} are in this case. It may be that the effect is to associate the other members of the set two sets {a, b, c, z} and {q, r, s, t} which are arbitrarily associated with the universal representation {x,y}. Such that, {q, r, s, t} is now interpreted to necessarily follow from {a, b, c, z} , when otherwise, the members of the two sets would have no associative connection to one another.

Thus, the interpretation of the universal law {x–y} is to view {a, b, c, z} and {q, r, s, t} as related – or to view them as being closer to one another than we would have otherwise. From an attentional standpoint, this would lead to universal and necessary, i.e. compulsive, transitions from one attentional state to another, ignoring all other possible transitions to other attentional states. From a memory standpoint, this would mean the reconstruction of events such that certain kinds of events universally and necessarily precede others; or the recollection of events that fit into an arrangement of parts according to a particular sequences while others are forgotten or erased. This, I argue, is what Peirce to view that such inference is at its heart a process of “erasure” (EP2:287-8, 1903). I return later in this dissertation to this feature of Statistical Deduction, and to its reliance on continuity (which enables the immediate perception of two sides of an instant); as well as its reliance on representational fields which are defined over the most rudimentary continuous fields of space and time.

Having thus distinguished the two kinds of Necessary Deduction from the two kinds of Probable Deductions, I now turn to two remaining aspects of Deduction. First, prior to Necessary Deduction (which he calls “Demonstration”), Peirce argues that there is a preparatory step called “Explication” which involves making the Abductive hypothesis as “distinct as possible” (EP2:441, 1908). Peirce’s reference to making something “distinct”, here, can be traced back to his discussion on sphere and content – or breadth and depth (W2:74, 1867). In distinguishing between the sphere (extension) and content (comprehension) of a concept, Peirce sees himself as contributing to a long philosophical debate on what it means to have “distinct” versus “clear” notions (W2:71, 1867). Peirce makes this mapping between distinctness and extension, and clearness and comprehension most clearly in 1865. In his 1865 Harvard lectures, he argues that a “distinct” notion is one that has a determinate extension – that is, has sphere or

breadth; while a “clear” notion is one that has comprehension – that is, has content or breadth (W1:298-9, 1865). In this way, distinctness is associated with the articulation of the subject of a conception, which as we have seen is a proposition involving a subject (extension) and a predicate (comprehension).

> He [Sir. Hamilton] should first have regarded the conception of quality as the distinction of clear, distinct, and adequate and noticed how that is applicable to the copula. When our knowledge of any proposed subject is the most imperfect possible which can enable us to predicate anything of it, it cannot be absolutely obscure. We must, at least, distinguish it from something. And then we can deny something of it. Thus the negative judgment implies no more than some clearness of cognition. The moment our conception attains the least distinctness the moment we recognize any part of it we can affirm that part. Thus affirmation implies some distinctness of cognition. When we have an adequate notion of the subject, then we can predicate that of it whose extension could not be made less relatively to the narrowest sense of the subject…
>
> (W1:298-9, 1865)

Consequently, in 1908, when he argues that the first step of Necessary Deduction is an “Explication” that renders the hypothesis as “distinct” as possible; I take Peierce to mean that this first step of Necessary Deduction involves the articulation of the Abductive hypothesis in terms of a determinate subject or extension.

The second additional aspect of Deduction that I will discuss relates to a third kind of inference that is adjacent to Deductive inference, but which is neither Necessary nor Probable. Peirce calls this kind of inference an inference of “natural concomitants” (EP2:113, 1901). Peirce lists three ways in which a hypothesis can lead to the explication of facts. He lists, as is his habit, only the two kinds of Necessary Deductions – Corollarial and Theorematic. However, I argue that this does not mean that Peirce abandons the idea of Probable Deductions (he discusses Probable Deductions late in his career, including at least as late as 1903 in his Lowell Lectures. Instead, I argue that Peirce most likely saw Probable Deductions to be less relevant to his discussion of the full or genuine version of his learning

mechanism, because as we saw, such deductions are not controlled and conscious and are thus not truly "reasoning".

The third way in which a hypothesis can be explicated so as to explain the facts that Peirce lists is called "natural concomitants". By this, Peirce is referring to a kind of crude Deduction which makes inferences about the experiential consequences of a hypothesis based on a "natural" association between hypothesis and its consequences. This is very similar to the language which Peirce uses to talk about the inference of sensations and of the faculty of Feeling in general. Like Statistical Deduction, and also most like Probable Deductions Proper, Deduction by "natural concomitants" is not a conscious and controlled process since it relies on a "natural" association. Such associations, as we've seen, are viewed by Peirce to be akin to compulsions from "within" (EP1:314, 1892).

With this view of Deduction under our belt, I next, I turn to Peirce's three kinds of Inductions before discussing how Peirce's articulation of different kinds of arguments in the 1900s maps onto the representational view of his learning mechanism that I argue he derived in the mid- to late 1860s.

Induction: Qualitative, Quantitative, and Crude

Consequently, in addition to the various kinds of Deductive inferences, Peirce describes three main kinds of Inductions – Qualitative Gradual Induction, Quantitative Gradual Induction, and Crude or Rudimentary Induction. They each describe a different way of working from a kind of hypothetical prediction. Like in Deduction – at least as it is expressed in the full or genuine version of Peirce's learning mechanism– Induction can be thought of in terms of stages, with only one stage being argumentative (i.e. involving chains of representations), while the others are only preparatory or accessories to the process. Peirce argues that Induction– at least as part of its involvement in a genuine learning mechanism– occurs in three stages.

First, there is a “Classification” stage in which “general ideas are attached to objects or Experience”. This step, due to its direct appeal to general ideas, seems to be closest to the hypothetical predictions of some kind of Deduction in the chain of representations that I take to be Peirce’s learning mechanism. The second stage is a “Probation” stage in which the classified predictions outputted from the previous stage are tested. It is at this stage that Peirce articulates the three main types of Induction, which he views as three kinds of probations. Lastly, there is the “Sentential” stage in which Induction performs a “final judgment”, i.e. outputs a final representation, of the “whole result” (EP2:442, 1908).

Qualitative Gradual Induction operates over a space of hypotheses outputted by some kind of Deduction. It tests a hypothesis by sampling from a space of the experiential predictions which have been explicated by Deduction and carrying out the scenarios described by these predictions. Since Theorematic Deduction is the only deductive inference Peirce lists as outputting not one, but several predictive conclusions, we would expect this set of predictions over which Qualitative Gradual Induction performs its sampling to be the output of Theorematic Deduction.

Peirce argues that the sampling which Qualitative Gradual Induction performs is not a random sample because the predictive hypotheses over which it is sampling are not “units”. Peirce argues that “[t]his kind of reasoning may be described in slightly different terms by saying that it tests a hypothesis by sampling the possible predictions that may be based upon it (EP2:105, 1901). Qualitative Gradual Induction comes in two flavors based on how much the set of predictions over which it is sampling appears to be a sample of all possible predictions which could be deductively inferred from the ideal hypothesis.

Quantitative Gradual Induction, by contrast, does deal with probabilities and ratios of frequency– and deals with them exclusively. Instead of sampling the Deductive predictions derived from a hypothesis, or theory, about the data; Quantitative Gradual Induction does sample from collections of singular individual units (EP2:105, 1901). I argue that this is because it is sampling from the output of a Probable Deduction, in particular, from the output of Statistical Deduction, which we have seen is a set of instances inferred from a universal and necessary *a priori* law or representation. In other words, Statistical Deduction (and

possibly Probable Deduction) only tells us how to pick out a set of subjects. Quantitative Gradual Induction seems compatible with such predictions as it is a way of computing a ratio of frequency from the set of subjects that have been picked out by Statistical (and possibly also by Probable) Deduction.

Quantitative Gradual Induction comes in three versions, with all three concluding a ratio of frequency about a collection of subjects.

> This family of inductions has three different kinds quite distinct logically. Beginning with the lowest and least certain, we have cases in which a class of individuals recur in endless succession and we do not know in advance whether the occurrences are entirely independent of one another or not. But we have some reason to suppose that they would be independent and perhaps that they have some given ratio of frequency. Then what has to be done is to apply all sorts of consequences of independence and see whether the statistics support the assumption…In the second variety of statistical induction, we are supposed to know whether the occurrences are independent or not, and if not, exactly how they are connected, and the inquiry is limited to ascertaining what the ratio of frequency is, after the effects of the law of succession have been eliminated…This second variety is the usual and typical case of statistical induction. But it occasionally happens that we can sample a finite collection of objects by such a method that in the long run any one object of the collection would be taken as often as every other and any one succession as often as any other. This may [be] termed a random selection. It is obviously possible only in the case of an enumerable collection. When this sort of induction is possible it far surpasses every other in certainty and may closely approach that of demonstration itself.
>
> (LL7:121-124, 1903)

Peirce describes this kind of Induction in some depth and its close relation to Deduction.

> The third order of induction, which may be called Statistical Induction, differs entirely from the other two in that it assigns a definite value to a quantity. It draws a sample of a class, finds a numerical expression for

> a predesignate character of that sample and extends this evaluation, under proper qualification, to the entire class, by the aid of the doctrine of chances. The doctrine of chances is, in itself, purely deductive. It draws necessary conclusions only. The third order of induction takes advantage of the information thus deduced to render induction exact.
>
> (LL7:120, 1903)

In this passage, Peirce makes it clear that Statistical, or Quantitative Gradual, Induction outputs a ratio of frequency computed over a collection which is the representational output of a Probable Deduction. Peirce argues that there are three ways in which Statistical, or Quantitative Gradual, Induction conducts this kind of inference.

In the first kind of Quantitative Gradual Induction, a ratio of frequency of qualitative character of interest is computed over a collection of subjects (of "these") picked out by Deduction that is *finite*. For this reason, the inductive inference takes the form of a random sample (EP2:98-101, 1901). However, Peirce considers two scenarios in which the collection of "these" of subjects picked out by the Deductive step is *not* finite, but is rather *countably infinite* (or "denumeral" (EP2:99, 1901)) collection.

In the second, and most typical, kind of Quantitative Gradual Induction, we are dealing with a countably infinite collection of subjects, picked out by the Deductive step, where the denumeral collection is "order[ed]" – that is, is organized according to a principle. In other words, the collection of "these" or subjects picked out by the Deductive step are put together in the mind, or "connected" (LL7:123, 1903) according to some organizing principle that can be used to draw as large a sample as desired from the infinite class pointed out by Deduction.

> Let us now consider another species of the first genus of induction… Let us now suppose that we are about to sample a denumeral collection in order to ascertain the proportionate frequency with which its members have a certain character designated in advance of the examination. Usually, there is no sense in speaking of a definite finite proportion of a denumeral collection; but I am going to suppose that this collection has an

> order which gives it a sense. The sample is to be drawn under the guidance of a precept under which we can enlarge any sample drawn indefinitely, and can also draw an indefinite number of samples. Now I shall suppose that in some way, no matter how, we become assured that a relation exists between four correlates, to wit, the predesignate character, the precept of sampling, the collection sampled, and the future course of experience, this relation being such that, in the long run, the distribution of the predesignate character in samples drawn under the precept will be the same as if they had been drawn strictly at random from an indefinitely large finite collection composing all our future experience of members of the same collection. Then, as before, we can infer inductively the proportional frequency of that character in future experiences of members of the same collection; and the induction must approximate indefinitely, though irregularly, to the true proportion.
>
> (EP2:101, 1901)

The precept of sampling, in the above passage, I take to refer to the universal and necessary law under which the Statistical Deduction is elaborating. I also take it to refer to the "order" or underlying organizing principle that gives "sense" to a countably infinite collection of "these", or subjects, picked out by Deduction. By arguing that in this version of Statistical Induction, the countably infinite (or denumeral) collection picked out by Deduction is "ordered", I take Peirce to be arguing that they are the output of a universal and necessary law that remains available to Inductive Inference, and allows Induction to sample as large a collection of "these", or subjects, as required, in a way that preserves their ordering according to a universal and necessary representation.

Peirce speaks directly to the point of what it means for a denumeral collection to be "ordered". In my reading of the following discussion, where Peirce speaks to the ordering of countable infinities, I read him as making the point that such orderings of countable infinity, while they can be *imposed* on infinities, are *subjective*.

> Every denumeral collection is numerable; that is to every member of it a separate ordinal number may be assigned; and this may be done in such a way as to exhaust the entire collection of finite whole numbers.

> Every denumeral collection, therefore, either has an order or may receive an order. A denumeral collection being taken in a certain order may be said to have a finite ratio to another taken in a given order, but, taken in another order, the ratio will be different. Thus taking the whole numbers in their natural order, one half of them are even; but they may be taken in such an order that only every third is even; as
>
> 1, 3, 2, 5, 7, 4, 9, 11, 6, 13, 15, 8, 17, 19, 10, etc.
>
> This series being indefinitely extended, no even number will be repeated nor will any odd number be repeated. For every number of the form 2N will be in the 3N place and every odd number of the form 4M + N where N is plus or minus 1 will be in the 3M + N place. To show that the whole is no more numerous than a part, or all the numbers than the even numbers, it suffices to write down
>
> 1 2 3 4 5 6 7 8 9, etc.
>
> 2 4 6 8 10 12 14 16 18, etc.
>
> Of course, there is no number without a double, and each double is an even number.
>
> (EP2:99-100, 1901)

Peirce argues here that the members of a countably infinite set can be ordered in such a way as to give the appearance of a certain ratio. However, this is merely an appearance, as another ordering may be given to that same countably infinite set that gives the appearance of a different ratio. See this section in particular, where he writes that "[a] denumeral collection being taken in a certain order may be said to have a finite ratio to another taken in a given order, but, taken in another order, the ratio will be different". Here Peirce is speaking about one of the properties of countable infinities which is that they can be given an order that makes it *appear* as if a certain finite ratio is present.

In the example above, for instance, Peirce is arguing that a countably infinite set can be given an ordering such that it appears as if two thirds of the infinity are odd numbers. We can come up with an ordering of

whole numbers such that we have two odd numbers followed by an even number (e.g. 1, 3, 2, followed by 5, 7, 4, and so on). Consequently, every finite sample of that countably infinite collection will make it appear as if in all of the countably infinite sample, there are more odd numbers than even numbers. In such an ordering of the countably infinite collection, the finite ratio of frequency of odd numbers in a finite sample of the ordered collection will appear to be ⅔. However, this way of ordering infinity can be matched up one by one with an ordering of infinity that makes it appear as if *half* of the countably infinite set are odd numbers. For example, in the typical way of ordering whole numbers which is (1, 2 followed by 3, 4, and so on), the finite ratio of frequency of odd numbers in a finite sample taken is ½. Because the two ways of ordering a countably infinite collection can be matched up one by one *indefinitely*, however, *the two ways of ordering the countably infinite collection must be equivalent*. Consequently, in a sense, both of the finite ratios are correct *given an arbitrary ordering of the countably infinite collection*. Since ordering is arbitrary, the computed ratio of frequency is a determination of the subject who is doing the counting.

By arguing that Statistical Induction is sampling from a countably infinite (denumeral) collection according to an order, and inferring a ratio of frequency from that finite sample, Peirce seems to be fully aware that this ratio of frequency cannot be said to be an attribute of reality– i.e. of an object *of representation*. Instead, it is a ratio of frequency that is only valid so far as it accepts an arbitrary *a priori* order. I argue that this ratio of frequency from Statistical Induction thus reflects a property of the subject *of representation* rather than the object *of representation.* In this way, Statistical Induction is very compatible with Peirce's Probable Deductions which can output, if not a finite sample, a *precept* (EP2:286, 1903) of sampling from a countably infinite (denumeral) collection according to a necessary and universal law– or order– which gives this denumeral collection its "sense". I return to the compatibility of Statistical Induction and Statistical Deduction in the next section, and the implications for the acquisition and cognitive behavior of representations associated with the cognitive faculty of Sensation of Reaction (Sensibility) later in this dissertation.

The last kind of Statistical Induction is the weakest form in which there is no order to the countably infinite (denumeral) collection that acts as a precept of sampling. In this last kind of Statistical induction, we do not even know whether the "class of individuals" that "recur in endless succession" is independent or not (LL7:121-2, 1903). Instead, we only have "some reason to suppose that they would be independent and perhaps that they have some given ratio of frequency". Peirce gives an example of this kind of inference (LL7:121, 1903), which involves, similarly to the other Statistical Inductions, the outputting of a ratio of frequency. I do not dwell on this last kind of Statistical Induction in order to dedicate more time to the most common kind of Statistical Induction which involves a countably infinite (denumeral) collection that is *ordered* according to a universal and necessary law which becomes its precept of sampling.

Peirce makes the case that the subjective aspect associated with Statistical Induction manifests as a very distinct approach to probability and certainty. Peirce makes the case that Statistical Inductions deal with the question of **morality** and **"moral" certainty** – the idea that certain things *should* not happen, even if they have a "conceivable" chance of happening.

> These are all the species I can mention of this first type of induction, in which we ascertain the value of a ratio and are morally certain to approximate to it indefinitely in the long run for each problem. By "morally certain," I mean that the probability of that event is 1. Of course, there is a difference between probably 1 and absolute certainty. In like manner, "bare possibility" should mean the possibility of that whose probability is zero. It is barely possible that a well-made pair of dice should turn up doublets every time they were thrown: it is a conceivable chance, though morally certain not to happen. But that a pair of dice will not turn up *sevens* is absolutely certain; it is not possible.
>
> (EP2:103, 1901)

Peirce gives the example of the moral certainty that accompanies our representation of dice that are "well-made". Because of this view of the dice, we infer that they "*should* not turn up doublets every time". This moral certainty accompanies the universal and necessary ordering of reality that renders any finite

ratio of frequency of the event as being “1”. Conversely, the probability of an event according to the universal and necessary law that is the ordering of the collection that *should* not happen, is taken to be “0” and to be a “bare possibility”. These feelings of being morally certain about the happening or non-happening of events rely on dealing with a world that has been ordered according to some precept of the subject. They do not necessarily match “conceivable chance” or the true possibility or impossibility of an event happening.

It is thus possible that well-made dice keep turning up “doublets”. We can *conceive* of a freak scenario where this would happen. But this *should* not happen. If this were to happen, we would take it to be a *mistake* or *accident*, without changing our minds about the fundamental ordering of the world. However, it is impossible that a six-sided die would turn up a seven. It is an event that is not even conceivable. Moral certainty is thus an important implication of Peirce’s views on Statistica Induction, and the kinds of cognitive behaviors it engenders in the mind.

The last kind of Induction in Peirce’s system is Crude Induction. This kind of Induction, I argue, differs from Qualitative and Quantitative *Gradual* Induction because it is an Induction that does not have a way of matching its hypothesis to occurrences. This is because it is an Induction that does not attempt to *explain* a set of experiences – either by articulating a theory in the case of Qualitative Gradual Induction, or by imposing an *a priori* order as in the case of Quantitative Gradual Induction. Such a work of explanation, for Peirce, involves the matching of occurrences to a general law– abstracted from the experience or imposed upon it (as in the case of necessary and universal representations or laws). It is this matching of individual occurrences to a general law (abstracted or universal) that allows one to *extrapolate* to explain, as of yet, unseen or unexplained experiences and articulate them in terms of what has already been seen or experienced. *For Peirce, this mapping of individual experiences to abstracted or universal laws enables the explanation of the future in terms of the past* (EP2:103, 1901). It thus constitutes, for Peirce, what it means to be engaged in an act of *explanation*.

> The second genus of induction comprises those cases in which the inductive method if persisted in will certainly in time correct any error that it may have led us into; but it will not do so gradually, inasmuch as it is not quantitative;—not but that it may relate to quantity, but it is not a quantitative induction. It does not discover a ratio of frequency. The first species under this genus is where the collection to be sampled is an objective series of which some members have been experienced, while the rest remain to be experienced, and we simply conclude that future experience will be like the past.
>
> (EP2:103, 1901)

In Crude Induction, however, there is no such explicit attempt to explain the future by a re-examination and re-organization of past experiences, or by a re-interpretation of it in terms of a universal law. The past experience remains unanalyzed and is only thought of in terms of itself. Consequently, to the extent that an explanation of the future can be given in terms of an unanalyzed past, it is to give "slight" and "negative" (EP2:104, 1901) support to the only hypothesis that can be articulated in this situation, which is that the unanalyzed past continues to be the case and that we are not dealing with a new experience. It is thus a hypothesis articulated purely, and solely, in terms of resemblance to an unanalyzed past.

> It gives, therefore, but a very slight and merely negative support to the hypothesis. It is a proper answer enough to gratuitous hypotheses. It is impossible to avoid making some use of it for that purpose. But it must be set down as the weakest possible of inductive arguments.
>
> (EP2:104, 1901)

Peirce gives an example of what such an Induction can look like.

> We may take Quetelet's well-known example of the ancient Greek who, never having heard of the flux and reflux of the ocean, should have wandered to the shores of the Bay of Biscay and should have there seen the tide rise for *m* successive half-days…if the Greek had seen the tide rise just often enough to suggest to him that it would rise every half-day forever, and had proposed then to make observations to test this hypothesis, had done so, and finding the predictions successful, had provisionally accepted the theory that

> the tide would never cease to rise every half-day, there would be just this justification for this conclusion, that it was the result of a method which, if it be persisted in, must correct its result if it were wrong. For if the tide was going to skip a half-day, he must discover it, if he continued his observations long enough. This degree of justification and no more he would have whether he made a dozen trials, or half a dozen, or three, or two,or one only, or even none at all. The argument would have precisely the same justification in either case. The method would infallibly correct itself, provided he continued this series of experiments; but not if he dropped it and subsequently commenced another series, as would be the case with quantitative induction.
>
> (EP2:103, 1901)

Peirce's point in this passage is that the hypothesis being tested is an unanalyzed hypothesis articulated in terms of the character of the experience itself– that "the tide would never cease to rise every half-day". There is no attempt to extrapolate from that about the tide's generalized behavior. The hypothesis is articulated in terms of the experience, which is the observation that over the half-day the tide has risen. It is for this reason that Peirce argues that the same method would be followed regardless of whether the hypothesis was formulated after a "dozen trials", "one", or "none at all". It is a hypothesis that can be articulated for any character of experience that remains unanalyzed, because it makes no predictions about individual experiences, other than the hypothesis that the future will look like the unanalyzed past.

With this, I have offered my interpretation of Peirce's Abductive, Deductive, and Inductive arguments from the 1900s. In particular, I have shown that Peirce's Deductive and Inductive arguments can each be broken up into three main varieties that seem to have some affinity with one another, such that some kinds of Deductions seem to have an affinity for some kinds of Inductions. Moreover, I have shown that not all the hypotheses tested by Deduction are Abductive– that is, not all the hypotheses tested by Deduction, are concerned about *truth* or with the object *of representation*. In the next section, I show how these different kinds of arguments can come together to elaborate in argumentative terms three versions of Peirce's learning mechanism when we relax the view that Peirce is committed to only one logic of discovery which is Abductive inference. I make the case that Peirce puts forward in addition to Abductive

inference, and its reliance and *association by causality*, two other kinds of associations that we've seen earlier in this section. These are *association by continuity* and *association by similarity*. I argue that when we view Peirce as offering three different ways of arriving at an explanatory hypothesis of a set of experience, and as offering three versions of Deduction and Induction, these come together quite naturally to support a view of his learning mechanism that upholds degenerate versions. I maintain, as is my main thesis in this dissertation, that the three versions of Peirce's learning mechanism are describing three specialized inferences associated with three specialized cognitions with specialized inputs, specialized outputs, and specialized computations that transform inputs into outputs.

Peirce's three versions of his learning mechanism in terms of his three arguments

Concept Learning as Analysis by Synthesis

Peirce's concern with a concept learning mechanism– a representational process through which something out of consciousness, or out of mind, comes to be articulated in terms that are intelligible to the mind– anticipates a contemporary interest in the cognitive sciences. In particular, recent work on a representational view of mind (Fodor 1975) has been accompanied with a view of the mind that increasingly views it in terms of representations, processes defined over these representations (Carey 2009), and probabilistic inference (Tenenbaum et al. 2011). In chapter 2, I started to advance the view that Peirce's approach to concept learning, in the guise of his views on abstracted meaning, had much in common with a contemporary view of cognition that sees certain tasks of cognition– for example visual perception– to be analogous to a communication problem. Such a communication problem involves a transmitter of a message (who is considered as being out of view), a message set, a channel and the coding rules for that channel, and a receiver (Knill 1996).

This view of cognition as a communication problem proposes to solve the problem in terms of bayesian probabilistic inference, in which we attempt to interpret the message received by the receiver in terms of a message set composed of structured representations, each associated with a probability. A message,

then, is seen as a synthesis of structured representations, where every message has a definite probability as a set of experiences which can be explained as a probabilistic combination of structured representations from the message set. The analysis of the message, consequently, takes the form of synthesizing a hypothesis about the data articulated in terms of the message set, which is then tested against some measurements about the message itself. We settle on an interpretation of the data in terms of the combination of the message set that best explains the behavior of the data.

> We propose an "analysis by synthesis" strategy where low-level cues, combined with spatial grouping rules (similar to Gestalt laws), make bottom-up proposals which activate hypotheses about objects and scene structures. These hypotheses are accepted, or rejected, by direct comparison to the image (or a filtered version of it) in a top-down process. These bottom-up proposals come with probabilities, which are a measure of their strength. If bottom-up proposals are sufficiently strong (i.e. the low-level cues are sufficiently unambiguous) then they may be accepted without any need for verification at a lower level.
>
> (Yuille and Kersten 2006:4)

This description of the contemporary methodological approach in the cognitive sciences– this "analysis by synthesis" – sounds strikingly similar to Peirce's descriptions of his "synthesis" or representational learning mechanism. I argue that Peirce's work on a representational learning mechanism for his specialized view of cognition articulates a kind of analysis by synthesis. I make this argument more fully in chapter 4. For now, I conclude this chapter with a final articulation of Peirce's learning mechanism in terms of his three arguments– Abduction, Deduction, Induction– that makes clear the connection of these arguments to his representational view of his learning mechanism articulated early in his career.

The Specialized Cognition of the Cognitive Faculty of the Understanding

I have so far made the case that Peirce maintains three logics of discovery which are associative in nature – with association by causality, or Abduction, being but one of the three ways in which the mind comes up with hypotheses that explain a set of experiences. In addition, I made the case that Peirce also

maintains three main kinds of Deductions (one unconscious and uncontrolled), and three main kinds of Inductions. I now argue that these different kinds of logics of discovery, deductive arguments, and inductive arguments map onto a representational view of Peirce's learning mechanism. In particular, I make the case that they describe the inferential behavior of *three versions* of Peirce's representational learning mechanism – one genuine and two degenerate – each associated with one of Peirce's specialized cognitive faculties. I associate the genuine version of Peirce's representational learning mechanism Peirce's specialized cognitive faculty of the Understanding, and the two degenerate versions with the cognitive faculties of Feeling and Sensation of Reaction. I begin with the genuine version of Peirce's representational learning mechanism, its articulation in terms of a chain of representations summarized as a chain of arguments, and its association with Peirce's specialized cognitive faculty of the Understanding.

I argue that Abduction (association by causality), Necessary Deduction (Corollarial and Theorematic), and Qualitative Gradual Induction come together to describe the genuine version of Peirce's learning mechanism (see Figure 10). Abduction, through its reliance on resemblance, makes the proposal of an abstract hypothesis whose peculiar meaning to the mind resembles an aspect of the object *of representation* as immediate impression. This corresponds to the second order mark between the ground *of representation* and the first hypothesis of Being (or "what is") depicted in Figure 10, where the hypothetical marks belong to the relational representation that is the ground *of representation*. As we saw in chapter 2, the proposal of Abduction differs from a hypothesis based solely on resemblance between an aspect of the immediate impression and inherited associations among feelings. Instead, its proposal is articulated as a representation (*B*) in the mind's hypothetical language of thought through the single order mark connecting *B* (quality or phenomenal form) to the ground *of representation*. I argue that this represents the first argument – or chain of representations– in the genuine version of Peirce's representational learning mechanism.

Next, the Necessary Deduction argument begins. It comes in two forms. The simplest is a representation (*A*) with no hypothetical marks of its own, whose only function in the learning mechanism is its connection

to the representation (*C*) via a mark of the second order, and to *B* via the imputed or ideal mark implied by the relation of both *B* and *A* to C. The three sets of marks– both real and ideal (imputed) – belong to *C* (representation or phenomenal accidents) whose external essential mark is that of the third order. This, I argue, maps onto Peirce's Corollarial Deduction which does not involve experimentation in the imagination, but merely the direct explication of the consequences of the Abductive hypothesis. In its second form, Necessary Deduction in the model that I present involves the activation of representation *A* (relation or phenomenal matter) and its second order mark.

In the model I present, the second form of the Necessary Deduction argument involves, in addition to the representations and marks that distinguish Corollarial Deduction, an activation of the second order mark of *A*. This second order mark refers also to the object *of representation* but poses, instead of the hypothesis of being, the experimental hypothesis of the noumenon. It is through this mark, I argue, that Peirce must have envisioned the experimentation in the imagination involved in Theorematic Deduction. Such experimentations involve a *relational* reference to the object *of representation* that views it as a representation associated with the specialized faculty of Sensation of Reaction. This faculty, as we saw in chapter 2 is involved with memory and imagination.

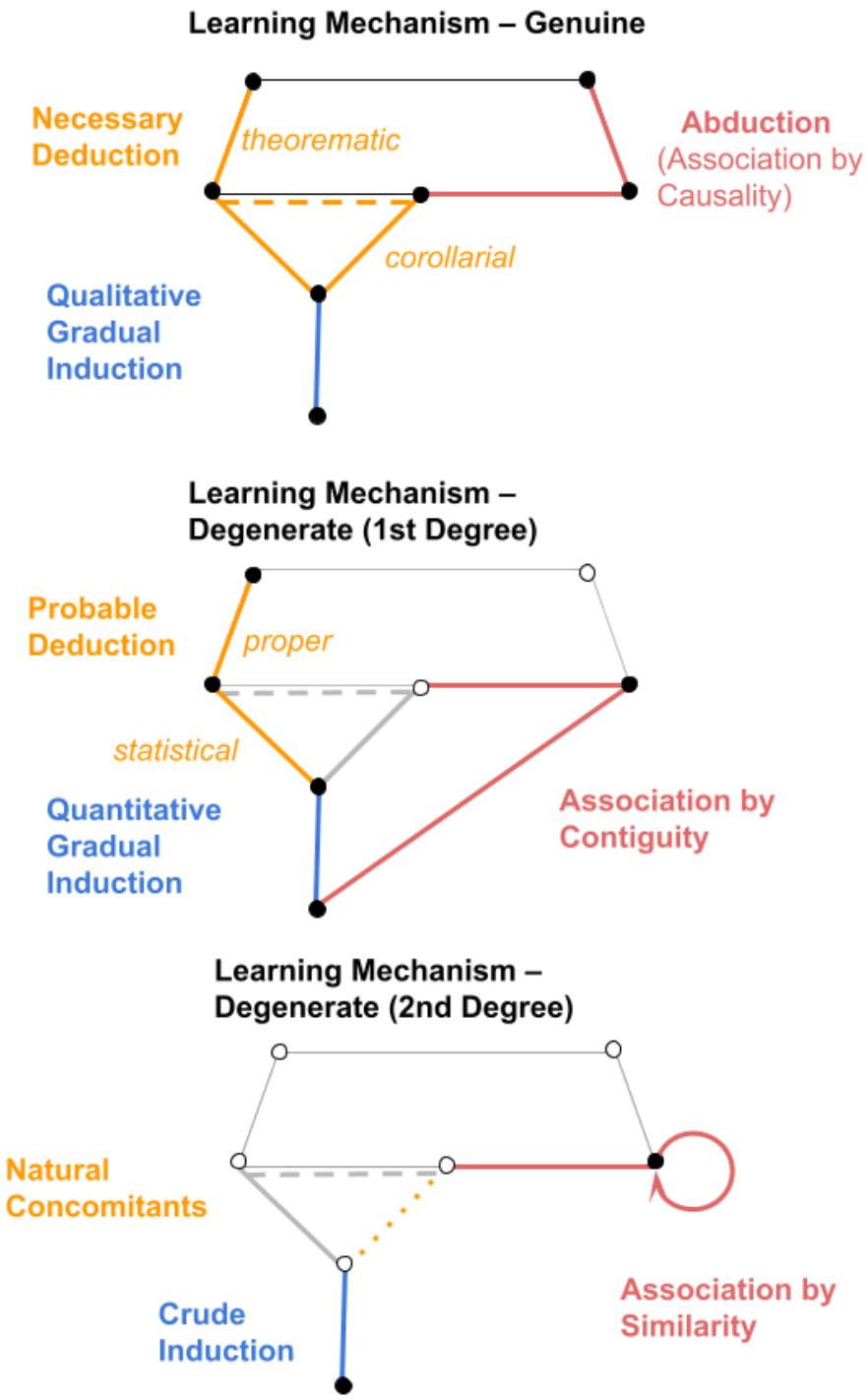


Figure 10: The three versions of Peirce's representational learning mechanism articulated in terms of Peirce's later work on inferential arguments.

Lastly, I argue that we encounter the last argument in Peirce's representational learning mechanism which is a form of Induction. It is not entirely clear from generally available primary material whether Peirce believes that all three versions of probation are involved in the inductive step of the genuine version of his learning mechanism. As we saw in 1908 (EP2:442, 1908), Peirce mentions that all three "probations" (Qualitative Gradual Induction, Quantitative Gradual Induction, and Crude Induction) are involved in a version of the learning mechanism that includes Abduction. For this reason, I take him as referring to the full version of his learning mechanism that results in conceptual knowledge. However, while he specifies how the different *stages* of inductive reasoning cooperate, he is not as clear about how the different *kinds* of probations work together. Regardless of whether all three or only one kind of probation is involved in the genuine version of Peirce's learning mechanism, however, I maintain that the involvement of Qualitative Gradual Induction of this version of Peirce's learning mechanism sets it apart from the others.

As we saw, Qualitative Gradual Induction works from a hypothesis that is a representation treated *as* a representation– a having attributes to the mind that come from resemblance to its innate feelings. Qualitative Gradual Induction begins from an Abductive hypothesis – from the proposal of an abstracted *peculiar meaning* which has been explicated in terms of *logical subjects* in the imagination. In other words, it begins from a representation of a comprehension and extension as corresponding to one another as *accidents* in that representation (*C*). I argue that Peirce's Qualitative Gradual Induction matches this ideal hypothesis articulated as predictions in the form of logical subjects, and matches these logical subjects to *substantial subjects* – or to parts of an immediate impression. This corresponds to the "testing" of the ideal hypothesis in experiential terms. These substantial subjects can be in memory – as in the cases where the induction corresponds merely to an observation, or to the actual manipulation of experience.

Induction thus involves the determination of a subsequent representation in which these observations of manipulations are to be carried out. However, this subject representation, which is the subject *of representation, remains* out of view. In my model, the second order mark that connects *C* (representation

or phenomenal accident) to the subsequent representation, and which is fundamental to the completion of Peirce's learning mechanism belongs to a subsequent representation which remains undistinguished in terms of its essential existential relations or overall number of hypothetical marks.

With this, I have described how a version of each of Peirce's arguments (Abduction or logic of discovery, Deduction, and Induction) come together seamlessly to describe the learning mechanism that I derived from Peirce's numerous drafted attempts at deriving his five universal categories or conceptions in the late 1860s– early in his intellectual life. I have contributed to the literature a completion of Peirce's learning mechanism at the time– which remained scattered across his drafted notes– and I have shown that they correspond very precisely to his more mature articulation of his learning mechanism in terms of arguments. I now turn to the next version of Peirce's learning mechanism which is degenerate in the first degree, and which I argue corresponds to Peirce's specialized cognitive faculty of Sensation of Reaction.

The Specialized Cognition of the Cognitive Faculty of Sensation of Reaction

The second form of Peirce's learning mechanism, I argue, involves a different logic of discovery than Abductive inference (association by causality). Instead of involving a reference to the object *of representation* through its immediate impression on the mind, this kind of inference instead makes a reference to the subject *of representation*. The first representation in this degenerate version of the learning mechanism, consequently, is the ground *of representation* which makes its reference to the subject *of representation* using a second order mark. I argue that this gives rise to the behavior of "association by contiguity" (EP2:50, 1868) in which, when faced with an object *of representation*, there is a compulsion to put it together in the mind in a particular way, for which arrangement there is no *reason*. This way of putting together the object *of representation* is arbitrary, because it has nothing to do with a character of the object, and all to do with how the subject *of representation* determines it.

This arbitrary, and compulsive, way of putting together the object *of representation* together in the mind is a hypothesis about that object. It is, however, a very different kind of hypothesis than the hypothesis of

Abduction (association by causality). First, because it is not concerned with a character of the object *of representation*, which is fundamental for Peirce for any discussion of truth, this kind of hypothesis is unconcerned with, or "unsusceptible of" truth (W1:334, 1865). For this reason, there is no effort in this kind of degenerate inference to match a hypothesis to its ground truth or object.

The next representation in Peirce's learning mechanism is *B* (quality or phenomenal form), the representation which is distinguished by its single mark of identity. *B*'s reference to the ground *of representation* ends the step of discovery in Peirce's learning mechanism. However, since the ground *of representation* here is a common character of the subject *of representation*, it is an *a priori* representation that is determined from within (W1:246, 1865). This kind of representation, as we've seen, is associated with the specialized cognitive faculty of Sensation of Reaction, and is thus articulated in terms of feelings *as instances*. In particular, it is associated with feelings that mark *transition* in feelings. Such feelings as instances are not taken by the mind as representations– or as standing in for any other attributes. Instead, their meaning is the transition that they mark and patterns in these transitions. This, I argue, is where the degeneracy of the first order comes in for this version of Peirce's mechanism.

There can be no establishment of resemblance between *B* and the ground *of representation*, because the character of the ground *of representation* is not a feeling as a *representation* which can be compared to the mind's innate feelings. For this reason, the representation *B* is degenerate. Because *B* is degenerate, there can be no second order relation between it and the subject *of representation*. Moreover, as a consequence, there can be no imputed relation between *B* and *A* (relation or phenomenal matter). While the rest of the learning mechanism remains the same – we still have the second order mark from *C* to *B*, and the second order mark from *B* to the noumenon – this leads to a very different learning behavior. I argue that this leads to a difference in Deduction and Induction, where the Deduction is a Probable Deduction which deals with a hypothesis that is a necessary and universal law that treats the object *of representation* as an instance. Such a law interprets the instance as part of a field (see chapter 2), which is defined over all instances of this kind, and which places this instance into necessary relations that situate it vis-a-vis all other instances in this universe.

We saw earlier in this chapter, that this kind of Deduction, in its two versions, involves an inference that outputs a collection of logical subjects, or a “precept” (EP2:286, 1903), i.e. method, by means of which a collection of subjects may be sampled. The two versions of Probable Deduction most likely are analogous to the difference between Corollarial Necessary Deduction, which does not involve a reference to the hypothesis of the noumenon, and Theorematic Necessary Deduction which does. Moreover, at least one of these two probable deductive inferences (Statistical Deduction) in one of its forms is an immediate inference and not conscious or controlled, but the result of blind habit.

Similarly, I argue that the inductive inference involved in this degenerate version of Peirce’s learning mechanism is his Quantitative Gradual Induction. As we saw, this kind of inductive inference does the work of actually taking a sample and arriving at the estimation of a ratio of frequency for a predesignate character of interest. It is in this way that the object *of representation* comes to be considered as possessing certain qualities, but these qualities are ever only estimation of a ratio, or *relative* frequency. Moreover, we saw that a unique attribute of this kind of inductive inference is how it treats countably infinite collections defined by a precept of sampling outputted by a Probable Deduction. Samples taken from such collections rely on a *subjective* ordering of their members. Consequently, we cannot speak of a definite ratio of frequency, but only of a ratio of frequency in a *sense* – or which takes for granted a subjective way of ordering reality. I return to Peirce’s degenerate learning mechanism, in the first degree, in chapter 4, and focus particularly on this point and its implications for representations associated with this version of Peirce’s learning mechanism.

I argue that this degenerate version of Peirce’s learning mechanism is the version used by his specialized mental faculty of Sensation of Reaction. The specialized input of this specialized cognitive faculty is thus a transition in feelings, or what Peirce calls an “effort” (W1:491, 1866). Such a transition is treated quantitatively, or as an instance, rather than qualitative, or as a representation of some other attribute. This specialized input is processed by a version of Peirce’s learning mechanism which is degenerate in the first degree. The specialized output is a representation of the object *of representation* that is arbitrary

and governed by a hypothesis that is a character of the subject *of representation* rather than a character of the object. It thus corresponds to a representation which has extension (i.e. points out a collection of subjects), but no comprehension (i.e. does not establish a relation of resemblance to the innate feelings of mind).

The Specialized Cognition of the Cognitive Faculty of Feeling

Lastly, I argue that Peirce's learning mechanism comes in a third version which is degenerate in the second degree. This third version of Peirce's learning mechanism involves a representation of the object *of representation* purely in terms of the material quality of the ground itself– which is feeling, or an instantaneous state of the nervous system. Such a ground *of representation*, the first representation in Peirce's learning mechanism, makes a reference to itself in this version of Peirce's learning mechanism. This leads to two degeneracies in Peirce's learning mechanism. First, as we saw in the last version of Peirce's learning mechanism, which is degenerate in the first degree, the representation *B* cannot establish a relation of resemblance with the ground *of representation*. *B* (quality or phenomenal form) is thus degenerate because it cannot express the coordination of parts, or form, that characterizes a representation taken *as* a representation.

Similarly, in this version of Peirce's learning mechanism, the ground *of representation*, while not quite a quantity or instance, is not taken as a representation because it has no external essential mark. It makes no appeal or reference to another representation, and is not involved in a symbolized inference. Instead, it relies on its innate associations with other feelings to lead to automatic associations by similarity– which we saw in chapter 2, involve two feelings sharing a neural connection according to Peirce's self-crafted neuroscience. The Deduction, in this degenerate version of Peirce's learning mechanism, is merely the inherited associations among feelings bequeathed by evolution. They do not rise to the level of consciousness. I argued earlier in this chapter that this kind of Deduction corresponds to Peirce's deduction by "natural concomitants" (EP2:113, 1901).

Lastly, I argue that the inductive argument in this degenerate version of Peirce's learning mechanism corresponds to Peirce's Crude Induction. Such an Induction, as we saw, does not require the explication of a hypothesis in terms other than itself. It is simply the hypothesis of the continuation of an analyzed past. In other words, it supports hypotheses that are not articulated in terms of their references to other representations. Such an Induction is compatible with both a hypothesis and a Deduction that are not articulated in terms of explicit symbolization

Peirce's learning mechanism, degenerate in the second degree, thus completely sidesteps the parts of Peirce's mechanism which involve direct or explicit references to collections of subjects, or extension. All three representations involved in phenomenon or thought – *A* (quality or phenomenal form), *B* (relation or phenomenal matter), and *C* (representation or phenomenal accident) – are degenerate in Peirce's learning mechanism. Consequently, to the extent that the subject *of representation* makes a reference to *C*, it is making a reference to the material quality of the ground *of representation* itself as a feeling. In this way, while this version of Peirce's learning mechanism has comprehension (i.e. makes a reference to the mind's innate feelings), it lacks extension.

With this I have made the argument that Peirce maintains a specialized view of cognition with three related specialized cognitive faculties throughout his intellectual career. This includes his earliest years in the late 1850s to his mature years. I have shown the continuity of this view through a number of changes in Peirce's system; and I have made the argument that these changes did not consist in an overhaul of this view, but in a deepening of it. In the concluding section of this chapter, I return to this overarching argument, and discuss its implications for the secondary literature on Peirce. I address in chapter 4, what the implications of the specialized view of Peirce's work on cognition that I propose in this dissertation are for a contemporary audience in the cognitive sciences and in the sociology of cognition.

3.5 Conclusion

Reading Peirce as offering a specialized theory of cognition: response to Murphey

This chapter marks a transition point in the dissertation as the last chapter that focuses exclusively on a reading of Peirce as offering a specialized theory of cognition. In chapter 4, I transition to the implications of such a reading of Peirce for contemporary debates in the cognitive sciences and the sociology of cognition. For this reason, I take the time to close out the key themes and questions discussed in chapters 2 and 3 here. First, I return to Murphey's two objections to Peirce's theory of cognition, and his confusion about Peirce's attentional subject.

I already showed in chapter 2 that Murphey's logical objection to Peirce's system regarding the predication of qualities is addressed when we view Peirce as offering a specialized theory of cognition, with one of the faculties – Feeling– being inherited or evolutionarily bequeathed. Predication, then, both involves the inheritance of qualities and a *comparison* of two objects in direct or immediate perception. In this way, an object comes to have the qualities that it has for a mind, in Peirce's system, *both* because the possibility of perceiving those qualities is inherited *and* because an act of comparison yields a resemblance in some aspect to those inherited potentialities which is actualized and predicated of an extension or subject. However, at the end of chapter 2, I had not finished addressing Murphey's metaphysical objection to Peirce's system, which is the argument that Peirce's system is inconsistent with the metaphysical categories that it endorses. I provide Murphey's full criticism in the passage below.

> The second kind of adequacy required of the categories is metaphysical: they must resolve the problem of the relation of the three universes. The "It" appears in the "New List" as the object. The "I" or pure abstraction, is of course the ground (1.551), while the Thou appears as the interpretant. Since these are the three references of the sign, it is the sign itself that is the glue which holds this multiple universe together. Peirce spells this out in some detail in a paper of 1866….This passage suggests that the terms "Firstness," "Secondness," and "Thirdness" were first derived from the names of the pronouns and only later matched with the number of entities connected by the relations…*One sees here a typically Peircean procedure: having set forth a doctrine with appropriate terminology, Peirce revises and refines the content of the*

> *doctrine while maintaining the the form and terminology unchanged.* Thus, extensive revisions of position pass unnoticed under a shell of changeless terminology, *to the utter confusion of the reader*.
>
> (Murphey 1961:88-9, emphasis added)

Murphey's metaphysical objection centers around the idea that Peirce maintains the same terminology of first, second, and third for his metaphysical categories, even as he undertakes overhauls of his system that changes what these categories mean. As I have shown, however, there is another way to read Peirce that avoids this "utter confusion". It is simply that Peirce is not describing *one* triad but *three nested* triads involved in cognition, as part of his specialized theory of cognition.

I made the case that Peirce was advancing a specialized view of cognition with three specialized cognitive faculties which he names Feeling, Sensation of Reaction (Sensibility) and Understanding. I have shown that Peirce maintains this distinction (which he introduced very early in his career) throughout the middle and late stages of his career. However, in addition, Peirce also maintains three "worlds" (W1:46, 1861 or "impulses" (W1:8, 1859) over which these specialized cognitive faculties are defined. These are the representational universes of the "I", the "IT", and the "THOU", each corresponding to a kind of representation which the mind recognizes – innate feelings or instantaneous states of the nervous system, transitions between feelings or two sides of an instant, and feelings articulated as a *composite* representation involving both innate feelings and their reference to comprehension, as well as transitions among feelings and their reference to extension. These three "universes" or "impulses", I argue, correspond to different *representational domains* of cognition.

I made the case that Peirce's views on these three *specialized cognitive faculties*, and their three *specialized domains of representations* are not reducible to the same level of explanation. Instead, as is crucial for any view of cognition that maintains specialization and upholds domain specificity, there are specialized domain representations as well as specialized operations defined over those representations (Wellman & Gelman 1992). Together, they come together to articulate a domain which is not reducible to either alone. I make the case that this is precisely the case with Peirce's specialized view of cognition. In

chapter 2, I covered Peirce's three specialized cognitive faculties, and his three specialized domains of representations. In this chapter, I covered the *specialized operations* or *inferences* associated with each of Peirce's three domains of cognition. These, I argue, involve the notion of *degeneracy* which allows the articulation of specialized versions of Peirce's learning mechanism that all have a relationship to an overall domain *general* learning mechanism. I return to this question of a domain specific versus a domain *general* learning mechanism in chapter 4.

I argue that Peirce's specialized operations or inferences, are degenerate versions of a learning mechanism described by the third nested triad in Peirce's theory of cognition. This nested triad expresses the general cognitive faculty of the Understanding, which is the full and genuine form of Peirce's learning mechanism. In the genuine version of Peirce's learning mechanism articulated there, we deal with three representational aspects of thought, or the phenomenon. These are quality (phenomenal form), relation (phenomenal matter), and representation (phenomenal accidents). This triad is crucial, and can be thought of as the engine that powers Peirce's learning mechanism. Degeneracy in Peirce's learning mechanisms is expressed as degeneracy in this innermost triad. Degeneracy in the first degree corresponds to a degenerate quality (phenomenal form), while Degeneracy in the second degree corresponds to *both* a degenerate quality (phenomenal form) and a degenerate relation (phenomenal matter).

Consequently, I argue that missing the specialized nature of Peirce's work on cognition leads to confusion in understanding his work on his metaphysical categories – i.e. the universal categories that he introduces to the world in 1867. I analyze Peirce's derivation of these categories, and show that in his many drafts leading up to his "New List" publication of 1867, Peirce is involved in a project that yields his model for a representational view of a concept learning mechanism. This model for a learning mechanism, however, was left out of the "New List" publication. This omission not only gives the impression that Peirce did not develop his full version of a concept learning mechanism until much later, but also obscure the hypothetical nature of his later work on this learning mechanism.

The exercise of reconstruction that I undertake in this chapter, shows that Peirce's work on hypothetical marks, or essential external relations, were part of Peirce's attempt to articulate his learning mechanism in representational terms. By putting Peirce's attempts together, I propose to have completed Peirce's objective with these drafts. This objective, I maintain, was to articulate his learning mechanism, which involves a long chain of representations, in terms of hypothetical marks or external essential relations. By completing Peirce's project in this dissertation, I am offering – to my knowledge– the first published account of this early version of Peirce's completed representational description of his learning mechanism.

I show that the resulting learning mechanism is entirely consistent with Peirce's mature work which, I argue, articulates the same learning mechanism in terms of his three kinds of arguments – Abduction, Deduction, and Induction. Moreover, in light of my completion of Peirce's 1865 to 1867 representational view of his learning mechanism, it becomes clear that Peirce's work on arguments are describing *three different versions* of each kind of argument, which come together to describe three versions of his learning mechanism. Peirce's work on degeneracy, consequently, which has also not received as much attention in the secondary literature outside of work on Peirce's semiotics, comes to play a focal role in understanding his work on specialized domains of cognitions and the inferential operations defined over such domains.

We can now at last understand a somewhat cryptic note from 1861 on Peirce's three domains of representations – I, IT, and THOU – associated with his three domains of cognition.

> I looks in,
>
> It looks out,
>
> Thou looks *through*, out and in again.
>
> (W1:45, 1861)

In light of the thesis put forward by this dissertation, and in light of its reconstruction and completion of Peirce's representational learning mechanism and its three versions, this passage takes on an intelligible meaning. "I", the domain of representations associated with the specialized faculty of Feeling, looks "in" to innate association and the qualitative attributes they give rise to in the mind. "It" , the domain of representation associated with the specialized faculty of Sensation of Reaction (Sensibility), looks "out" to the object *of representation* and its immediate impression on the mind which is viewed as external. Lastly, "Thou" looks "through", involving a dynamic that leverages both domains of representations of "I" and "It".

Peirce's Three Logics of Discovery and Definition of Explanation

One consequence of viewing Peirce as maintaining a specialized view of cognition, as I have proposed in this dissertation, is that it changes our views on Peirce's Abduction and associated work on a logic of discovery. The contemporary literature that touches upon Peirce's learning mechanism has focused almost exclusively on Peirce's Abduction. This literature has focused on Abduction's role in discovery (Hanson 1958; Jantzen 2016; Magnani 2001, 2009). Such a literature, and its association with scientific discovery as a whole, has filtered into sociology's methodological literature (Tavory & Timmermans 2013, Timmermans 2014, Reichertz 2007). One implication of my work on Peirce's learning mechanism is that Abduction is *not* the only logic of discovery that Peirce maintains.

My work in this area maintains that Peirce offers *three* ways in which a hypothesis explaining an experience can arise, and consequently, *three* different kinds of explanations. I argued in this chapter that Peirce's Abduction corresponds to his "association by causality" (EP1:50, 1868), which is one of his three different forms of associations which result in hypotheses. The other two are association by contiguity and association by similarity. These three kinds of associations correspond to different hypotheses that can be made about a set of experiences depending on the cognitive faculty in question. Thus, a set of experiences can be explained vis-a-vis a character of the object *of representation* – the most well-known case in Peirce's system. In this case, the governing hypothesis is arrived at through Abduction. However, a set of experiences can also be explained vis-a-vis a character of the subject *of representation*. In this

ase, the governing hypothesis is arrived at through an association by contiguity which is both necessary and universal through the representational universe of the hypothesis. Lastly, a set of experiences can be explained vis-a-vis a character of the ground *of representation* – which is something that both the object and subject *of representation* have in common. In the case of cognition, this is the material quality of feeling itself– the biological neurons and neural connections in the brain. Consequently, a set of experiences can be explained in no other terms than the material quality of what they are. The hypothesis remains analyzed in terms of other representations or terms.

The significance of this view that I put forward – that Peirce supports *three* ways of formulating hypotheses about the world, and three ways of formulating an explanation– stands to contribute to this interdisciplinary community interested in scientific discovery and concept learning viewed as an act of discovery. In particular, it raises the question of how we know which kind of hypothesis to offer for a set of experiences. For Peirce, this question is intimately connected to the notion of *surprise* (EP2:287, 1903). The faculty of Understanding and the explanations that it offers using association by causality or Abduction is only kicked into gear when we experience surprise. This surprise already presupposes a hypothesis of some kind. Consequently, Peirce leans into one of his core tenets which is that every cognition is the result of a previous cognition.

Surprise occurs when a hypothesis we have about the world fails to explain it. Thus, this brings into the picture another key notion, which is that of the relation among *explanation*, *causality*, and *consciousness*. Peirce, as we saw, defines explanation as the explanation of a new, or as of yet unexplained, set of experiences in terms of old, or explained, experiences[22]. The experience of surprise arises in light of a violation of expectation of a pre-standing hypothesis of some kind. The nature of the hypothesis that prompts our surprise up to that point is nearly irrelevant. What is important is that after that point of surprise, we enter into the process of formulating a *causal* explanation through the faculty of Understanding. This causal explanation differs from other kinds of explanations because, being conscious and deliberate, it becomes in Peirce's system a *conscious* explanation. Conscious explanations involve

[22] In this way, Peirce is in agreement with a contemporary literature on learning mechanisms and hypothesis testing (see Carey 2009)

the mental faculty of Understanding which operates in terms of *propositions* that predicate feeling (comprehension) to transition(s) in feeling (extension). For this reason, the representations of the specialized faculty of Understanding are propositional, and are for that reason, the only kinds of representations that are *knowledge* and can be called *conceptual*.

The specialized view of Peirce's theory of cognition that I offer thus holds implications for scientific discovery in its articulation of three logics of discovery. It also stands to contribute to this community in the relation it establishes between surprise, the deliberate and controlled inferences of the faculty of Understanding, composite (propositional) representations, and causal explanation.

Peirce's hypothetical language of thought and psychological essentialism

Lastly, I want to take a moment to return to Peirce's hypothetical marks or essential external relations which proved to be the key to unlocking Peirce's attempts at articulating a representational view of his learning mechanism in the late 1860s. This work occurred as part of Peirce's drafting of what is arguably the most well known aspect of his system, which are his five universal categories or conceptions. It is my view that Peirce sought a way to articulate a representational learning mechanism – a mechanism that can only be described as a chain of representations– in terms that would distinguish among the different kinds of representations involved and their role in the learning mechanism. Peirce adopts a view of essential external relations as a way to meet this goal. However, there are important aspects of this effort that go beyond Peirce's articulation of his learning mechanism.

First, Peirce advances as part of this work a view that has gained traction in the cognitive sciences and philosophy on psychological essentialism (Gelman 2004; Gelman and Wellman 1991). This is the view of psychological essentialism – the idea that cognition has as one of its fundamental aspects the hypothesis that something seen is matched by an unseen underlying mechanism. A well-known psychological study (Keil 1989) exemplifies this idea. In a set of experiments, children and adults were asked to assess whether a drawing was a racoon or a skunk. Some responders were given a drawing of a skunk, but told

that it used to be a raccoon which had been physically altered to look exactly like a skunk. Young children still maintained that despite looking indistinguishable from a skunk, the drawing was still that of a racoon. This phenomenon has been replicated in other contexts (Gelman 2004). I argue that Peirce takes this idea and formulates his learning mechanism around it.

Peirce's learning mechanism runs on the idea that representations can be expressed as different kinds of hypotheses which are versions of psychological essentialism. It is these hypothetical marks that make the learning mechanism run, as they correspond to different inferences– or chains of representations– that the mind performs as part of an argument. What appears as psychological essentialism, then, for Peirce, corresponds to a fundamental aspect of how the mind's learning mechanism, in all its forms, works.

This articulation of a hypothetical learning mechanism that takes seriously the notion of psychological essentialism is also related, for Peirce, to his work on what can be a *language of thought* (W1:86, 1861). Thought, for Peirce, corresponds to the phenomenon – a relic of Peirce's early challenge of Kant's view of cognition, which became the launch pad for his own, alternative, theory of cognition articulated in Kantian terms. Peirce makes the case that the phenomenon, or thought, has three aspects in his learning mechanism. Each of these aspects is a representation that makes a different kind of hypothesis about its input. These different hypotheses are expressed as hypothetical marks of different orders. These different orders of marks correspond to different representational behaviors. These hypotheses are the only aspects of Peirce's learning mechanism that are specified ahead of time, and they are for that reason an expression of mind itself. Everything else that is in the mind is a "work[ing] over" (W1:246, 1865) of an input which is an instantaneous state of the nervous system.

As a result, in my reading of him, Peirce takes the stance that internal meaning, because it must be prompted by an external representation, is "peculiar" ("Analysis of Creation" fragment in Murpley 1961:50) to a particular input. However, internal meaning (which can be thought of as the vocabulary of thought), is distinguished from *language*, which is a regularizing force (W1:86, 1861). For this reason, I make the case that the only regularizing force in Peirce's learning mechanism are his hypotheses: the

hypotheses of being and noumenon (which are two different hypotheses made about the object *of representation* as part of the learning mechanism), the hypotheses of quality (phenomenal form), relation (phenomenal matter), and representation (phenomenal accidents), and the hypothesis of substance (a hypothesis made about the subject *of representation*) correspond to a *hypothetical language of thought*. I thus put Peirce's work on five universal categories or conceptions in conversation with a much more contemporary literature in cognitive science and philosophy through this dissertation (Fodor 1975).

I argue that interpreting Peirce's five universal categories or conception as articulating a *hypothetical language of thought* holds important implications for the cognitive sciences, and for the philosophy of language and mind. It offers a different answer to the question of how the mind acquires its meanings, and articulates these meanings in thought, by establishing a novel distinction between *meaning as peculiar* and *language as hypothetical*. This alternative, when viewed as part of Peirce's specialized theory of cognition, has much to offer to a contemporary audience.

In chapter 4, I speak directly to such an audience by discussing how my reading of Peirce as offering a specialized theory of cognition could benefit two scientific communities in particular. First, a cognitive science community which has made investments in developing the view of a specialized "core cognition". As well as a sociology of cognition community which has made investments in an attentional, or topological, view of group representations. I show how my reading of Peirce's specialized theory of cognition not only stands to contribute to some of the discussions being held in these two communities independently; but can also act as a theoretical bridge bringing these two communities closer together. I argue that the theoretical bridge that my reading of Peirce's specialized view of cognition establishes between these two fields could allow one field to address some of the weaknesses of the other as collaborators under a unifying framework.

Chapter 4: Group vs. Core Cognition and My "Peircean Synthesis" Learning Mechanism

4.1 Chapter Introduction

This last content chapter of the dissertation connects the work from chapters 2 and 3 on a Peircean specialized cognition, and on an associated learning mechanism grounded in psychological essentialism, to contemporary work in the sociology of cognition and the cognitive sciences. In so doing, it connects to the work of Pierre Bourdieu, and makes the case that in light of a specialized cognition reading of Peirce, Bourdieu's work describes a theory of *reference* very much in conversation with Kripke and Putnam's work in the philosophy of mind and language on "wide" content. It makes the case that a Peircean-Bourdieusian theory of reference – with its focus on the learning mechanism that underlies the acquisition of wide content – strengthens a deeply-rooted sociological tradition in distributed or attentional representations of social groups (Zerubavel 1997), and in attention more generally (Berger and Luckmann 1966; Brekhus 1996; Cerulo 1998; Davis 1983; DeGloma 2015; Goffman 1986; Larossa, Simonds, and Reitzes 2004; Mullaney 1999; Ryan 2006; Simpson 1996). Moreover, it makes the case that a Peircean-Bourdieusian theory of reference goes a long way in addressing some of the issues associated with the ways in which wide content has been incorporated in theories of conceptual development in the cognitive sciences. In this chapter, I propose a response to the problem of wide content determination that is grounded in a Peircean-Bourdieusian theory of reference. I also put forth the framework for a conceptual learning mechanism (Peircean synthesis) that stands as an alternative to an established learning mechanism inspired by the pragmatic tradition in the cognitive sciences– developmental psychologist and cognitive scientist Susan Carey's Quinian bootstrapping.

This chapter has three main parts in which I make three main claims. In section 4.2, I claim that Susan Carey's theory of "core" cognition (Carey 2009) corresponds to Peirce's specialized cognitive faculty of Feeling. I view both to be elaborating on a theory of *narrow* content in a dual factor theory of conceptual content, where conceptual representations are viewed to possess *two* kinds of content that determine them in the mind– wide content that refers to things "out there", and narrow content that refers to internal

meanings “in the head” (Block 1986). I argue that Carey and Peirce, viewed in a specialized cognition lens, are very much aligned regarding core cognition and innate “feelings”; with the exception of their theory of reference. I make the case that Carey’s core cognition– which I view as primarily a cognitive theory of narrow content– conflates wide and narrow content in a way that Peirce’s specialized faculty of Feeling does not. Carey’s innate “core” representational systems impart *both* wide and narrow content to the mind *despite* being innate. This view goes against the Peircean specialized cognition position which takes the stand that wide content can only be *learned* from the sensory environment – i.e. from “reality”.

I argue that the difference between Carey’s view of “core” cognition and Peirce’s view of the specialized cognitive faculty of “feeling” is based on a difference in how they think about the way a concept makes reference to the world. In other words, I argue that the differences between Carey and Peirce boil down to their theories of *reference* (i.e. how a concept acquires wide content) and not to their theories of *meaning* (i.e. how a concept acquires narrow content). This difference, I argue, leads to a very different line of thinking about the domain-general learning mechanism which builds upon their theories of “innate” qualitative states of mind. This is because *all learned* qualitative states of mind, and their associated experiential properties, depend upon this initial starting state.

In section 4.3, I focus on the differences betweenCarey and Peirce’s understandings of content determination, in regards to content “out there” or extension. I argue that Peirce, viewed in light of specialized cognition, offers a theory of reference that is compatible with contemporary work on wide content in philosophy of language and mind – namely Saul Kripke and Hillary Putnam’s work on natural-kind terms (Kripke 1980/72, Putnam 1974). Moreover, a Peircean specialized theory of cognition stands to contribute to a long-standing challenge in philosophy regarding the articulation of a theory of *wide* content determination – i.e. a theory of *reference*. It is here, I argue, that *sociology of cognition has an important contribution to make in articulating a cognitive theory of reference*. I make the case that Peirce’s work on the specialized cognitive faculty of Sensation of Reaction (Sensibility) establishes the groundwork for a theory of reference that is fleshed out in the sociology of cognition. This budding theory of reference, I argue, can be found in the contemporary work by sociologist Eviatar Zerubavel (Zerubavel

1997), but most powerfully in the work of Pierre Bourdieu (Bourdieu 1984, Bourdieu 1990). Bourdieu's work has only recently come to be viewed in light of cognition (Lizardo 2004), but I argue that it articulates something lacking from the main thrust of the sociology of cognition literature. That something is a theory of a *learning mechanism* that underlies the acquisition of dispositional representations– such as Bourdieu's "habitus", and Peirce's "efforts".

I argue that both Peirce and Bourdieu's views on the acquisition of wide content account for the acquisition of representations called "signs", through the constitution of the *body*'s *distributed muscular* memory. I maintain that this process of constitution, or "conditionings" (to use Bourdieu's terms), occurs over a *continuous* extensive field, which is a prerequisite for the acquisition of sign representations that impart wide content to the mind. Bourdieu and Peirce, I show, are strikingly aligned regarding the nature of the learning mechanism that underlies the acquisition of wide content, including in their descriptions of three interrelated steps that leads to this kind of acquisition. These are: 1) "conditionings" *(Bourdieu)* or associations of contiguity *(Peirce)*; 2) "simple transfers[23]" *(Bourdieu)* or probable deduction proper *(Peirce)*; and 3) "applications" *(Bourdieu)* or quantitative (statistical) induction *(Peirce)*. The "sign" representation that results from this process of acquisition for both Peirce and Bourdieu imparts "sense" or intuition, but no qualitative content or meaning, to the mind.

"Group" cognition – the term that I reserve for the acquisition of wide content, differs from "Core" cognition in that it is not innate but *learned*. Yet, at the same time, the representations of core cognition are *determined* (in the Peircean sense) by their experiential input, while those of group cognition are *not determined* by such an input. This is because the representations of *core* cognition rely on exposure to an input in order to become activated (Carey 2009:12), and for this reason core cognition can be said to be *determined* (in the Peircean sense) by its input. On the other hand, the representations of group cognition,as we will see, can be inferred from *any* and *all* input and is for that reason *undetermined* by the input. Because they are *ubiquitous* to an environment, representations of group cognition cannot be said to have been determined to be different than they would have been otherwise by any particular input

[23] Also referred to as "analogical" transfers in (see Bourdieu 1980).

(W1:217, 1865). It is for this reason, as we saw in chapter 2, that Peirce calls the representations acquired through the learning mechanism associated with group cognition *a priori* – in the sense of *not* being determined (in this particular sense of the term) from without.

Peirce's work, I maintain, constitutes a theory of reference. It parallels the work conducted by sociologist Pierre Bourdieu on the acquisition of the "distinctive signs" (Bourdieu 1984:170) that result from the operations of the habitus on cognition. Bourdieu's work, conducted nearly a century later, on social class, thus acts as a case study in this chapter – and an elaboration– of a Peircean theory of reference. I do not engage in this chapter in a discussion of how such a striking parallel came to occur – and as we will see, parallel it is – however this dissertation as a whole makes clear the need for rigorous work on the intellectual history of Peircean influences on the discipline of sociology.

Bourdieu, in this reading of him, thus gives us a sense of what a Peircean specialized cognition understanding of the acquisition of a purely *extensive* representation imbued with wide content and no narrow content looks like. Moreover, it suggests that **social class**, as a representation with only wide content, differs from *natural* kinds (Kripke 1980/72, Putnam 1974) in which wide content is only an element. I raise the idea that social classes are what I call "***social* kinds**", that differ in fundamental ways from *natural* kinds due to having wide content but no narrow content. My work in this chapter, thus raises a hypothesis regarding the ***ontological status* of social categories**, and offers a tentative theory of what the learning mechanism underlying social kinds in general would look like.

In section 4.4, I discuss what consequences the Peircean-Bourdieusian theory of reference that I develop in this chapter has for a theory of conceptual development and the specification of a concept learning mechanism. A learning mechanism is a mechanism that allows you to establish some kind of correspondence between something in the mind and something in the world (Carey 2009, Fodor 1975). We thus can say that we have "learned" something when we can make this mapping. There are many theories of learning mechanisms (Fodor 1998, Gopnik & Meltzoff 1998, Piaget and Inhelder 1968, Piaget 1977), and many theories of conceptual development. The one I want to look at, however, is Susan

Carey's work on core cognition and Quinian bootstrapping because it has been so influential in the cognitive sciences; and because of the many areas of similarity that it has to my work on what I call "group cognition" and a "Peircean synthesis" learning mechanism. Carey's work has a distinct *pragmatic* flavor to it, which we can see in her incorporation of neo-pragmatic philosopher Willard Quine as the inspiration for her theory of a domain-general learning mechanism. Thus, the compatibility that I see between Carey's theory of conceptual development, and the theory of conceptual development that I develop from a specialized cognition reading of Peirce, should not be too surprising.

I argue that Carey's learning mechanism maps onto Peirce's in its treatment of narrow content and conceptual meaning, but is underspecified in its treatment of wide content and conceptual reference. In this way, my work on Peirce and a theory of reference, or "group" cognition, *complements* Carey's work on core cognition, which can be read as a theory of meaning. However, differences in theories of conceptual content, and in the specialized cognitions involved in general cognition, must, necessarily, be reflected in differences in the domain-general learning mechanism that synthesizes conceptual content from specialized representations. In section 4.4, I discuss these differences between my Peircean synthesis and Carey's Quinian bootstrapping. These differences include differences in what kinds of content (wide and narrow) that the two theories attribute to core cognition. In a specialized Peircean cognition framework, core cognition is not core knowledge – in that it cannot have extension as well as intension. Core cognition is purely, and strictly, narrow content or intension. Consequently, a new account is needed for how such wide content is added to core cognition representations– most likely through the domain-general learning mechanism.

Secondly, the theory of conceptual development that I develop in a specialized Peircean cognition framework is in line with Putnam and Kripke that intension (narrow content) *cannot* determine extension (wide content). Consequently, it adds an interpretational constraint to Carey's Quinian bootstrapping mechanism which can, at times, be read as if wide content, or extension, is a determination of intension, or narrow content. This narrow content is captured in her systems of core cognition as innate, inferential, and abstract "conceptual roles". It raises the challenge of specifying a theory for how wide content is

acquired in a theory of conceptual development that maintains core cognition, and a domain-general learning mechanism for conceptual change. My Peircean synthesis learning mechanism straddles the fine line between extension and intension determination by leveraging the use of *simulations* and making the effects of intension on extension to be purely *hypothetical*. I do not hope to fully articulate this learning mechanism in this dissertation, but merely to give its rough outlines, and to highlight the importance of a theory of reference to accompany the theory of meaning that Carey's core cognition presents compellingly. Moreover, I argue that sociology of cognition has much to add to this discussion.

4.2 Core Cognition Without Core Knowledge

Core cognition as a cognitive theory of narrow content and Peirce's specialized faculty of Feeling

In its assessment of the cognitive sciences, much of sociology continues to associate it with Jean Piaget– the Swiss biologist and philosopher who revolutionized experimental psychology. Piaget developed a theory of conceptual development that dominated the cognitive sciences for over forty years. Piaget's theory of conceptual development made the case that the conceptual development of children is essentially "outside-in" – that is, children start the world without an innate inferential mechanism or innate representations, and instead must build such abstract structures from their interactions with the outside world. For Piaget, the child has interactions with the external world and comes up with increasingly abstract generalizations of those experiences. These increasingly more abstract generalizations of the external world develop in a series of general-stages of development that are associated with a radical reorganization of the child's deep logical, inferential, structures. Such deep, inferential, logical structures are associated with causal reasoning, such that young infants, for Piaget, are unable to think in terms of causal inference like adults can (Gopnik & Meltzoff 1998).

Piaget's theory of conceptual development, however, began to buckle under an overwhelming amount of empirical evidence in the 1980s and 1990s that refuted key aspects of his theory (see Gopnik & Meltzoff

1998 and Gopnik 1996 for an account), dismantling, and eventually overthrowing Piaget's hold over the interdisciplinary field. Here is an excerpt from 1996 summarizing this experience.

> New theories often spring from the failures of the old theories. Piaget's thesis that there are broad-ranging, general stages of development seems increasingly implausible. Instead, cognitive development appears to be quite specific to particular domains of knowledge. Moreover. children consistently prove to have certain cognitive abilities at a much earlier age than Piaget proposed, at least in some domains. Also contra Piaget, even newborn infants have rich and abstract representations of some aspects of the world. Moreover, Piaget underestimated the importance of social interaction and language in cognitive development. Finally, Piaget's account of assimilation and accommodation as the basic constructivist mechanisms now seems too vague.
>
> (Gopnik 1996: 221)

In the wake of Piaget, and in light of experimental evidence that children and young infants do come equipped with innate abstract representations and even causal inferential mechanisms, a new paradigm began to emerge that shook off the empiricist theory of Piaget for a more rationalist, or nativist, bent. While these theories were still *constructionist* theories of conceptual development – that maintained we constructed or learned our meanings throughout life– they did not take the view that our cognitive inferential processes were learned over a lifetime. They instead took the stance that such cognitive inferential processes and learning mechanisms were inborn.

A number of these post-Piaget theories coalesced under the banner of "theory-theory" – a paradigm that took the stance that infants were born with an innate inferential mechanism – capable of causal inference and hypothesis testing– that they maintained throughout their lifetime. For this reason, the process through which infants and young children acquire knowledge about the world takes the same form as the process by which scientists come up with theoretical explanations about the world. Both infants and young children, as well as adult scientists, are using the same inborn cognitive machinery in order to come up with "theories" or theoretical explanations about the world (Gelman and Wellman 1991; Carey

1985; Gopnik and Wellman 1992; Karmiloff-Smith and Inhelder 1974; Keil 1989; Perner 1991). The central learning mechanism through which children and adults think, reason, and make causal inferences about the world was thus taken to be innate. However, there was still lacking a theory about how such innate causal inferences give rise to conceptual knowledge about the world. In particular, there was still missing an account of how this process deals with *both* innate representations, *and* learned aspects from our environment.

In this context, developmental psychologist Susan Carey offered a cognitive theory that attempts to balance innate content and external reference to the world (2009). Carey's work on "core" cognition makes the case that our conceptual knowledge about the world is learned in terms of concepts we already understand (Carey 2009:519). In this, she is in line with other nativist cognitive theorists, including Jerry Fodor who takes the radical nativist stance that all lexical concepts are "primitives" and innate (Fodor 1981). This leads him to commit that we are inborn with hundreds of thousands, if not millions, of conceptual representations. On the other end of the spectrum are cognitive theorists like Gopnik and Meltzoff who argue that all our conceptual knowledge of the world are "theories" – or productive explanations about the world– that require intense learning from something akin to a *tabla rasa* with the exception of the concept learning mechanism itself (Gopnik & Meltzoff 1998). Unlike Piaget, however, these innate inferential theory-building, concept learning mechanisms, are inborn and remain stable throughout the course of an individual's life.

Carey takes a moderate stance in between these two extreme nativist views, and makes the case that in addition to an innate inferential concept learning mechanism that is part of the mind's central process of learning through which it builds theories of the world; the human mind comes equipped with a limited set of innate "core" representational domains that govern initial inferences about objects, agents, numbers, etc. These core representational domains are innate and evolutionarily bequeathed, but most importantly, they are *modular*. That is, they are shielded from revisability due to learning. Unlike conceptual, theory, representations that result from the mind's *central* processes, the representations that result from the innate core representational domains cannot be revised in response to additional evidence and

experience. Instead, they remain stable throughout an individual's lifetime. This is not to say that individuals do not learn new representations that come to, in many cases, override initial core representations; but that these fast and automatic inferences remain in place and are the first interpretational tools used by the mind in the face of a conceptual problem.

The problem being addressed by Carey, Fodor, Gopnik & Meltzoff, and others, can be understood in terms of the communications analogy from chapter 2. In that chapter, we saw that the problem of concept acquisition – for example in the acquisition of a visual perception, but extending to rich conceptual terms such as "love" or "community" – could be understood as a communication problem. Such a problem involves a *sender of a message* or *transmitter* (the perception, concept, or other representation to be acquired by a mind), a *receiver* (the mind receiving the message), and a *message set* from which a message is constructed and sent out over a *channel*. The task of the receiver (the visual system, the mind, etc.) is to decode the message assuming access to the message set.

Fodor, Gopnik and Meltzoff, and Carey are all arguing that the message set is a set of innate mental representations. However, they are making different arguments about how this message set is constructed and what it is composed of. Fodor is making the case that the message set is a large set of hundreds of thousands of primitives corresponding to all the lexical words in language (Fodor 1975, Carey 2009). The decoding task of the receiving mind, then, is simply to apply the laws of compositionality in a language about how sentences are constructed out of smaller meaning units or lexical worlds (Fodor 1975). There is no involved learning mechanism involved in concept learning, and no subunit structure to concepts. All units of meaning are simply tokenized by experience, through some process that connects symbols in the mind to experiences in the world that Fodor leaves largely unspecified under the name of "sustaining mechanisms" (Fodor 1975). In the case of more complex conceptual meanings that go beyond simple perceptual experiences– for example in language and other symbolic systems, all that is required of the receiving mind to decode the conceptual meaning of a representational input is to grasp and apply the relevant combinatorial laws of grammar and syntax.

Gopnik and Meltzoff make an interesting argument which is that the message set is not a set of representations, but a *learning mechanism* that the mind uses in order to construct its meanings directly from sensory representational input. This learning mechanism is a hypothesis testing mechanism, like that used by scientists to develop theories about the world (Gopnik and Meltzoff 1998), where the mind constructs a hypothesis about the input in terms of symbolic representations, and goes on to test whether that hypothesis is correct about the world. Fodor, however, levies a criticism at such theories, which is that the hypothesis being tested by the mind's central learning mechanism must be articulated in terms of symbols or concepts the mind already knows[24]. Consequently, without an innate set of primitives, or innate representations that already have *meaning* to the mind, Fodor would argue that Gopnik and Meltzoff's concept learning mechanism never gets off the ground.

Carey takes a middle position between these two extremes by arguing that the message set includes *both* a *limited* set of innate representations that already have meaning to the mind, *and* an innate hypothesis testing learning mechanism for learning new conceptual meanings based on the starting set. Consequently, Carey faces the additional challenge of articulating both the starting state of the message set, and the learning mechanism that continuously *constructs* the message set as we go along. For this reason, other than the small set of primitive meanings that are innate to the message set, other constructed meanings based on these primitive meanings will include an internal meaning structure. For this reason, Carey also faces the task of articulating what constitutes meaning "in the head" (Block 1986), if you will, so that new meanings can be defined over old ones through some kind of concept learning mechanism.

Carey takes a view regarding such meaning in the head articulated by philosopher and cognitive scientist, Ned Block. Block, like others (Harman 1982, McGinn 1982, Loar 1982) takes the view that the inborn and inferred meaning in the head can be described in terms of *conceptual roles* – abstractions that describe the way the concept behaves in the mind. However, Block's definition of conceptual roles gives a more constrained understanding of what characterizes the conceptual roles that define meaning in the head in

[24] In this way, Fodor mirrors Peirce's views on the topic.

terms of the causal roles a concept plays from the perspective of inference and reasoning. Here is an example of Block describing these kinds of conceptual roles.

> Conceptual role is *total causal role*, abstractly described. Consider, by way of analogy, the causal role of herring. They affect what they eat, what eats them, what sees them and runs away, and, of course, they causally interact with one another. Now abstract away from the total causal role of herring to their culinary role, by which I mean the causal relations involving them that have an effect on or are affected by human dining. Presumably, some of what affects herring and what they affect will not be part of their culinary role: for example, perhaps herring occasionally amuse penguins, and this activity has no culinary causes or effects. Similarly,elements of language have a total causal role, including, say, the effect of newsprint on whatever people wrap in it. Conceptual role abstracts away from all causal relations except the ones that mediate inferences, inductive or deductive, decision making, and the like.
>
> (Block 1986:468)

Carey agrees with Block in her characterization of the meanings "in the head" that are innate to the message set, or constructed in an interplay between experience and the hypothetical concept learning mechanism. Like Block, she refers to such meanings as "narrow content" (Carey 2009). Moreover, Carey specifies more than the functional roles of these meanings in the mind, but also the *format* of such meanings. Carey maintains that innate primitives or core meanings are most likely *iconic*. Carey's definition of the iconic format is very similar to Peirce's definition of icon representations which we saw earlier in this dissertation. For Carey, Mental representations that are iconic in format different from those that are not (and are, for example arbitrary and linguistic), in that they are, first of all, "analog" such that there is a part-to-part correspondence or *similarity* between the representation and the thing it represents (Carey 2009:135).

One of Carey's main contribution in her work on core cognition– the theory that we have an evolutionarily bequeathed small set of innate representations that are organized according to certain domains of inference from which new meanings are constructed– is her articulation of the learning mechanism that

allows one to construct new meaning from old meanings using hypothesis formation and testing. In this task, she stands out from other cognitive scientists because of the attention she pays to what Ned Block calls “wide content”. Like Block, Carey takes the stance that the full content of a concept is not exhausted by its meaning – itself articulated in terms of meanings already in the mind; but that a concept’s content – its *total* meaning to the mind, if you will – is also affected by what the concept is *referencing* in the world. In this way, Carey sees herself as addressing a key weakness of psychological theories of concept and conceptual content.

> Psychologists’ responses have been that, if this is so, they are not particularly interested in wide content. Psychologists are concerned with the format and computational role of mental representations, and if these do not determine the referents of concepts, so be it. Fine, but we psychologists must recognize that we are ignoring a central desideratum for a theory of concepts: what determines their extensions. Surely an adequate theory must get this problem right because, if our concepts of real entities (in contradistinction to fictional ones) are not appropriately connected to the world, they would not support learning about it.
>
> (Carey 2009:507)

Carey’s theory of a concept learning mechanism differs from many other cognitive theorists in making the case that conceptual content is “dual factor”, and that the concept learning mechanism through which conceptual meaning is acquired needs an account for how *both* narrow content (meaning in the head) and wide content (meaning in the world) is acquired.

Once again, thinking of this process in terms of a sender and receiver in a communication problem is helpful here. The message being constructed from the message set via an innate hypothesis testing learning mechanism has both a sender (the thing in the world from which the representation being learned is emanating from), as well as a receiver (the mind in which a representation with local meaning is crafted for the “message” emanating from the sender). It is for this reason that the process of construction used by the receiver is a *learning* mechanism, because it is a process that concludes a representation as the result of a computation over a representational input (Carey 2009:12). You can think

of the narrow content as the connection of the constructionist learning mechanism to the message receiver. It captures how the message is *interpreted* in the "head" of the receiver. This narrow content, as we saw, is described by Carey and dual-factor theorist Ned Block in terms of conceptual roles.

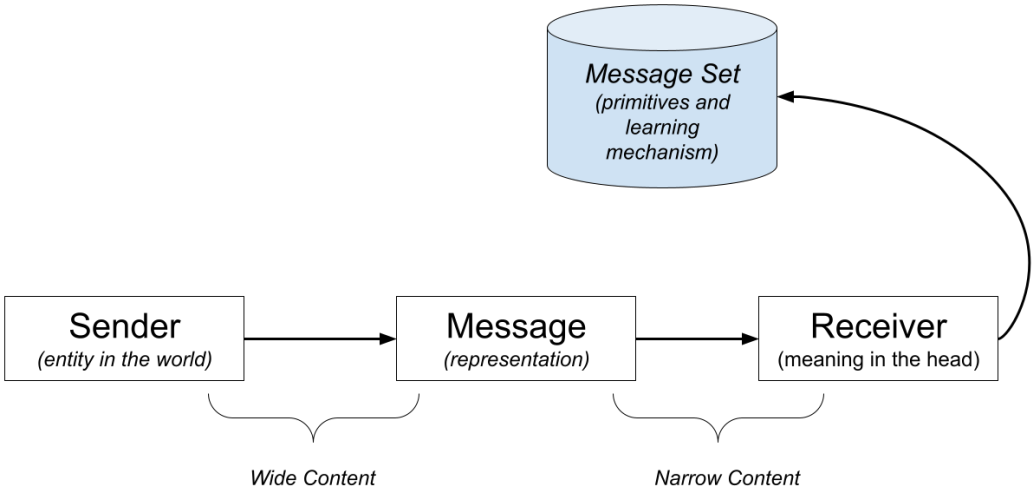


Figure 11: The innate state of cognition articulated as a communication problem (per Knill et al. 1996), from the perspective of the receiver. The message set includes both the set of primitives and the innate concept learning mechanism. The message is the representation being learned by the receiver using the message set. The sender is the entity in the world to whom the message is attributed.

At the same time, Carey and Block are making the case that we also need to take into account the connection of the concept learning mechanism to the *sender*. This connection to the sender is often kept out of view in the cognitive sciences, but Carey raises the important point that without having a theory of how the concept learning mechanism can learn concepts that are not only *meaningful* to the receiver, but to some extent "*true*" of the sender, in order for the process being described to be considered "learning" at all. A good theory of conceptual acquisition that takes seriously the idea that conceptual content is "dual-factor" (i.e. has *both* **narrow content**, also called **intension**; *and* **wide content**, also called **extension**) must then not only have a theory of *meaning* but also a theory of *reference*.

I make the case that in her work on innate core representational domains, and in her articulation of a domain-general concept learning mechanism, Carey bears many points of similarity to Peirce when he is read as offering a specialized theory of cognition. Peirce, as we saw, makes the case that the specialized cognitive faculty of Feeling is a degenerate learning mechanism that short-circuits the step of representation, and simply involves the activation of innate, evolutionarily bequeathed, sets of neural associations based on similarity – on the sharing of parts or neurons in instantaneous states of the nervous system. Such innate associations give rise to iconic representations, or "icons", in the mind that are the representational outputs of this specialized kind of cognition. Peirce argues that such neural associations are innate and evolutionarily bequeathed, but also domain-specific – involving the atrophying of neural connections in a fully connected brain over millions of years to result in circuits with more interconnectedness. And that such innate representations (as we saw in chapter 2, Peirce takes a similar view as Carey in his definition of innateness) that result from inherited neural associations lead to the inference of sensations, perceptions, emotions, and "instinctive motions" (W1:491, 1866).

Carey, like Peirce, takes the view that the modular core representational domains can be thought of as learning mechanisms (Carey 2009: 471, 475) that lead to certain fast and automatic inferences about the world. Such inferences, enabled by the system of representations in core systems, for Carey, lead to conceptual knowledge. It is for this reason that Carey differentiates her theory of "core cognition" from other theories of "core knowledge" (Spelke 1988) because Carey sees these core representational domains not as innate *knowledge*, but as *representational capacity* for the acquisition of knowledge. Such representational capacity for domain-specific knowledge acquisition is organized in modular systems of representations that perform a domain-specific version of a learning mechanism. Carey's description of innate domain-specific systems of core representations, which she articulates in terms of conceptual roles, thus seems analogous to Peirce's description of the specialized faculty of Feeling articulated in terms of innate neural associations.

Moreover, Peirce, argues that these innate domains of neural associations are used as primitives in a process of hypothesis testing that allows the acquisition of new conceptual meanings that involve both

feelings (the iconic representational outputs of innate representational domains), *and* efforts (the indexical representational outputs of the second specialized faculty of cognition that is not innate but learned from the environment). In this way, the outputs of the specialized faculty of Feeling are outputted as representations that are available for the construction of new conceptual meanings via a domain-general learning mechanism. This is a view that Care also shares (see Carey 2009:526).

Carey, however, begins to part with Peirce in her views on wide content – how it is acquired by the mind and the role it plays in conceptual learning and content determination. Wide content, as we saw, is an important area for Carey, and an important area for a theory of conceptual development. I argue that it is in this area, however, that Carey's groundbreaking theory integrating specialized and general cognition begins to face some challenges. Moreover, I argue that it struggles with an area that has long puzzled philosophers and cognitive scientists – in the articulation of a theory of reference. I make the case that a specialized cognition reading of Peirce, in conjunction with aspects of the sociology of cognition, offers a viable theory of reference that addresses many of the challenges Carey faces in her attempt to account for wide content in a domain-general concept learning mechanism. I formulate such a theory of reference in section 4.3, but I first tackle the challenge faced by Carey and the cognitive sciences related to wide content and a theory of reference.

Wide content in Carey's theory of conceptual development

In addition to her work on innate, modular, core representational domains (core cognition), Carey revolutionized the cognitive sciences by introducing a learning mechanism that allows us to think about the interplay between narrow and wide content, between content in the head and content "out there" in terms of a representation's reference to something out in the world. It operates on the view that determining the reference, extension, or wide content of a representation is as important for its conceptual content as determining its meaning in the mind articulated in the mind's internal language of primitives and computations defined over these primitives. That is, perceiving that it is *that* cup over that that is red, is not the same as perceiving a blanket qualitative state of *redness*. Wide content plays an important role

in our ability to make reference to entities in the world and test the theories that we formulate about their meaning. They in a very real sense *anchor* our conceptual meanings. From a sociological perspective, the question of wide content is bread and butter because it lies at the heart of our ability to speak about groups – class, race, gender, etc. – in a way that is intelligible to the mind.

Carey in her work on core cognition is putting forward an approach that is trying to do two very important things in the cognitive science literature: one is to argue that we need to think about wide content, about how it is that we reference to things outside of the mind, and incorporate a theory of reference explicitly into a theory of learning. Secondly, Carey is attempting to establish a theory about the state of the innate stock of primitives that we have in our minds that serves to establish the message set we use to construct meanings in the head. Such an initial state, we saw, for Carey involves a small set of representations organized in modular domains, with domain-specific learning mechanisms for reasoning about representative input established within a domain. Such an account of the initial state and the process for constructing new conceptual meanings from it is tantamount to a theory of *meaning* of narrow content. Carey's theory of *meaning*, or narrow content, we saw holds much in common with a specialized cognition reading of Peirce. However, Carey diverges from Peirce in important ways in her theory of reference or wide content, and how such content is used in the mind's domain general mechanism through which it transcends its initial state to acquire new conceptual meanings in light of experience.

First, Carey makes the case that the mind's stock of primitives, organized in core representational domains, come with *both* narrow and wide content. The implication is that the human mind is equipped to make reference to entities in the world that it has evolved in – that is, our cognitive system is tied to the local experiences of space and time that our evolutionary ancestors were exposed to over millions of years. In addition, in the cases of new conceptual meaning, the wide content or reference to the world involves an interplay between innate "syndromes"[25] (Carey 2009: 518-9) or other kinds of conceptual roles that at least partly determine what kinds of entities the conceptual meanings are referencing in the

[25] If we think of these syndromes as innate mappings between things in the head and entities in the world, the analogy between syndromes and the Leibnizian "pre-established harmony" that Peirce eventually rejected as the solution to this same problem is clear.

world. Syndromes (see also Macnamara 1982, Laurence and Margolis 1998) can be thought of as innate "referential factors" (a term from Block that we will return to) that determine the kinds of mechanisms or functions that the mind constructs in order to map its conceptual roles to an internalization of the entities in the world as "placeholder" structures. Such an internalization of the entities in the world as linguistic or explicit representations is made possible by innate language learning devices (Carey 2009:237) and by innate core domains with both narrow and wide content.

Below is Carey describing such a process with a representational input that has been evaluated through some unspecified process as a representation that is emanating from an entity that is a "natural kind" – that is, an entity that is a physical entity in the material world such as "tree", "water", "dog", etc. She uses an illustration from the work of psychologist Macnamara (Macnamara 1986) on the natural kind concept "tiger".

> The argumentative force of Macnamara's proposal is that we take a role slot we have for natural kind concepts and plug in a representation of an exemplar of a newly encountered natural kind, and what we get is a new concept. The exemplar-representation, or prototype abstracted from several exemplars, or representation of the kind constrained by its role in an intuitive theory, is thus part of the sustaining mechanism presupposed by information semantics. It helps ensure that our symbol *tiger* refers to tigers and not lions….That is, we have conceptual role machinery that treats words as placeholder kind terms; a conceptual role is generated by plugging a new term into that role and coordinating it with of members of the kind that have been ostensively defined by others in the language community.
>
> (Carey 2009:517-8)

Being tagged as a "natural kind" concept associates the concept with certain referential factors that are part of its "kind syndrome". Such a syndrome is a set of roles that determine how something in the head is to be sustained by a thing in the world. In the case of the "natural kind" syndrome, the syndrome specifies that an iconic image, or other kind of internal meaning, is to refer to the placeholder linguistic word, "tiger". This linguistic placeholder has been made to refer to a reference in the world, in this case, in part, through

a socio-historical process involving the picking out of references by a “language community” – a theme we will return to shortly. In this way, for Carey, “[k]ind syndromes are those aspects of our mental representations of tigers that help us use our concept *tiger* to refer to tigers” (Carey 2009:518).

Thus, the syndrome is associated *both* with the determination of a *referent* (what the individual *think*s they are referring to), as well as the determination of a *reference* (what the individual is *actually* referring to). In this view of the picture, the role of the social language community is meant to be offered as a theory of reference – of what the individual is *actually* referring to. We will revisit such a theory later. However, it is not the only theory of reference at work. The ostensive pointing out of the tiger by the linguistic community relies on our perceptual representations and core representations picking out something in the world – in space and time. This too is part of the theory of reference. In this example, the wide content that is inborn in the perceptual and core systems is kept out of view. But I argue that these as well must be taken into account in a theory of reference.

For Carey, referential factors such as innate “kind” syndromes, but also conceptual roles associated with the narrow content of a concept, determine how the mind structures the functions, or “sustaining mechanisms”, that link the thing in the head (the intension, i.e. the set of conceptual roles and innate iconic representations) to the entity in the world (the extension or reference). In order to do so, these referential factors and other conceptual roles in the mind make reference to “placeholder structures”; which are internalizations of linguistic, or explicit, systems of symbols in the world. These placeholder structures are relational internalizations of external explicit symbols that retain the relational order among these external explicit symbols. Carey reserves this process of the internalization of a relational order that comes to stand to the mind for the external entity itself to external *symbolic* entities, such as natural language or mathematical notations. In the example of the acquisition of the natural kind example we saw above, the acquisition of the wide content of “tiger” (Carey’s example) depends on having tokenized the concept “tiger” using a lexical word.

Carey thus, in her theory of reference commits to a "Quinian linguistic determinism" (Carey 2009:251) that limits such a theory of reference to symbolic concepts that can be tokenized in language or other similar formal, symbolic, systems of representation. This leads Carey to conclude, for example, that one of the key differences between humans' and other primates' ability to learn the integer list lies not in differences in their domain-general learning mechanism, but in their ability to create a placeholder structure from language (Carey 2009:332). The ability to extract the relational "meaning" (as Carey calls it) from a formal explicit symbolic system such as natural language or the system of mathematical notations is thus a precondition for being able to construct a placeholder process and engage in Carey's domain-general concept learning mechanism which she calls "Quinian bootstrapping".

> There is no doubt that children have the capacity to learn meaningless ordered lists of words—they learn sequences such as "eeny, meeny, miny, mo," the alphabet, the days of the week, and so on. Indeed, nonhuman primates have this capacity, and so it is likely part of innate computational machinery (e.g., Terrace, Son, & Brannon, 2003). This step in the learning process—learning an arbitrary ordered list ("one, two, three, four, five, six...") is a paradigmatic example of one aspect of Quinian bootstrapping: the meanings of the counting words are exhausted, initially, by their interrelations, their relative order in the list. At this point in the process, the verbal numerals are placeholders with respect to the numerical meaning they will come to have.
>
> (Carey 2009:308)

> …all bootstrapping processes require language or some other explicit symbols to provide a system of placeholder symbols with at least some relations among them directly represented. No other animal creates explicit symbols, and thus, if bootstrapping processes such those detailed here are required to create representations of natural number, there is a second reason to expect no other animal to do so.
>
> (Carey 2009:330)

> Remember that nonhuman primates, like young children, can learn meaningless lists. But in none of the training studies with nonhuman animals were the animals taught the list itself. Thus, even if they had the

> capacity for Quinian bootstrapping, they did not have the placeholder structure available to support the induction.
>
> (Carey 2009:332)

In other words, it is not only the ability to extract a relational structure from a representational input that is already articulated in a system of explicit representations that is needed for concept acquisition, for Carey. The learner must also be able to articulate this relational structure in terms of explicit symbolization, or language, of their own. The relational structure must be articulated linguistically in terms of explicit representations that are "external" to the mind (Carey 2009:472) or as "public symbols" (Carey 2009:464), in order to support the subsequent learning process. The placeholder thus plays a dual role. First, it captures a relational order that is associated with external representations or public symbols that are *outside* the head. Secondly, it acts as a mental symbol internal to the mind that supports the subsequent process of learning. This is an incredibly important step, but Carey does not dwell on it, and instead relegates this work to the linguistic community and work on innate linguistic acquisition devices (Carey 2009:249). However, this is a crucial step that seems to describe something of a magic trick – the acquisition of a structure that is partly *in* the head (as explicit representation) and partly *outside* the head (as a relational structure that is veridical of the metaphysically real order in the world), and *bridges* between narrow and wide content. I argue that the placeholder structure, and its relationship to an external relational order is a critical insight in Carey's work on wide content determination that finds support in the sociology of cognition.

Carey is trying to solve a very tricky problem– one that has plagued the cognitive sciences and philosophy of language and mind for a long time (Russell 1905, Searle 1982, Kripke 1980/72, Putnam 1974). In order to do so, she attempts to evoke Block's distinction between referent and reference in her account of wide content, but struggles because of the lack of a pre-formulated theory of *reference*. Carey thus formulates her own theory of reference. Such a theory has two layers. First, wide content determination– or reference– is an aspect of the innate primitives that are evolutionarily bequeathed. Wide content is thus part of core cognition. Secondly, in cases of newly acquired conceptual meanings,

wide content is partly determined by conceptual role – including innate roles that pertain uniquely to being able to make a reference to certain predetermined kinds of entities in the world, and which Block would refer to as “referential” factors in a dual-factor theory of conceptual content. Such referential factors determine functions that map between the conceptual role structure in the head, and a relational internalization of entities in the world as they are articulated in language or other explicit symbols.

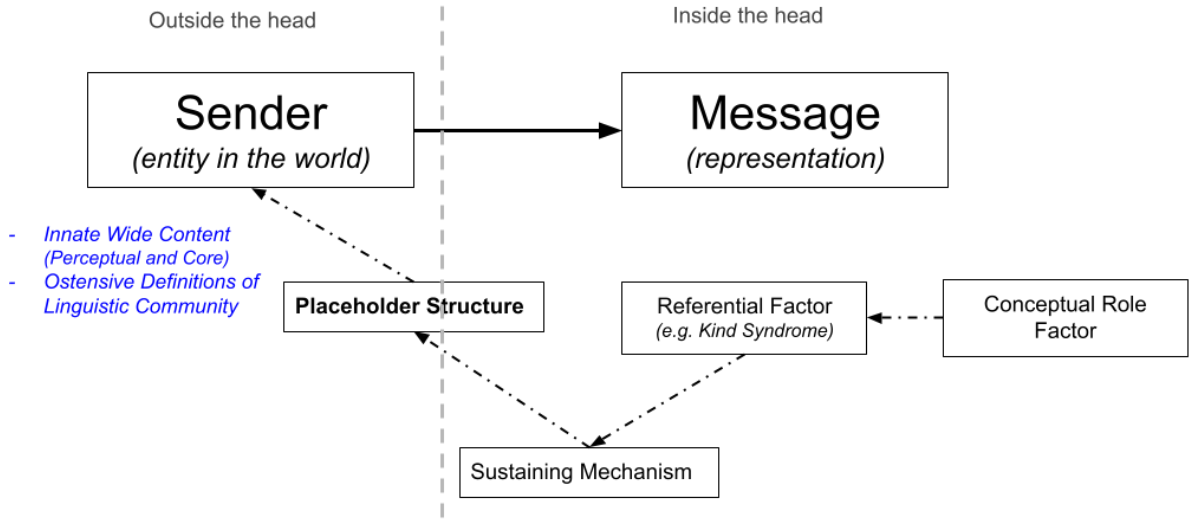


Figure 12: Carey’s Quinian bootstrapping mechanism articulated in terms of a communication problem. The Receiver is out of view. Note the seeming magic trick of a placeholder structure that is partly in the head and partly outside the head.

Carey’s theory thus involves things in the head determining an idiosyncratic function, or mapping, that comes to determine the reference of conceptual content to a thing – not in the world exactly – but in the *symbolic representation* of the world. Carey’s assumption, I think, is that at this point, core domains associated with the acquisition of the lexical word “tiger”, for example, are now at work to determine the reference of the sensory-perceptual experiences of tigers. In the case of natural kinds, Carey adds an additional step in the chain of consequences, which is the ostensive picking out of references in the real world by the linguistic community that is somehow passed on to the learner. The tiger means “this” particular individual instance of experience. As we will see, this is not a fully fleshed out theory of reference. Nevertheless, even this social-historical theory of reference depends on the inborn wide

content associated with the learner's perceptual and core representations. These innate wide contents pertaining to the primitive substrate of the internal meaning of a concept then carry us the rest of the way home to the reference of an entity in the world. Thus, once we have reached a reference to the lexical *symbol* for tiger, for example, we are now reliant on evolutionarily bequeathed wide content determining mechanisms to make the final reference to entities in the world.

Carey's theory of inference is an ingenious one, and one crafted in a dearth of such theories in the cognitive sciences. However, I argue that it faces an important challenge– that it flies in the face of a well accepted picture of wide content determination that Carey herself maintains that she ascribes to. The question of wide content as it currently stands in the cognitive sciences was perhaps first formulated by philosophers Saul Kripke and Hilary Putnam in the 1970s in response to a previous paradigm regarding the determination of conceptual references to the world. Under this older paradigm, conceptual references to the world (extension) were determined by what we *knew* about the world (intension). Such knowledge, Kripke argues, take the form of definitions (Russell 1905), or clusters of definitions (Searle 1982)[26] that could serve to identify a unique entity in the world. Kripke and Putnam, however, argued that this was not the case. An average person, for example, utterly unfamiliar with the classics would be able to refer to Julius Caesar without knowing anything about Caesar that would identify uniquely in history (see Kripke 1980/72:81). Caesar would be a "Roman leader", perhaps, for such a person – one of many. Nevertheless, we would be hard pressed to say that such a person did not have a reference in mind when they spoke of Caesar. This led Kripke and Putnam to conclude that extension – what a thing in the head referenced; was *not* determined by intension – what we knew about the reference. Any descriptor of the reference is merely ascribed and is a contingent fact about the reference that does not determine it. This tenet – that intension (narrow content) does not determine extension (wide content) is a fundamental one in the cognitive sciences' contemporary views on wide content.

Block avoids running afoul of Kripke and Putnam by making a distinction between *referent* and *reference*, and stipulating that his dual factor theory offers a theory of *referent* (what the mind *thinks* it is

[26] Although there are those who argue that this is a mischaracterization of Searle's views. See, for example, Zvolenszky 2012.

referencing), but not a theory of *reference* (what it is *actually* referencing) (Block 1986: 644). Block makes the case that conceptual roles, or meanings in the head can only determine *referents*, but not *reference*. Blocks' dual factor theory, consequently, stops right up to reference but does not make the leap. Carey seems to be quite aware of this problem as she develops her account of wide content and how it is acquired by the mind and incorporated in general cognition (Carey 2009:504). However, Carey cannot stop there. Unlike Block, she is attempting to offer a theory of the entire process of conceptual learning or development end-to-end. In addition to a theory of *referent*, Carey must also offer a theory of *reference*. I now turn to this latter theory in Carey's theory of conceptual development and her articulation of a domain-general learning mechanism.

Kripke and Putnam's challenge for a theory of reference and Carey's problem with wide content determination

Carey, like many in the cognitive sciences, is working under the premise that Kripke and Putnam are offering a theory of reference. However, I argue that Kripke and Putnam's work in this area was not completed. If, as they claimed, intension (things in the head) did not determine extension (things outside the head), *what did*? Kripke himself is transparent that he is not proposing an answer to this question– that is, a theory of reference– but rather, a broad picture of what such a theory would need to look like (Kripke 1980:93-4). However, in the literature that has followed, Kripke and Putnam have not only come to be regarded as offering such a theory of reference, but of offering one that maintains that such a theory of reference boils down to establishing the socio-historical processes that transmit the *direct* experience of an ostensive event (i.e. the pointing out of "that" guy as Caesar) in a "chain" of social relations from speaker to speaker, in the case of Kripke (Kripke 1980/72:91). Or, worse, in the case of Putnam, as a process that boils down to a semantic division of labor in which only some members of the society – or "experts" (Putnam 1974:287) – know the sufficient and necessary conditions for picking out a reference, while, for the general population, the reference for a concept is simply a reference to those experts responsible for knowing the details needed for picking out the extension. While these aspects that highlight the importance of *social processes* in the determination of wide content are certainly important to

the theory of reference that Kripke and Putnam *would* have wanted to see developed, they are not in my view the key insight that they hoped to impart to a subsequent literature dedicated to the formulation of such a theory of reference.

I argue that both Kripke and Putnam are pointing to the same underlying mechanism as critical for anyone committed to the crafting of a theory of reference that they themselves did not offer. And that this crucial underlying mechanism is not causal historical (Carey 2009: 507) as it is often read in the literature. Rather, it is the underlying mechanism of the acquisition of a *relational order*. Kripke's example about the "chain" of social relations that come to fix the name of an infant at a baptism is usually taken as support for a socio-historical theory of reference. Here is the passage in question.

> Someone, let's say, a baby, is born; his parents call him by a certain name. They talk about him to their friends. Other people meet him. Through various sorts of talk the name is spread from link to link as if by a chain. A speaker who is on the far end of this chain, who has heard about, say Richard Feynman…may be referring to Richard Feynman even though he can't remember from whom he first heard of Feynman or from whom he ever heard of Feynman….A certain passage of communication reaching ultimately to the man himself does reach the speaker. He then is referring to Feynman even though he can't identify him uniquely…a chain of communication going back to Feynman himself has been established, by virtue of his membership in a community which passed the name from link to link….
>
> (Kripke 1980/72: 91)

I argue, however, that the standard interpretation could not be what Kripke had in mind because while the speaker may *intend* to make that same original reference, their *ability* to do so cannot possibly be the empirical investigation of this chain and the initial baptism being referenced. Here is Kripke making a similar point: "[o]n our view, it is not how the speaker thinks he got the reference, but the actual chain of communication, which is relevant" (Kripke 1980/72: 93).

How is such an "actual chain of communication" to be established? How is one to "follow such a history" (Kripke 1980/72: 95)? An obvious answer would be to determine this historical chain of social relations empirically. However, Kripke is explicit that any fact that can be the result of empirical investigation is *contingent*, and for that reason cannot fix a reference (Kripke 1980/72: 105). The reference must be a necessary "rigid designator" whose meaning is the same in all possible worlds the speaker could be referring to (Kripke 1980/72: 102). In order to obtain such a rigid, metaphysically (and thus necessarily), true designator, I argue, Kripke is making the case that the speaker must *index themselves* to the *actual world* in which they are living.

> To clear up one thing which some people have asked me: When I say that a designator is rigid, and designates the same thing in all possible words, I mean that, as used in *our* language, it stands for that thing, when *we* talk about counterfactual situations…If you say 'suppose Hitler had never been born' then 'Hitler" refers here, still rigidly, to something that would not exist in the counterfactual situation described.
>
> (Kripke 1980/72: 77)

In this example, the speaker has used their world, and their relation to other existence in their world, of fix the reference in the counterfactual, "suppose Hitler had never been born". In other words, they have made *themselves* the index that embodies the relational order (social or otherwise) that fixes, or determines, a concept's reference.

Here is Kripke describing this indexical aspect of references, and how a thing becomes the index, or measure, of references.

> Someone who thinks that everything one knows *a priori* is necessary[27] might think: 'This is the *definition of a meter*. By definition, stick *S* is one meter long at t_0. That's a necessary truth.' But there seems to be no reason so to conclude, even for a man who uses the stated definition of 'one meter.' For he's using this

[27] Kripke is not such a person, and dedicates much of the set of lectures articulating the distinction between something that is *a priori*, which is an epistemic state (taken in a sense slightly different from Peirce as something that can be that is *independent* from experience); and *necessity*, which is a *metaphysical* state (something that will be the same in every possible world).

> definition not to *give the meaning* of what he called the 'meter', but to *fix the reference*…. There is a certain length which he wants to mark out. He marks it out by an accidental property, namely that there is a stick of that length. Someone else might mark out the same reference by another accidental property. But in any case, even though he uses this to fix the reference of his standard of length, a meter, he can still say, 'if heat had been applied to this stick *S* at t_0, then t_0 stick *S* would not have been one meter long.'...There is no conflict between that counterfactual statement and the definition of 'one meter' as 'the length of *S* at t_0', because the 'definition', properly interpreted, does *not* say that the phrase 'one meter' is to be *synonymous*…with the phrase 'the length of *S* at t_0', but rather that we have *determined the reference* of the phrase 'one meter' by stipulating that 'one meter' is to be a *rigid designator* of the length which is in fact the length of *S* at t_0.…The reason is that one designator ('one meter') is rigid and the other designator ('the length of *S* at t_0') is not.
>
> (Kripke 1980/72: 54-6)

In other words, an accidental property– which Kripke argues is a *qualitative* state of mind– when taken *quantitatively* (as in, taken for no other reason other than that it is in a relation that we want to mark or emphasize) – comes to fix a reference. In this example, while the stick or person that becomes the index to which other "accidental" properties or definitions can be associated, may change in terms of their epistemic properties– the qualitative states of mind associated with them, for example, as the result of empirical investigation; the measure that their quantitative relation to the world established remains constant or "rigid".

This I think highlights an important nuance in Kripke and, as we will see, Putnam's work– that it is the role of the speaker or learner *themselves*, in their quantitative relation to a world of relations, as an "index" or metric, that fixes their references. According to this reading of Kripke, the references of an individual would seem to be on the one hand ego-centric, yet, because of the individual's connection to others in a relational structure, that ego-centric fixing of references comes to capture the whole system of *actual* relations in a way that gives it a *metaphysical* necessity.

In my reading of Kripke, references only have cognitive content to the extent that they are determined to refer to a relational order that the individual comes to *embody*. This means, I argue, that for the speaker to make a reference, they must first *fix* it by the construction of an index. This act of index construction depends on their ability to anchor the entire relational structure of their world that comes to determine the reference in their own intimate locality – in their own local or actual world and their relational position in that world (Kripke 1980/72:78). Consequently, the theory of reference for which Kripke is setting up the groundwork is one in which the speaker must somehow acquire the entire "chain", or relational structure, as an index, or metric, of all other references. Moreover, the speaker or learner must be able to do so *without* empirical investigation of the contingent properties, definitions, and other "qualitative" or epistemic states of mind that are metaphysically accidental (Kripke 1980/72: 105). This raises two challenges– one for a theory of reference, and another for a theory of concept acquisition based on such a theory reference. First, how is the index that fixes references to be acquired without reference to "contingent" qualitative states of mind or qualitative properties, and (which is the same thing) without empirical investigation from the part of the speaker or learner? Secondly, how do "accidental" qualitative states of mind or properties come to be identified with the reference if such a reference cannot be grasped as anything other than an index which cannot be apprehended in terms of its qualitative attributes?

Putnam takes a similar approach to reference and also defines such terms as "indexical". References, or the wide content of a concept, for Putnam as well as Kripke, are "token-reflexive" and rely on the token– in this case the speaker or learner– *themselves* becoming the index that fixes the reference.

> Words like 'now, 'this', 'here' have long been recognized to be *indexical*, or *token-reflexive*– i.e., to have an extension which varies from context to context or token to token. For these words, no one has ever suggested the traditional theory that "intension determines extension." To take our Twin Earth example: if I have a *Doppelganger* on Twin Earth, then when I think "I have a headache," *he* thinks, "I have a headache." But the extension of the particular token of 'I' in his verbalized thought is himself (or his unit class, to be precise), while the extension of the token to 'I' in *my* verbalized is *me* (or my unit class, to be

> precise). So the same world, 'I', has two different extensions…but it does not follow that the concept I have of myself is in any way different from the concept of my *Doppelganger* has of himself.
>
> (Putnam 1973: 290)

Putnam and Kripke– not offering a theory of reference– do not offer a theory about how this indexicalization of the speaker or learner occurs. I show in the next section one possible answer to this question which has found its way in the sociology of cognition, and which is at the forefront of a specialized cognition reading of Peirce's work, is that the speaker or learner comes to embody the relational order in which they are embedded. The common thread among the host of thought experiments provided by Kripke and Putnam in "Naming and Necessity" and "Meaning and Reference", I argue, is that **it is the acquisition of the relational order *itself* that constitutes, or "fixes", the reference of the concept**.

Carey, despite denouncing Kripke and Putnam as offering merely a "causal historical" theory of inference not relevant for many of the problems of conceptual acquisition pertinent to herself and other psychologists, seems to have intuited a similar idea. A key aspect of her theory of reference, as we saw, is the idea of the acquisition of a "placeholder structure" with a purely "relational" meaning. However, despite this emphasis on the relational order, Carey's theory of reference does not boil down to the acquisition of the placeholder structure – after all, for Carey, the placeholder structure is merely symbolic (linguistic or otherwise) – and is not the *actual* entity of interest in the theory of inference. Instead, Carey's theory of reference (as we see in Figure 12) boils down to innate, evolutionarily bequeathed, wide content that is associated with the core systems of representation.

This understanding of the placeholder structure, and its role in determining the reference of a concept, confronts Carey with two challenges. First, as is clear from Figure 12, Carey's theory of reference runs the risk of being interpreted as a theory that flies in the face of the Kripke and Putnam tenet that intension cannot determine extension. As we can clearly see, internal conceptual meaning (in some cases solely innate) determines, in a downstream effect, the consequences of the reference of the concept to an entity

in the world. Carey does not deny this, and softens this determining chain of consequences. First, for example, she argues that the chain of consequences, perhaps because it is mediated by a number of steps, only partially determines the *referent* and the reference to an entity in the world (Carey 2009:515-6). Secondly, acknowledging that this is not enough to shake off the interpretation of her theory as arguing that intension determines extension, Carey makes the case that the kind of determination involved in mind references to at least one kind of world entity (natural kind entities via innate kind syndromes) is not *really* determination because the conceptual roles that eventually come to determine the extension are revisable, and are not *taken* by the individual to determine the reference unrevisably (Carey 2009:517).

These arguments, however, fall a bit flat and reveal a brittle point in Carey's core cognition and associated domain-general concept learning mechanism. First, a mediated causal relation remains a causal relation. Consequently, Carey's first defense against the *"intension-cannot-determine-intension"* objection is neutralized right away. The second defense is a bit more nuanced and lives and falls on our definition of what it means for something to "determine" another thing; and whether the conscious or semiconscious state of mind of the knower affects the determining relation. According to at least one definition of what it means to "determine" which we saw earlier in this dissertation, Carey's second defense also does not hold. Peirce in 1865, as we saw in chapter 2, argues that something (*A*) is determined by something else (*B*) to the extent that *B* causes *A* to be different than it would have been otherwise (W1: 217, 1865). Such a definition of determination has nothing to do with the conscious or semiconscious state of mind of the subject.

In the chain of consequences from conceptual roles (intensions) to reference (extension) in Carey's chained theories of referent and reference, only the conceptual roles can be said to cause the reference to be different than what it would have been otherwise. The conceptual roles are explicitly stipulated to be "primary" and to determine the referential roles by Block (Block 1986:643), whose dual-factor theory underpins Carey's approach to conceptual roles. The referential roles are explicitly stipulated to determine the sustaining mechanisms, which Carey stipulates are "not content determining" according to the view on

sustaining mechanisms she is referencing (Carey 2009:519). Consequently, the sustaining mechanisms do not determine the placeholder structure. Lastly, the placeholder structure is articulated in explicit symbolization that, in my reading of Carey, relies on an innate language process of language acquisition, and on innate wide content to make their reference. Since this last step in the theory of reference is evolutionarily bequeathed, and in the realm of core cognition and other modular systems, it is by definition "encapsulated" and indefeasible. For this reason, in this chain of consequences from conceptual roles to reference, only the conceptual roles cause the reference to be different from what it would otherwise have been. Which makes them, as best I can see it, *determining* of a concept's wide content according to at least one well-grounded definition of a determining relation.

My goal here is not to strike down Carey's core cognition theory or her concept learning mechanism. As we saw, on the question of narrow content, Carey's theory is compelling and rich in explanatory power. Instead, I argue that there is a weak point in an otherwise compelling account of conceptual development that lies precisely in an area that Carey herself pointed out was a weakness for psychology and for the cognitive sciences in general. This recognized weak point is the theory of reference. I argue, however, that this area is precisely where sociology, in particular the sociology of cognition, excels. In the next section, I argue that the sociology of cognition offers a powerful response to Kripke and Putnam's challenge for the articulation of a theory of reference grounded in the acquisition of a relational order in the world *without* going through intension, or qualitative states of "the brain or of the body" (Kripke 1972/80:212). I find such a theory of reference to be particularly well articulated in the work of sociologist Pierre Bourdieu. Moreover, I show that just as Carey's compelling theory of narrow content and narrow content determination is strikingly in line with the Peircean specialized faculty of Feeling that I develop in this dissertation; Bourdieu's particularly well articulated theory of reference is strikingly in line with the second Peircean specialized faculty of Sensation of Reaction (Sensibility) that I present in chapters 2 and 3.

4.3 Group Cognition and a Theory of Reference

Positioning Bourdieu in the philosophy of mind, language and cognition and in cognitive theories of conceptual development

What Determines Wittgenstein's Rules (Indexical Representations)? Kripke and Taylor's Interpretations

I see the cognitive sciences' more recent investment in "theory" mental structures, innate concept learning mechanisms, and an innate stock of representations and associated specialized cognition as a movement embracing nativist, or rationalist, perspectives in the wake of Piaget. Carey's work in this area, I argue, is an important step towards bridging nativist arguments with a serious look at wide content and the effect of the environment on conceptual content that resists the idea that extensions (entities in the world) can determine intensions (symbols in the head). Such a view, I show in this section, can be attributed to Piaget. Coming from a nativist push-back against Piaget's brand of empiricism, Carey is attempting to avoid the opposite extreme– a view that intension comes to determine extension. Yet, while neither can determine the other, a view of conceptual development must somehow integrate the role of intension and extension in the acquisition of conceptual knowledge.

Carey's attempt to address the problem, I argue, involves shoring up a weak point in psychological theories of cognition that have tended to focus on intension (symbols in the head). Carey's theory of reference, despites its efforts, I argue, continues to flirt with the idea that intension determines extension. In a search for an alternative theory of reference, I argue, we need look no further than sociology and the sociology of cognition. In this section, I articulate a theory of reference based on the work of Pierre Bourdieu which I read in light of the specialized cognition view of Peirce that I developed in this dissertation. I argue that read in this light, Bourdieu's work on the habitus, its acquisition, and functionings, correspond to Peirce's degenerate synthesis in the first degree (see chapter 3). This Peircean-Bourdieusian theory of reference, I argue, describes a specialized cognition associated with the internalization of external relational structures, or "orders", which come to impart a cognitive content that is not abstracted or intellectualized as conceptual representations, or articulated in terms of the mind's internal meanings. Instead, this specialized cognition can only be deployed in practice – that is, in the

manipulation of a field of material objects, and of our nervous system considered in material (or quantitative) terms. In this way, Bourdieu and Peirce can be read as offering a response to Kripke and Putnam's challenge for a theory of reference.

I am not the first to see the relations between Bourdieu's work on the habitus and Kripke's work on wide content and a theory of reference. Taylor (1993) and Bouveresse (1999), for example, offer readings of Bourdieu's habitus in light of Wittgenstein's work on "rules" as determinants of human action. Taylor makes the case that Bourdieu offers an answer to how rules that govern action can be understood without being represented as abstract (conceptual) representations. Taylor sees Bourdieu as being in conversation with the work of German philosopher Ludwig Wittgenstein's (Wittgenstein 1953) on the relationship between a rule and its explanation, and with Saul Kripke on Wittgenstein's work on rules. While Taylor takes Bourdieu's habitus to offer an *alternative* to Kripke's interpretation of Wittgenstein and supporting his own understanding of what comes to *constitute* the habitus as a kind of rule for action; I argue that Bourdieu rather *bridges* Kripke and Taylor's position in an interesting way.

Taylor hones in on Wittgenstein's observations that people's actions are based not only on what they know or intellectualize, but also based on certain regulatory rules that govern their behavior. These rules are more than just blind conditioning to a stimulus, but seem to impart some kind of "sense" (Taylor 1993:32) akin to an implicit understanding of the organizing logic that individuals in a society share. I include here Wittgenstein's passage to which Taylor is responding.

> Suppose I give this explanation: "I take 'Moses' to mean the man, if there was such a man, who led the Israelites out of Egypt, whatever he was called then and whatever he may or may not have done besides."—But similar doubts to those about "Moses" are possible about the words of this explanation (what are you calling "Egypt", whom the "Israelites" etc.?). Nor would these questions come to an end when we got down to words like "red", "dark", "sweet".—"But then how does an explanation help me to under-stand, if after all it is not the final one? In that case the explanation is never completed; so I still don't understand what he means, and never shall!"—As though an explanation as it were hung in the air unless

> supported by another one. Whereas an explanation may indeed rest on another one that has been given, but none stands in need of an- other—unless *we* require it to prevent a misunderstanding.

We see here in this passage that Wittgenstein is describing the same problem of wide content that Kripke addressed in “Naming and Necessity”. Wittgenstein, however, does not limit his argument to proper names, but instead extends it to what he views to be other social rules such as directions (sign-posts) and instructions, including laws and regulations. For Wittgenstein, the rule is not determined by the explanations of it. Every explanation of a rule can be followed by another, indefinitely. The rule, then, is akin to what Kripke calls reference and thus an index. For this reason, any qualitative description or definition of it does not determine it.

Taylor does an excellent job in articulating this problem of reference within the context of *reference* and wide content.

> There are an indefinite number of points at which, for a given explanation of a rule and a given run of paradigm cases, someone could nevertheless misunderstand…If in order to understand directions or know how to follow a rule, we have to know that all these deviant readings are deviant, and if this means that we have to have formulated thoughts to this effect already, then we need an infinite number of thoughts in our heads to follow even the simplest instructions. Plainly this is crazy. The intellectualist is tempted to treat all these potential issues as though they would have to be *resolved* by us already, if we are to understand the directions…But since any explanation leaves some potential issues unresolved, it stands in need of further explanations to back it up. And further explanations would have the same lack and so the job of explaining to somebody how to do something would be literally endless.
>
> (Taylor 1993: 30)

As in Kripke and Putnam’s thought experiments regarding natural kinds, and other kinds of indexical representations whose conceptual content to the mind are their *reference*, the content that rules impart to

the mind cannot be exhausted by descriptions or definitions of them. That is, the conceptual content that such references impart to the mind cannot be exhausted by the *meanings* we give to them.

But what is the rule an index *of*? Here, Wittgenstein adds another dimension to this problem, and that is the idea of "practice". As Taylor points out, for Wittgenstein, the effect of a rule on behavior is a "practice" (Wittgenstein 1968/53:202) that does not involve the intellectualization of the rule in terms of thought or conceptual representation.

> Hence there is an inclination to say: every action according to the rule is an interpretation. But we ought to restrict the term "interpretation" to the substitution of one expression of the rule for another.
> 202. And hence also 'obeying a rule' is a practice. And to *think* one is obeying a rule is not to obey a rule. Hence it is not possible to obey a rule 'privately': otherwise thinking one was obeying a rule would be the same thing as obeying it.
>
> (Wittgenstein 1968/53:201-2)

The intellectualization of a rule in terms of explanations, descriptions, and definitions, for Wittgenstein, much like it is for Kripke, are things that are identified with the rule, but which do not touch upon its true nature. Wittgenstein associates the way the rule comes to affect our actions as a kind of "blind" force (Wittgenstein 1968/53:219) that does not involve intellectualization which is not articulated in the "private" internal meanings of the mind. Instead, the rule seems to be referencing what Wittgenstein calls "customs" of *ways* of doing, or using, things. The acquisition of a rule, consequently, for Wittgenstein is tantamount to "master[ing] a technique" (Wittgenstein 1968/53:199), i.e. a "practice".

Wittgenstein here adds something missing from Kripke's lectures on reference, and it is about a theory not only of what a reference *is*, but also of how it is *acquired*. The two are intimately intermingled questions. To answer one is to answer the other. Taylor attempts to leverage Wittgenstein's insight on how a rule is acquired to help formulate an understanding of what a rule *is*. In order to do this, Taylor attempts to balance two aspects of the rule– first, that it is *not* articulated in the "private" internal

meanings of the mind and is not for that reason a linguistic, or intellectual, conceptual representation; yet at the same time, that it can be intellectual*ized*. That is, that "we can often articulate reasons" for a rule "when challenged" (Taylor 1993:32). Taylor's answer is an alternative to Kripke's answer to the same interpretational challenge presented by Wittgenstein's work on rules.

Taylor articulates two positions regarding the nature, or "bedwork" of rules (Taylor 1993:31), or, to use Kripke's terms, the aspect of the rule that is necessary and not contingent. Taylor entertains two views on this position– Kripke's and his own.

> There are two broad schools of interpretation of what Wittgenstein is saying here, which correspond to two ways of understanding the phenomenon of the unarticulated background. The first would interpret the claim that I act without reasons as involving the view that no reasons can be given here, that no demand for reasons can arise. This is because the connections which form our background are just *de facto* links, not susceptible of any justification….The second interpretation takes the background as really incorporating *understanding*; that is, as a grasp on things which, although quite unarticulated, may allow us to formulate reasons and explanations when challenged. In this case, the links are not simply *de facto*, but make a kind of sense, which is precisely what one would be trying to spell out in the articulation….What the first cannot account for is the fact that we do give explanations, that we can often articulate reasons when challenged.
>
> (Taylor 1993: 31-2)

The difference between the two views, is that Taylor attributes to Kripke the view that the determining "bedrock" of rules are the "connections" or "*de facto* links" – social or otherwise – that "form our background" and which are "not susceptible to any justification". This view is certainly in line with Kripke's work on reference and his "picture" of what a correct theory of reference would look like. Taken in light of Kripke's work on reference, I argue that this view boils down to the idea that the *reference* of rules are social relational structures, or the "*de facto* links" that form the "background" of our lives. This is an important insight that I argue is not lost on Bourdieu in his work on the habitus.

However, Taylor takes the position that Kripke's view does not account for the fact that the rules can be *explained* or intellectual*ized*, even though they are not properly intellectual (conceptual). I do not think that this is a fair characterization of Kripke's view, here, and I will return to this shortly. Instead, Taylor offers an alternative view of the "bedrock" of rules– that is, the thing that determines rules– are "understandings" that become *embodied* in the background of our lives. These "embodied understanding[s]" (Taylor 1993: 37), Taylor argues, are "a kind of sense" that underlie the relational structure, or the "*de facto* links", of our world. Taylor is aware that this view does not contradict Kripke's, and in fact, depends on Kripke's characterization of the "bedrock" of rules as an external relational structure. However, Taylor insists that it is a view that is an *alternative* to Kripke (Taylor 1993: 32). Taylor, understandably, seems to want to emphasize the significance of thinking of Kripke's external relational structure of "*de facto* links" as having a "sense" or some kind of order. It is an important point, and one that merits emphasizing. However, I think that connecting these two ideas explicitly is a much stronger argument. Moreover, this point, at the intersection of Kripke and Taylor's interpretations of Wittgenstein's work on rules as indexical representations is a point that Bourdieu seems to be explicitly elaborating in his work on the habitus, as we will see.

Perhaps in his desire to differentiate Kripke's view that the "*de facto* links" that form the external relational structures of our lives, from his view that this external relational structure must be organized according to some kind of "sense", I argue that Taylor pushes too far in the other direction. Instead of focusing on this "sense" – what it is, how it is acquired, and how it operates in the mind– Taylor falls into a trap that he is actively trying to escape from. The trap of intellectualism, and a confusion between meaning and understanding on the one hand, and sense or practical logic on the other. As I show, this is still a trap for social theorists today. Taylor maintains that the "sense" that is embodied in the relational structure of the external, or material, world is a kind of *understanding.*

Taylor argues that *because* we can give explanations of rules, they must be a kind of understanding. However, because they are not fully intellectualized, and thus not truly conceptual, it must be an understanding that does not involve the use of representations. What Taylor is struggling to grasp is the

idea of an understanding that is not representational. Such, I argue, is not possible – the reason for Taylor's difficulty here. Instead, I argue that we have something more akin, here, to *representation without understanding*. While Taylor associates his view of embodied understanding to Bourdieu's habitus – of the habitus as *understanding without representation* (Taylor 1993: 34); I argue in this section that Bourdieu is tracing out a different path more in line with the idea of *representation without understanding*. The role of the body and of embodiment for Bourdieu, I argue, is to offer a *distributed* kind of acquisition of the 'sense' of external relational structures which yields a *non-conceptual* kind of representation– a sign. This sign, however, while it imparts a *practical sense*, does not impart *understanding* which is, and must be, conceptual. It cannot impart understanding because it is in no way determined by intension– or symbols in the mind– and for this reason is not, at its core, a meaning.

I argue that sense, for Bourdieu, differs from intellectualized conceptual knowledge in that it involves the practical manipulation of the world in order to replicate the distributional *relational* order of the world that we have internalized in our bodies. Rules and other indexical representations such as that of social class, then reference this internalization of the external relational order and the determinant of their conceptual content. Sense can never transcend practice and materiality. However, it leads to the production of representations or "distinctive signs" that nevertheless come to transmit some kind of conceptual content to those who have also internalized the same "code" in the distributed muscular memory of their bodies and nervous system. I show in this section how Bourdieu's habitus gives rise to "sense" rather than to conceptual understanding through a process that by-passes the intellectualization of representations– i.e. the assignment of internal meaning to these representations, while nevertheless concluding in representations. In doing so, I offer a theory of how the habitus comes to determine conceptual content without the use of abstract, conceptual, knowledge of the "rule" by which it is operating. I argue that in such an explanation, the idea of *distributed* muscular memory plays an important role.

I thus formalize Taylor's attempt to describe the habitus as an "embodied understanding" (Taylor 1993: 34), and instead argue that the habitus is an internalization of an external relational order that is held in a distributed sense in the body, and leads to an automatic, unconscious, and "immediate" kind of inference.

In short, I offer a well-specified concept learning mechanism for the so-called “embodiment” of an external relational order, and show that while this agrees with the general intuition in this literature, such an embodiment is *not* knowledge or understanding. I opt instead for Bourdieu’s well-specified use of the word “sense”, or intuition, for this kind of conceptual content; which makes clear the nature of this conceptual content as not *meaning*, but rather *reference*.

The “bedrock” described by Wittgenstein (Wittgenstein 1968/53:217), I argue, is indeed one of “links” (or “chains” to use Kripke’s term) – or a *relational order*. However, it is *not* a background of “understanding” as Taylor argues (Taylor 1993: 43). It guides our practical sense allowing us to code and decode the ordering of actions in the world– as manners, practices, uses, customs, etc. – through a learning mechanism that involves immediate, automatic, and unconscious inferences. At the same time, because it is still connected to the general learning mechanism through which we acquire conceptual knowledge, this practical “sense” can be *rationalized* into a partial and non-determining intellectual understanding to the mind. In this way, Bourdieu’s work on the habitus and its acquisition, when read through a specialized Peircean cognition lens, thus bridges Kripke’s work which is operating in the framework of a theory of reference and wide content, and Taylor’s work which is operating within the framework of embodied knowledge or embodied understanding

In general, Kripke’s work on references, and on rules as well as natural kinds as *indexical* representations, is much elucidated by the idea that: first, they are references that are referencing an external relational structure, and secondly, that they are referencing a relational structure that is ordered according to a “sense” that can be acquired without the use of conceptual, or “intellectual”, representations. Bourdieu’s work on the habitus, I argue, capitalizes precisely this nuance at the intersection of Kripke and Taylor’s interpretation of Wittgenstein’s rules. Rules, and I argue social classes, are in many ways similar to natural kinds– both involve mental representations that primarily references, or wide content; and which are thus determined by entities in the world rather than symbols in the head. However, I argue that Rules and social classes differ in an important way from natural kinds in the way non-determining qualitative states of mind, or meanings, come to be associated or identified with them by

the individual. I return to this difference between natural kinds and rules or social classes at the end of this section.

Maintaining the intension/Extension Distinction: Bourdieu's Cognitive Underpinnings Are not Piagetian or Embodied 'Understandings"

Kripke's work, as we saw, became a foundational piece in the philosophy of cognition and in empirical cognitive theories – in part through its work on wide content determination. Consequently, the relevance of Bourdieu's work in this space makes his work also relevant to discussions in the cognitive sciences. This perspective on Bourdieu– as being in conversation with the cognitive sciences and with theories of cognition — has gradually filtered into sociology. Sociologist Omar Lizardo played an important role in bringing some of this perspective into sociology by noticing a connection between Bourdieu and the cognitive sciences (Lizardo 2004). In particular, Lizardo, posits that the work of developmental psychologist, Jean Piaget, on conceptual development underpins Bourdieu's theory of the habitus. In this way, Lizardo's claim helps establish Bourdieu as not only being in conversation with philosophies of mind and language, but as elaborating a theory of *cognition*.

In addition, in later work (Lizardo 2019), Lizardo attempts to position Bourdieu within the diverse landscape of theories present in the sociology of cognition. Lizardo takes a similar view as Taylor (1993) who positioned Bourdieu in a more philosophical literature as elaborating a theory of embodied "understanding", or embodied "knowledge". Lizardo makes the case that Bourdieu's is a sociology of cognition that is fundamentally one of *embodied c*ognition (Lizardo 2019, Lizardo 2009). The view of embodied *cognition* that Lizardo describes, I show, bears much in common with Taylor's characterization of embodied *understanding*. I argue that on both counts– regarding the cognitive science underpinnings of Bourdieu's work on the habitus, and regarding Bourdieu's place in the sociology of cognition– Lizardo's work points us in the right direction, but does not do justice to the full scope of Bourdieu's contributions to the cognitive sciences and to the sociology of cognition.

First, I argue that while Bourdieu uses the terminology of Piaget (as Lizardo rightly points out), his underlying theory of cognition is *not* Piagetian. Instead, I argue, Bourdieu is attempting to craft a theory of reference that transcends Piaget – one that addresses the challenge established by Kripke and Putnam. Moreover, I argue that Bourdieu's articulation of what is at its heart a theory of reference, can be viewed as a theory of *acquisition* that looks a lot like Peirce's work on the specialized cognitive faculty of Sensation of Reaction (sensibility), and its associated learning mechanism (degenerate in the first degree). While this might be a case of parallel development (Merton 1986), I don't get into the intellectual history here. But the similarities in the articulation of a *learning mechanism* for the acquisition of wide content – or the reference of a concept– are clear and striking, as we will see.

In his attempt to establish a cognitive basis for Bourdieu's habitus, Lizardo argues that Bourdieu's habitus has its cognitive roots in a "blend" of post-structural anthropology (Durkheim and Mauss), post-Sausserian structural anthropology (Levi-Strauss), and the "psychological genetic structuralism" of Jean Piaget (Lizardo 2004:376). What results, according to Lizardo's early characterization of Bourdieu's work, is a theory of the habitus that is an example of a "creative cognitive sociology" which Lizardo sees as resembling the more contemporary work of sociologist Eviatar Zerubavel. Lizardo's view of Zerubavel is one that attributes a "schemata" as the relevant mental structure being operated in this line of work (Lizardo 2004:377).

Lizardo characterizes the cognitive sociology that he attributes at the time to Bourdieu and to Zerubavel as as one that "takes seriously the historical development of schemata of perception, classification and action that are ultimately responsible for both macrostructural social reproduction and change" (Lizardo 2004:377). Moreover, Lizardo points to the influence of Jean Piaget in the development of Bourdieu's habitus. In particular, Lizardo focuses on analogical transfers, embodied schemas, and bodily operations in Bourdieu's work – linking them to Piaget's work on cognitive development and theory of knowledge which he defines as "social, practical, and grounded in action" (Lizardo 2004:383). Lizardo focuses in particular on schemas in his characterization of a cognitive science approach to cognition that involves a focus on the processual mechanism through which concepts are acquired – in other words, Lizardo is

making the case that the cognitive sciences differ from the sociology of cognition in its focus on concept learning mechanisms and conceptual development. However, the view of conceptual development that Lizardo settles upon is one that is quintessentially Piagetian. It involves three steps that depict an outside-in process of conceptual development. We first begin with the “gathering raw information from the environment in the form of pre- processed perceptual stimuli”; followed by the “transforming perceptual stimuli into more abstract representations of the environment, usually referred to as schemata or schemas”; and lastly, the response of the learning “with an action sequence in order to either transform or respond to the environmental representations constructed from the sensory stimulation” (Lizardo 2004:383).

Schemas, as Lizardo points out, involve *abstract* representations. Schemas, in particular Piaget’s “bodily schemas”, as Lizardo refers to them**,** involve the construction of the deep causal structures that enable the learner to acquire increasingly more abstract representations. This is a key feature of Piaget’s theory of conceptual development– the idea that we abstract general, conceptual, representations from sensory-perceptual input, including the most fundamental concept learning mechanism required for the construction of conceptual knowledge. In this way, Piaget’s theory of conceptual development is one that maintains that extension (entities in the world), determine intensions (symbols in the head).

Despite differences in the ways in which Bourdieu and Piaget define the environment over which the mental structures are acquired – abstract in Piaget’s case, and relational and material in Bourdieu’s – Lizardo concludes that Bourdieu’s work on the habitus is grounded in a Piagetian cognitive framework. Lizardo concludes that Bourdieu’s habitus is a Piagetian "cognitive *operation*" (Lizardo 2004: 388), which can be understood as abstract, or symbolic, *instructions* for action in various domains. Such instructions, being in a Piaget framework, build on one another and become applied to higher and higher levels of abstraction – transcending from the material or bodily to the mental or cognitive.

I argue, however, that while Bourdieu certainly seems to borrow terminology from Piaget, he is not ascribing to Piaget’s theory of conceptual development which maintains that mental, or symbolic,

representations can somehow be abstracted from an external, material, environment. My view is that Bourdieu eschews the mental, or symbolic, altogether; and makes the case (as we saw in the earlier section) that we must be able to characterize a different kind of cognition that does not involve symbolic representation, but remains purely and solely in the body. This is a vastly different view from Piaget whose work is explicit that extension comes to determine intension. Rather, my view is that Bourdieu is making a crucial point that extension *stays* extension, even in the mind's cognition of it – leading to a different kind of conceptual content than conceptual knowledge.

We can see this logic in Bourdieu's work – that extension stays extension and does not come to determine intension– even in the passage that Lizardo uses to support his argument that Bourdieu ascribes to Piaget's view that: " 'higher order' mental operations have their foundation in "lower order" motor operations" (Lizardo 2004:388). I replicate that passage, taken from Bourdieu's "Logic of Practice", below.

> Practical belief is not a "state of mind", still less a kind of arbitrary adherence to a set of instituted dogmas and doctrines ("beliefs"), but rather a state of the body. Doxa is the relationship of immediate adherence that is established in practice between a habitus and the field to which it is attuned, the pre-verbal taken for granted of the world that flows from practical sense. Enacted belief, instilled by the childhood learning that treats the body as a living memory pad, an automaton that "leads the mind unconsciously along with it", and as repository for the most precious values, is the form par excellence of the "blind or symbolic thought" . . . which Leibniz refers to, thinking initially of algebra, and which is the product of quasi-bodily dispositions, operational schemes, analogous to the rhythm of a line of verse who's words have been forgotten, or the thread of a discourse that is being improvised, transposable procedures, tricks, rules of thumb which generate through transference countless practical metaphors that are probably as devoid of perception and feeling as the algebraist's dull thoughts. Practical sense, social necessity turned into nature, converted into motor schemes and body automatisms, is what causes practices, in and through what makes them obscure to the eyes of their producer, to be sensible, that is informed by a common sense. It is because agents never know completely what they are doing that what they do has more sense than they know.

(Bourdieu 1990:68–69)

Bourdieu refers in this passage to seventeenth and eighteenth century German philosopher, Gottfried Leibniz, and Leibniz' work on "blind" thought. This is a very telling reference about what kind of theory Bourdieu is envisioning here. Leibniz' "blind thought" captures the idea that in mathematics, for example, let's take algebra, the mathematician manipulates the external explicit mathematic symbolic representations "blindly" – as in, without thinking consciously about their meaning. Instead of conscious reasoning, in these actions, Leibniz argues that we are dealing with the result of action governed by "blind" force or habit (Leibniz 1996/1765). We see Wittgenstein use the term "blind" in a similar way in his work on rules (Wittgenstein 1968/53:219). This kind of cognition, Leibniz argues, bypasses conscious reasoning and understanding, and can be thought of simply in terms of external representations.

Consequently, in this passage, I do not take Bourdieu to be saying, like Piaget, that what are initially external sensory-perceptual experiences of our environment are abstracted to the level of conceptual representation and understanding. Quite the opposite, I take Bourdieu as arguing that external experiences *stay* external and are manipulated as external in the cognition of the learner. Instead of being converted into abstract, conceptual, representations, external experiences are experiences as habitual and automatic "rules of thumb" that are not intellectualized and do not involve explicit reasoning. They are regarded in cognition as purely external– as wide content; and not in terms of the mind's internal meanings, which are associated with "perception and feelings". In this way Bourdieu seems to be making a similar association of internal meanings or narrow content with "perceptions and feelings" and other qualitative states of the nervous system. It is because "social necessity" – perhaps in the same sense that Kripke reserves necessity to refer to reference and not meaning – is internalized, yet never conceptualized as knowledge or understanding, that for Bourdieu, "agents never know completely what they are doing".

This is a fundamentally different view from Piaget's, in which a state of the body is conceptualized and abstracted as a state of mind. However, for Bourdieu the "state of mind" remains separate and distinct

from the “state of mind”. This “stage of body”, while it plays a critical role in cognition, remains unconscious, un-verbalized, and unarticulated in terms of conceptual representations. For this reason, I argue that while there is a cognitive underpinning to Bourdieu’s work – one that is fundamentally concerned with conceptual acquisition– it is not that of Piaget.

Similarly, while I argue that Bourdieu’s position in the sociology of cognition is compatible with that taken by Zerubavel, I disagree with what Lizardo takes to be Zerubavel’s view. I do not associate Zerubavel’s view of cognition to be one that is grounded in the schema structure, but rather in *empirical generalizations* such as scripts (Bruner 1990), narratives (Nelson 1986), and connectionist models (Bechtel 1987; Bates & Elman 1993; Clark 1993; Thomas and McClelland 2008) such as networks; which (as I will show) differ from schemata in a fundamental way. Lizardo comes to refine their position on what kind of sociology of cognition Bourdieu is elaborating. Lizardo (2019) makes the case that Bourdieu’s work on the habitus is instead associated with embodied cognition.

The literature on embodied cognition (Clark 1997; Lizardo and Strand 2010; Ignatow 2007; Lakoff and Johnson 1999; Barsalou et al 2003) takes a similar view as Taylor (1993)’s definition of embodied *understanding* – that an external material structure can come to be abstracted into states of minds that are “elaborated in terms of high level symbolic representations”. Here is Lizardo’s description of this kind of view.

> The basic idea is that, rather than being first acquired via the direct internalization of elaborate symbolic representations, belief and value systems are first inculcated via the routine enactments of bodily comportments and only later elaborated in terms of high level symbolic representations.
>
> (Lizardo 2019:72)

Lizardo attributes this view to Bourdieu. However, it is, in its fundamentals, the same Piagetian view that extension determines intension, which Bourdieu, as we saw, directly rejects. For this reason, while I see Bourdieu as offering important insights to embodied cognition and to embodied understanding, I do not

see him as operating within that framework. Rather, I see Bourdieu's work as occupying a position in the sociology of cognition that bridges a very particular view of embodiment and the internalization of external relational orders in the body, and Zerubavel's work on the topological, or distributed, representations of social 'concepts' (Zerubavel 1997).

While Lizardo focuses on the pertinence of Bourdieu's work to work on embodiment, I argue that it misses the pertinence of Bourdieu's work as a theory that breaks with the distinctly Piagetian view that extension determines intension. Instead, I read Bourdieu as offering a theory of how external relational structures come to be acquired in cognition through the body's distributed *muscular* memory. These external relational structures, I argue, are acquired not as Piaget-style schemata, but as *empirical generalizations* that operate primarily through *attention* and *memory* without the use of abstraction and internal meanings. Bourdieu's work, in my reading of him, emphasizes a much more *limited* role for relational orders that have been internalized as distributed dispositions in muscular memory. And call for the articulation of a separate mechanism for how such distributed dispositional "sense" is incorporated in conceptual knowledge.

Moreover, my reading of Bourdieu in light of a specialized cognition view of Peirce's work addresses some specific claims in the embodied cognition literature. Such as the idea that embodied cognition gives rise to "analog" representations (Lizardo 2019:72, Glenberg & Galles 2012). I offer a theory about the cognitive *learning* mechanism by which external relational orders become embodied, not as knowledge or understanding, but as *sense*. Such a sense, I argue, does not impart *meaning*, or narrow content, to the mind – in the form of *iconic* representations, analogues, or conceptual roles; but imparts *reference or wide content* that give rise to *indexical* representations or "signs".

I argue that Bourdieu's work goes beyond the broad specifications of embodied cognition, and a Piaget-style commitment to a radical empiricist that professes to abstract intension from extension. Instead, in my reading of him, Peirce points to a different kind of specialized cognition that, nevertheless, collaborates in a systematic way with general cognition – very much in the style of my specialized

cognition reading of Charles Sanders Peirce. Bourdieu's view of cognition is thus not, in this light, one that takes after Piaget in assuming a *tabla rasa* in terms of an innate representational concept learning mechanisms. At the same time, neither is it a view of cognition that confounds sense and understanding (or knowledge), indices and icons, meaning and reference, or narrow and wide content in the way that these two very different kinds of conceptual content often get confused in the broader literature on embodied cognition. Rather, it is an approach to cognition that sees the specialized cognition that occurs primarily through distributed *muscular* memory as leveraging– in a limited way– the mind's innate concept learning mechanism. I associated such a view in sociology with the work of Eviatar Zerubavel and his school. Zerubavel's work on memory, for example, shows that this kind of distributed cognition is nevertheless a cognition that collaborates in memory and the acquisition of certain kinds of conceptual content (Zerubavel 2003).

In this way, my reading of Bourdieu is that the representational output of the cognitive process in which the habitus is involved is an index, or reference. Such a representational output has nothing to do with "belief and value systems" (Lizardo 2019). The habitus gives rise to *signs* which impart sense and *not* meaning or understanding. Such a sense remains practical – that is, always involves the manipulation of materiality in order to be expressed – and does not transcend to "linguistic" representations (Bourdieu 1984:483). In this way, my reading of Bourdieu as offering a much more bounded view of the representational output associated with the habitus, and the role this representational output plays in cognition, is in line with a Zerubavelian view that topological, distributional, or "mindscape" representations operate primary through attention and memory– giving us a *sense* for the organization of the relational orders of time and space.

However, I argue that because of Bourdieu's emphasis on the role of the body and its dispositions in the process through such practical representations are acquired, Bourdieu brings together the best of embodied cognition (with its emphasis on bodily conditioning) and Zerubavel's attentional cognition (with its emphasis on scripts, narratives, and other empirical generalizations). Moreover, I argue that Bourdieu offers something missing from the more descriptive approach of the Zerubavel school– this is the

articulation of a *learning mechanism* for the acquisition of this kind of conceptual content. Such an account pays attention to the role of inference and causal connections between entities in the world and things in the head (to the extent that such things ever end up in the head) in the cognitive behavior of mental structures.

The Mental Structure of the Habitus: Empirical Generalizations vs. Schemata

I argue that Bourdieu's work on the habitus – an internalization of an external relational order that occurs through *embodiment*, via the body's distributed muscular memory and it effects on attention and memory– brings together the best of embodied cognition and Zerubavel's attentional or topological theory of cognition. In addition it contributes significantly to our understanding of the underlying *cognitive learning mechanism* that underlies its theoretical position. I argue that this includes not only a theory of conceptual development that pertains to the acquisition of the habitus structure; but also some insight about the *format* of the habitus as a kind of mental structure. I argue that Bourdieu's habitus is an *empirical generalization*– distinguished from both iconic representations and full conceptual representations (that I take to be "theory"[28] structures), as well from a hybrid mental structure that has come to play a large role in the sociology of cognition – the *schema*. The schema structure, unlike empirical generalizations, is a vestige of a Piaget theory of conceptual development that comes loaded with an important assumption – that extension (entities in the world) can come to determine intension (symbols in the head).

Sociology of cognition, overall, seems to have an empiricist bent, and tends to favor empiricist theories of mental representations. This would explain its affinity for Piaget and neo-Piaget scholars (Mandler 1992, Lakoff & Johnson 1999), as well as for scholars working from a perspective that prioritizes empirical generalizations as cognitive structures over others. However, I want to flag an important distinction between a *Piagetian* theory of cognition and an empiricist theory of cognition that supports *empirical generalizations*. Piagetian theories of cognition maintain that we have *abstract* entities that are derived from empirical generalizations of experience. Empirical generalization theories– and many other

[28] In line with the "theory-theory" literature.

theoretical perspectives in the cognitive sciences (Gopnik and Meltzoff 1998; Carey 1985; Spelke 1988; Fodor 1975) – reject the idea that we can derive such abstract entities from sensory-motor data.

For this reason, *schema* theory which has influenced a wide swath of the sociology of cognition (Cerulo 2010; DiMaggio 1997; Lizardo 2017; Lizardo 2019; Sewell 1992; Wood et al. 2018) is part of a *Piagentian* theory of cognition because it maintains that we can construct abstract representations from external experience. In contrast, connectionist theories (Thomas and McClelland 2008), and even theories that maintain scripts (Nelson 1986) or narratives (Bruner 1990) as mental structures that do not abstract from the data, are theories of *empirical generalizations*. Theories of empirical generalizations are compatible with a specialized cognition Peircean theory of reference. Piaget-style schemas, however, are *not*.

To maintain schemas as a mental structure in a theory of cognition, is to make a similar error (from the point of view of a Peircean specialized theory of cognition) as Carey. It is to argue that extension determines intension. However, in keeping with philosophical work on wide content and content determination (Kripke 1980/72, Putnam 1984), I argue that in order to work within the framework of content determination, we must look for theories of cognition that *do not* involve *either* the determination of extension by intension, *or* the determination of intension by extension.

I make the case that a theory of conceptual development developed in a Peircean specialized cognition framework meets that standard. Moreover, I argue that Bourdieu, while he may have been influenced by the terminology of Piaget, maintained a theory of *empirical generalizations*, and directly spurned the idea that we could abstract away from the "bodily" disposition that is the habitus. Instead, I argue that Bourdieu's work on social class is pushing back against Piaget's idea of an "outside-in" view of cognition that maintains that we are able to somehow *abstract* intension from extension, in much the same vein that characterized a much more contemporary break from Piaget in the cognitive sciences (Gopnik 1996).

Instead, Bourdieu's work, I argue, establishes a viable alternative to Piaget's work – an approach to wide content, or indexical representations, and how the human mind comes to acquire such cognitive content

in a way that leaves extension *un-intellectualized*. In this way, Bourdieu is very much in line with Peirce about a view of extension and wide content determination. Moreover, Bourdieu is in line with the insight from the post-Piaget cognitive sciences. In this contemporary view of cognition that distinguishes between extension and intension and the cognitive processes through which they come to be found in the mind (Block 1986). In keeping with this idea, one cannot have "outside-in" *meanings*, any more than one can have "inside-out" *references*. Meaning– a qualitative state of the nervous system– is *narrow* content, and differs strictly from *reference*, which is wide content. Consequently, extension cannot determine intension, any more than intension can determine extension.

Bourdieu is not the only one in the sociology of cognition to have maintained a theory of cognition that is a theory about empirical generalizations and not Piaget-style schemas. The Zerubavelian school (Brekhus 2007), is another example, which has produced illuminating work on this area. I choose to focus on Bourdieu, however, because he offers something currently lacking in mainstream sociology of cognition– and that is a discussion of a *conceptual learning mechanism* and a theory of how we come to *acquire* the dispositional, or "topological" (Zerubavel 1997), mental structures that give rise to the sign representations that make-up our social world. I now turn to this discussion.

A Peircean-Bourdieusian theory of reference and the acquisition of wide content

Some Preliminaries

In Kripke and Putnam's work on wide content, Kripke makes it clear that what he is offering is not yet a theory of reference, and that such a theory is needed. I argue that a specialized cognition reading of Peirce's work offers the rudimentary framework for such a theory. Moreover, in this section, I show how Bourdieu's work on the habitus of social class is not only strikingly aligned with my reading of Peirce as offering a specialized theory of cognition, but helps illuminate Peirce's learning mechanism by grounding it in empirical work.

I argue that Peirce, and Bourdieu read in light of Peirce, offer a response to Kripke and Putnam and articulate a theory of reference that involves a number of key insights. First, the Peircean-Bourdieusian theory of reference that I develop in this section emphasizes the importance of a *continuous* metaphysically real extensive field over which the acquisition of wide content (an external relational structure) is to occur. Secondly, it offers a mathematically rigorous definition of the relational "order" of the extensive field, and offers a mechanism by which this order comes to *constitute* the nervous system through *distributed muscular memory,* and comes to impart "sense". Lastly, it offers an inferential mechanism through which the constituted nervous system comes to acquire, or interpret, external experiences as distinctive "signs". Moreover, both Peirce and Bourdieu speaks of the ways in which the representations that are the output of this inferential learning mechanism come to be associated with qualitative meanings, or conceptual understanding, that do not determine them.

Peirce's theory of reference, in particular, rests upon his view of immediate perception, and his theory of how we come to perceive *relations* immediately– that is, without the use of explicit inference (reasoning) or chains of representations. I show that the immediate perceptions of relations, for Peirce, rests upon a *quantitative* treatment of representations – a treatment of representations "as instances" (W1:324, 1865). It is this nuance, I argue, that allows Peirce (as well as Bourdieu) to offer a response to the challenge raised up by Kripke – it offers a way of determining conceptual content *not* in terms of qualitative states of the nervous system, but in terms of *quantitative* states of such a system. Such quantitative states of the nervous system are simply the "blind" (EP2:12, 1895) sensations of *transitions* between qualitative states.

Consequently, I argue that Bourdieu, read in light of a specialized Peircean theory of cognition, offers a theory of reference that meets the challenge laid down by Kripke– one that articulates how an external relational order comes to be internalized without depending on "accidental", or contingent, "qualitative" states of the brain and the body (Kripke 1980/72:212). As part of this theory of reference, I argue that Bourdieu describes a concept (or conceptual content) learning mechanism that is strikingly in line with the specialized faculty of Sensation of Reaction (Sensibility) and its associated learning mechanism (degenerate in the first degree) that I describe in chapter 3. In order to give a sense of the *processual*

mechanism that I take to be one of the main insights in Bourdieu's work, I engage in a close reading of Bourdieu's titular work "Distinction: A Social Critique of the Judgment of Taste" (1984). I now turn to this task.

The Peircean-Bourdieusian Theory of Reference and Degenerate Concept Learning Mechanism

Section introduction

In the sociological literature on social class, few individuals loom as large as Pierre Bourdieu. Bourdieu's work on class marked a transition away from– and as a bridge between– two very different views of what social classes are as ontological objects. On the one hand lies the view that social classes are real collections of individual bodies. This view, most associated with French sociologist Émile Durkheim (Durkheim 1982/1895) can be seen as an objectivist position. Reality is limited to individual singular existents, or entities, whose reality consists in being *singulars* who occupy space and time. Consequently, in order for these objective collections to be said to *exist*, they must be individual existents and, thus, *countably* finite. However, this seems to disagree with an empirical fact of social groups, which is that they continue to grow in an indefinite future– they are by definition *infinite*.

On the other end lies the view that social classes are subjective *concepts*. This view can be associated with American sociologist Harold Garfinkel (Garfinkel 1981), who takes this view into a contemporary setting that thinks seriously about cognition and concepts. However, this subjectivist view can also be associated with German sociologist Max Weber, who takes a similar stance (Weber 1978/1922). What defines this stance– irrespective of the level to which it attends to cognition– is the idea that mental representations such as class are *aggregated* or built from the ground up (Bourdieu 1984:483) – from individuals' idiosyncratic conceptual representations.

Sociology has, over the years, taken a number of positions about the ontological reality of groups like the group representation of social class. Some positions borrow from discussions in adjacent disciplines such

as philosophy (Abend 2008), while others are home-grown admixtures (Berger and Luckmann 1966, Parsons 1951). However, since these various traditions do not agree on what constitutes a *concept* let alone a *representation*, aligning these traditions has proved difficult.

Bourdieu occupies an interesting position in this space because he explicitly viewed himself as bridging the objectivist stance of Durkheim which views social groups as being *independent* of individual consciousnesses, and the subjectivist stance of Garfinkel which viewed social groups as emerging from subjective *linguistic* (i.e. conceptual) representations, or concepts.

> Social subjects comprehend the social world which comprehends them. This means that they cannot be characterized simply in terms of material properties, starting with the body, which can be counted and measured like any other object in the physical world…It is therefore necessary to move beyond the opposition between a 'social physics' – which uses statistics in objectivist fashion to establish distributions (in both the statistical and economic senses), quantified expressions of the differential appropriation of a finite quantity of social energy...and a 'social semiology' which seeks to decipher meanings and bring to light the cognitive operations whereby agents produce and decipher them. We have to refuse the dichotomy between, on the one hand, the aim of arriving at an objective 'reality', 'independent of individual consciousnesses and wills', by breaking with common representations of the social world (Durkheim's 'pre-notions'), and of uncovering 'laws' – that is, significant (in the sense of non-random) relationships between distributions– and, on the other hand, the aim of grasping, not 'reality', but agents' representations of it, which are the whole 'reality' of a social world conceived 'as will and representation'. In short, social science does not have to choose between that form of social physics, represented by Durkheim…and the idealist semiology which…as Harold Garfinkel puts it, can do no more than record the recordings of a social world which is ultimately no more than the product of mental, i.e. linguistic structures.
>
> (Bourdieu 1984:483)

In this passage, Bourdieu articulates his position as bridging a gap between two positions. First, an objectivist "social physics", which he attributes to Durkheim; and its concern with statistical laws,

distributional regularities, and with a reality which “can be counted and measured”. Secondly, a subjectivist “social semiology” associated with Garfinkel and his mental “linguistic structures” that views reality as an aggregation of agents’ explicit representations which involve “will” and imply a conscious and deliberate process.

Bourdieu’s contribution is one that puts forward a view of mental representations that are not conceptual in the sense of involving explicit *linguistic* representations; but which are nevertheless *representations* which must have their effect through an act of cognition. The view of conceptual representations articulated by Garfinkel, and against which Bourdieu defines himself, is a view fairly aligned with a contemporary cognitive science literature that views conceptual representations as synonymous with *language* or non-iconic symbols (Carey 2009). Such explicit or linguistic conceptual representations are viewed to differ from other kinds of mental representations because they are articulated in a language of thought that involves inference and inferential mechanisms (Fodor 1975). These representations are acquired through a laborious concept learning mechanism that is conscious and controlled (Carey 2009). In this way, in addition to being acquired, they can truly be considered to be *learned*.

Bourdieu explicitly pits himself against such a view for the mental representations associated with social class. Instead, he searches for a kind of “knowledge without concepts” (Bourdieu 1984:468), one that is a mental structure with a close relationship to the body, or “bodily hexis” (Bourdieu 1984:193). In situating himself and the kind of mental representation he considers social classes to be against a contemporary view of concepts, Bourdieu takes a stance on the mental representation of class that grasps for a different kind of mental structure and a different kind of acquisition or learning mechanism than is associated with full conceptual representations. Instead of being built from the bottom-up as an aggregation of individual meanings, Bourdieu’s class representation is imposed top-down through the conditioning of *objective* material conditions of existence. It thus occupies a very precisely identified position between the floating axes of objectivity and subjectivity in the discipline. Moreover, I argue that the view that Bourdieu eventually lands on is surprisingly aligned with the view that my specialized cognition reading of Peirce ascribes to “group” cognition and group representations.

I argue that what Bourdieu says about the cognition of social class is very consistent with what Peirce says about "efforts" which are associated with the representational domain of the specialized mental faculty of Sensation of Reaction (Sensibility). Both efforts, and the habitus (as we will see), give rise to "conventional" (W1:469, 1866) or "arbitrary" (Bourdieu 1984: 39) "signs" which are associated with a learning mechanism closely related with distributed memory, and conditioned muscular (as well as neural) associations that reflect a relational order external to the mind. For Peirce, signs are acquired through a particular *degenerate* version of his learning mechanism that is associated with the specialized cognitive faculty of Sensation of Reaction (Sensibility).

As we saw in chapter 3, there are two possible ways in which this degenerate version of Peirce's learning mechanism can be deployed, based on the kind of deductive inference being implemented. I argue that Bourdieu's description of the cognition of class describes, precisely and accurately, a version of Peirce's learning mechanism that is degenerate in the first degree and uses *probable deduction proper*– an immediate inference that involves the practical reproduction of the entire relational order so as to arrive at an interpretation of the input. In particular, I argue that Bourdieu's description of "habitus" – the result of a physio-mental conditioning that captures objective material conditions of existence– and its organization of "fields" of classifiable objects, captures what is akin to Peirce's view of the "order" of a countably infinite (denumeral) collection.

Lastly, I make the case that Bourdieu agrees with Peirce in arguing that a representation like social class must be learned over a *continuous* Peircean extensive field[29] (which differs in a specific respect from the *discrete* Bourdieusian fields of application). In such a continuous extensive field, every member is defined vis-a-vis the other members and it is possible to speak of two sides of an instant. I argue that Bourdieu offers the conditions of material existence as the continuous Peircean field over which social classes are

[29] As we will see, Bourdieu and Peirce both use the term "field" to mean related, but different things. Bourdieu's use of "field" correspond to what Peirce would describe as a "universe of hypothesis" (EP2:288, 1903) – a universe of discrete objects, or elements, with their own internal logic to which the habitus can be transferred in an act of inference. Peirce's use of the term "field" is restricted to what Bourdieu describes only as the material conditions of existence. For this reason I distinguish between the two views of fields by explicitly referring to "Bourdieusian" or "discrete" fields, and to "Peircean", "extensive", or "continuous" fields.

learned. Moreover, I argue that Bourdieu's description of how the habitus is applied by *analogous transfer* is consistent with the behavior of Peirce's probable deduction *proper*. This distinguishes Bourdieu's description of the acquisition and cognitive behavior of the representation of social class from that of another kind of group cognition that involves *statistical* probable deduction. I return to statistical probable deduction, and how it differs from probable deduction *proper*, in the next section.

As we saw in chapter 3, multiple kinds of inductions can be used in the genuine form of Peirce's learning mechanism (qualitative induction, quantitative induction, and crude induction). Similarly, multiple inductions can be used in the version of Peirce's learning mechanism that is degenerate in the first degree (quantitative induction and crude induction). It is thus the difference in deduction that distinguishes among different kinds of first degree degenerations in Peirce's learning mechanism. One version of Peirce's learning mechanism (degenerate in the first degree) uses probable deduction proper, while the other version uses statistical probable deduction. The same discovery step– association by contiguity– starts off the version of Peirce's learning mechanism that is degenerate in the first degree. Consequently, identifying a group cognition as involving either probable deduction proper or statistical probable deduction is enough to identify it from the point-of-view of conceptual acquisition or *learning*. Specifying, in addition, the kind of continuous extensive field over which the group (degenerate in the first degree) cognition takes place is enough to identify a group representation from a *metaphysical* standpoint. As we saw, for Peirce, representations of space and time are continuous because space and time are *metaphysically* real and continuous. Similarly, representations of social class in this framework are continuous because the extensive field over which they are defined is *metaphysically* real and continuous. I argue that Bourdieu offers both specifications (learning and metaphysical) in his work on the cognition of social class.

In short, I make the case in this section that the sociological concept of class– as described by Bourdieu– corresponds to a mental representation that is the output of a group cognition (and thus, of a learning mechanism degenerate in the first degree) that involves Probable Deduction Proper. For this reason, the ways in which Bourdieu has written about class– in terms of habitus, material conditions of existence,

universes of hypotheses (Bourdieusian fields), and social space– are very close to what a Peircean view of this group representation, and the ways that it is learned or acquired, would suggest. For this reason, a sociological view of class is very compatible with my addition to the literature on Peirce– which is that Peirce is offering a *specialized* theory of cognition, along with the detailed description of a representational learning mechanism for the acquisition of core, group, and conceptual representations.

Continuity, necessity, and universality in Bourdieu's material conditions of existence

Bourdieu's Three Aspects of Class Follows Peirce's Definition of the Representational Domain Associated with Sensation of Reaction (Sensibility)

Bourdieu's view of what is colloquially called the social "concept" of class is a complex one that involves establishing a distinction between social class as a real, existing– i.e. countable, *material structure* with intrinsic properties; social class as a *relational structure*; and social class as a *mental structure* or cognition. In my reading of him, Bourdieu argues that class is first and foremost a *metaphysically real* organization of material conditions of existence. For this reason– like Peirce's metaphysical space and time– class is first and foremost a *metaphysical reality* stamped in what Bourdieu calls the "material conditions of existence".

> The true basis of the differences found in the area of consumption, and far beyond it, is the opposition between the tastes of luxury (or freedom) and the tastes of necessity. The former are the tastes of individuals who are the product of material conditions of existence defined by distance from necessity, by the freedoms or facilities stemming from possession of capital; the latter express, precisely in their adjustment, the necessities of which they are the product.
>
> (Bourdieu 1984:177)

Bourdieu sees one of the "fundamental determinants" (Bourdieu 1984:106) of these material conditions of existence to be income or "economic power", which he defines as the "power to keep economic necessity

at arm's length" (Bourdieu 1984:55). For Bourdieu, economic power associated with income determines in a fundamental way the material conditions of our existence – what we can possess, how much of it, and in what quality. Economic power is thus the power to choose among objects with a set of characteristics, where the fulfillment of a pre-articulated physical necessity is but one of an exploding set of possible characteristics that these objects can have. It is the power to establish a relation to the material world that, due to its distance from necessity, comes to involve an increasing amount of choice among varying options. It is to such a defined material condition of existence that Bourdieu points as the objective conditions of class.

Because class, for Peirce and Bourdieu, is in one of its aspects a metaphysically real entity, class *at any moment* is a *real*, and thus *countable*, collection of individuals. Such individuals can be human agents who share certain homogeneous material conditions of existence which express the system of relations that is social class. In the passage below, Bourdieu describes such a collection of individual agents as "objective class".

> So it is necessary to reconstruct what has been taken apart…. One must therefore construct the *objective class*, the set of agents who are placed in homogeneous conditions of existence imposing homogeneous conditionings and producing homogeneous systems of dispositions capable of generating similar practices; and who possess a set of common properties, objectified properties, sometimes legally guaranteed (as possession of goods and power) or properties embodied as class habitus (and, in particular, systems of classificatory schemes) .
>
> (Bourdieu 1984:101)

However, as an objective *countable* collection of individuals, social class can also be a collection of objects, practices, and other elements that have been classified by the same system of relations– just as the human agents have been.

> If a group's whole life-style can be read off from the style it adopts in furnishing or clothing, this is not only because these properties are the objectification of the economic and cultural necessity which determined their selection, but also because the social relations objectified in familiar objects….
>
> (Bourdieu 1984:77)

At the same time, however, class is a group that constantly extends past this finite countable collection of individuals to an *indefinite* collection of *future* individuals.

> Every group tends to set up the means of perpetuating itself beyond the finite individuals in whom it is incarnated…. Death, from the point of view of groups, is only an accident, and personified collectives organize themselves in such a way that the demise of the mortal bodies which once embodied the group–representatives, delegates, agents, spokesmen–does not affect the existence of the group or the function in which it is realized: *dignitas non moritur*.
>
> (Bourdieu 1984: 72)

Class has this property, for Bourdieu, because it transcends being a mere material structure by "inscrib[ing]" itself in the minds of the agents which it shapes and classifies (Bourdieu 1984:470) – thus perpetuating itself into an indefinite future.

Thus, at the same time that it is a *countable* collection of individuals defined by a *homogeneous condition of existence*, class is also a *countably infinite* collection of individuals for Bourdieu. This is because these material conditions of existence can extend to a countably *infinite* set of objects that can be "worked-upon" (Bourdieu 1984: 39) – including the agents themselves. For this reason, I argue that Bourdieu's objective class is also what Peirce calls a "precept" (EP2:286, 1903) – a principle or method delineating *how to* pick out a collection of real individual existences. This precept, as we saw in chapter 3, relies on identifying an underlying "order" that gives a countably infinite (denumeral) collection its "sense" (EP2:100, 1901). We will see that Bourdieu also adopts the terms "order" and "sense" to speak of his views on class, and uses these terms in very similar ways to Peirce.

Consequently, for Bourdieu, class is not just a material structure. It is also a *mental* or cognitive structure.

> The cognitive structures which social agents implement in their practical knowledge of the social world are internalized, 'embodied' social structures. The practical knowledge of the social world that is presupposed by 'reasonable' behaviour within it implements classificatory schemes (or 'forms of classification', 'mental structures' or 'symbolic forms'–apart from their connotations, these expressions are virtually interchangeable), historical schemes of perception and appreciation which are the product of the objective division into classes (age groups, genders, social classes) and which function below the level of consciousness and discourse. Being the product of the incorporation of the fundamental structures of a society, these principles of division are common to all the agents of the society and make possible the production of a common, meaningful world, a common-sense world.
>
> (Bourdieu 1984:468)

This mental structure, however, is not conscious. It operates "below the level of consciousness and discourse". It is a mental structure that is shared, or is "common to all the agents of the society", and it enables both the "production of a common, meaningful world" as well as the *reproduction* of such a world into an indefinite future. It is this common mental structure that gives agents a common "sense" of the world and how it is ordered. It is, to some extent, what enables individual agents to be in the same *social* world at all. Just as the representations of space and time allow all human beings, for Peirce, to live in the same physical world.

Moreover, we see in this passage that the kind of mental representation that social class is for Bourdieu is one that has its origins in "historical" developments that lie outside of cognition altogether, and are for that reason "arbitrary" (Bourdieu 1984: 39) to the social, cognitive, and material world they've come to determine. I return to this theme regarding the origin of the representation of social class later in this section.

Lastly, social class is also a *relational* structure. It is a *system of relations* among objects that reflects an "order", or higher-level organizational scheme. Because this organizational scheme originates from the ways in which human beings are organized, or ordered, vis-a-vis one another, I believe, Bourdieu reserves the term "social" for this relational structure. Thus a relational structure, or order, that originates in the ordering of human beings vis-a-vis other human beings is a "social" order or structure.

> Thus, by an apparent paradox, the maintenance of order, that is, of the whole set of gaps, differences, 'differentials', ranks, precedences, priorities, exclusions, distinctions, ordinal properties, and thus of the relations of order which give a social formation its structure, is provided by an unceasing change in substantial (i.e., non-relational) properties.
>
> (Bourdieu 1984:163)

This passage should bring to mind Kripke's views on Wittgenstein's rules and on the substrate of references, or indexical representations. However, Bourdieu does more than articulate the relational structure. In his emphasis on subjective distance and differences, I argue that Bourdieu gives us a way of thinking about the "sense" incorporated in relational orders that Taylor (1993) argued for compellingly. For Bourdieu, it is this "order" among human beings and their worked-upon objects that "gives a social formation its structure". However, paradoxically, it is the "substantial (i..e non-relational) properties" of the *material* structure that seem to constitute the changes in the relational or social structure. I argue that this appearance of a paradox disappears when we take into account the relation among the three aspects of Bourdieu's social class, and hone in on the underlying cognitive process that holds Bourdieu's theory of social class together.

This social or relational structure is thus that of a social "order". I argue that Bourdieu means the term "order", in very much the same way Peirce does– as a way of ordering a set of countably infinite objects, so as to give a "sense" or appearance of a stable finite ratio or qualitative property (EP2:99, 1901). It is this ordering that structures relations among human beings and their artifacts. While reflected in the material conditions of existence, and affected by them, this social *order* is not reducible to those material

conditions. Rather, while the material conditions and their "substantial properties" are in constant flux in Bourdieu's view of class; the "order" that gives a "social formation" its structure remains the same. Such an order is relational in nature, and involves the manipulation of a set in order to establish a "set of gaps", "differences" "ranks", and "distinctions". In other words, it involves the accentuation of differences (and conversely, of similarities) in order to transform what would otherwise be a uniform set into one that is ordered according to a precept or method of sampling. Thus an ordering of material conditions of existence comes to mirror an ordering in the relations of human beings. To the extent that the material structure is the result of some organizational scheme, or *order*; the material structure that is Bourdieu's class is also a *social* structure.

As we saw, Bourdieu's social order is expressed not just in the material conditions of existence, but also in the mind. In this way social structures are not only expressed in material structures, but also in *mental* structures. Bourdieu describes the kind of cognitive experience this inscription of the social structure in mental structures gives rise to.

> The *sense* of limits implies *forgetting* the limits. One of the most important effects of the correspondence between real divisions and practical principles of division, between social structures and mental structures, is undoubtedly the fact that primary experience of the social world is that of doxa, an adherence to relations of order which, because they structure inseparably both the real world and the thought world, are accepted as self-evident.
>
> (Bourdieu 1984:471)

He argues that it gives rise to a "sense" – or a "primary experience of the world that is that of doxa", or of simple "adherence to relations of order". This adherence to the relational order is not due to an intellectual process, but is the result of simple habit which results from the inseparability of the relational order from "both the real world and the thought world" – leading to a cognitive acquiescence that takes this ubiquitous relational structure as "self-evident". In a sense, Bourdieu's "doxa" expresses the idea that

both the “real” world and the “thought” world share a material basis, and can both be treated quantitatively– that is, purely in terms of relations among entities and the ordering of these relations.

For Bourdieu, the material structure determines the cognitive or mental structure. The cognitive structure determines the relational (or social) structure. And the relational structure goes on to determine the material structure in turn. We are thus dealing with a *cycle* that has an arbitrary, or historical, starting point (see Figure 13). In this way, for Bourdieu, what begins as a *relational* structure that pertains to *social* relations– as an “order” reflecting the nature of the relations human beings have with one another (e.g. relations of intimidation, subordination, and violence; or of solidarity, cooperation, and goodwill) – is “inscribed” in the minds of individual agents as a *cognitive* structure *through* the material structure which comprises the material conditions of existence.

> Thus, through the differentiated and differentiating conditionings associated with the different conditions of existence, through the exclusions and inclusions, unions (marriages, affairs, alliances etc.) and divisions (incompatibilities, separations, struggles etc.) which govern the social structure and the structuring force it exerts, through all the hierarchies and classifications inscribed in objects (especially cultural products), in institutions (for example, the educational system) or simply in language, and through all the judgements, verdicts, gradings and warnings imposed by the institutions specially designed for this purpose, such as the family or the educational system, or constantly arising from the meetings and interactions of everyday life, the social order is progressively inscribed in people's minds. Social divisions become principles of division, organizing the image of the social world. Objective limits become a sense of limits, a practical anticipation of objective limits acquired by experience of objective limits, a 'sense of one's place' which leads one to exclude oneself from the goods, persons, places and so forth from which one is excluded.
>
> (Bourdieu 1984:470)

It is in this way “objective” limits become “a sense of limits”, or a *cognition* that is little more than *doxa* – or blind, un-intellectualized, habit.

Bourdieu describes these cognitive effects of the material conditions of existence on agents (and the relational structure they express), as “conditionings” associated with their material environment. The cognitive or mental structure that results from the “conditionings” the material conditions of existence enact on individual agents is experienced, not as explicit conceptual knowledge that is associated with language, explicit discourse, and consciousness (Bourdieu 1984:466, 468); but as a “sense”, whose “meaning” (or, perhaps, more accurately– whose *content* for the mind) cannot be divorced from its application to some class (or field) of discrete, existing, objects (Bourdieu 1984:94).

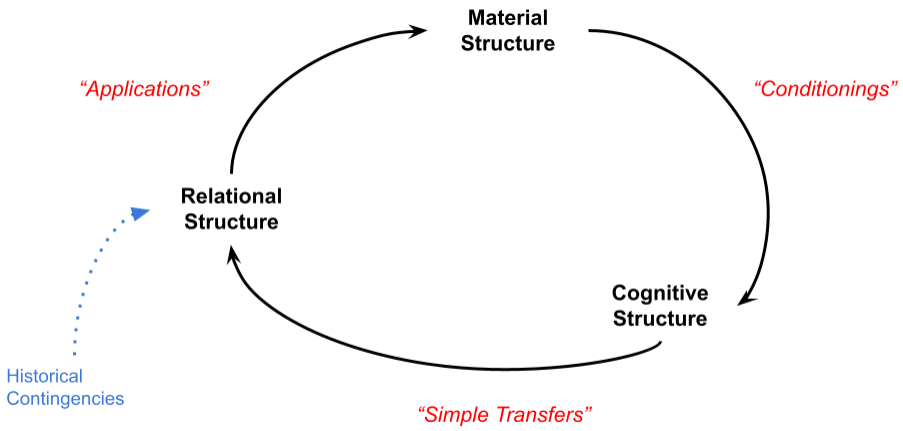


Figure 13: Relation among the three aspects of Bourdieu’s definition of class. Mechanisms that connect the different aspects are noted in red. Historical contingencies give rise to the relational structure but are outside the closed system and experienced as the establishment of “arbitrary” conventions.

In other words, the cognitive structure that results from the “conditionings” that the material conditions of the environment inflict on agents, is a cognitive structure that depends on a *practical* (Bourdieu 1984:466) application in order to contribute to the elaboration of meaning or meaning-making. It is, in this way, similar to Peirce’s description of a “sign” – a representation with extension but no comprehension. We will see that Bourdieu applies precisely the same term of “sign” (Bourdieu 1984:170) to refer to this kind of representation and the kind of content it imparts to the mind’s meaning-making process.

I argue that grasping Bourdieu's theory of class involves understanding the nature of this relationship among these three aspects of class– social, material, and cognitive; and how this relationship comes to be established. I argue that this cyclical determining relationship between social class, material class, and cognitive class in Bourdieu's work is the result of an implicitly specified cognitive learning mechanism that relates material conditions of existence, historical (arbitrary) processes, and a concept learning mechanism which is associated with representations that are not linguistic concepts, but are "signs" which lack an intellectual component. It is to the action of this learning mechanism that I argue Bourdieu refers when he describes the "conditionings" of the material conditions of existence on the mind of an agent, among other quasi-cognitive processes. Unpacking Bourdieu's definition of class thus involves unpacking the learning mechanism that Bourdieu assumes and subsumes in his three-aspect definition of class.

I undertake to show in this section that Bourdieu's definition of social class is equivalent to that of the ordering of a denumeral (i.e. countably infinite) collection defined over a Peircean (continuous) extensive field that comprises the material conditions of existence. Moreover, I argue that Bourdieu's description of the process through which: 1) the material structure comes to determine the cognitive structure ("conditionings"); 2) the cognitive structure comes to determine a particular relational structure ("simple transfers"); and 3) the relational structure comes to determine the material structure in turn ("applications"), describes a particular path through Peirce's learning mechanism reserved for the specialized cognitive faculty of Sensation of Reaction (Sensibility). I argue that this implied cognitive learning mechanism that underlies Bourdieu's theory of class is strikingly similar to that offered by Charles Sanders Peirce in his descriptions of the cognition of a sign through the acquisition of an "effort". Such an effort, as we've seen, is a representation with extension (broad or wide content) but without comprehension (deep or narrow content). In particular, Bourdieu's description of the process through which the cognitive structure is acquired, and how this cognitive structure goes on to affect cognitions of an *ordered* social world; maps onto a version of Peirce's learning mechanism degenerate in the first degree that involves *probable deduction proper* with striking accuracy.

Bourdieu's Habitus as a System of Emphases

For Peirce, the acquisition of “efforts” – the input processed in the specialized cognitive faculty of Sensation of Reaction (Sensibility) – occurs over an *extensive* field that is continuous. Such a field (if we recall from chapter 2) is defined as “a total which has subjective elements *ad libitum* all of which are perfectly related to the others and any one of which supposes all the others. Such are time and space” (W1:84, 1861). As we saw in chapter 2, for Peirce, every part of an extensive field is fully and necessarily determined vis-a-vis other parts of the field.

Fields, for Peirce, can be discrete (or “quantum” (W3:69, 1873)) or continuous. However, fields that give rise to representations with extension, or wide content, *must* be continuous. Such fields are called “extensive” fields (W1:84, 1861). This is because of how Peirce defines the specialized cognitive faculty of Sensation of Reaction (Sensibility) and its representational domain. The specialized faculty of Sensation of Reaction (Sensibility) is defined over representations *as instances*, and thus treats every representation as a quantity which marks a *transition* between instantaneous states of the nervous system called “feelings”. The faculty of Sensation of Reaction (Sensibility) can only be defined over instants that are themselves transitions *between* instantaneous states, and mark two sides of an instant. Such can only be the case in a continuous field. Consequently, a representation associated with the cognitive faculty of Sensation of Reaction (Sensibility) consists in establishing which transitions between feelings are *relevant*. It organizes patterns of transitions and sequences, or *orders*, of instants in attention, memory, and in imagination.

Peirce’s description of the representational domain of the Sensation of Reaction (Sensibility) thus bears much in common with sociologist Eviatar Zerubavel’s work on mindscapes – or topological– concepts, in associating efforts and the “group” representations they give rise to– such as signs or indices – with the organization of attention and memory (Zerubavel 2003, Zerubavel 1997). However, Peirce goes much further than Zerubavel in articulating a detailed description of how such a representation inscribes its particular kind of *wide* conceptual content. In addition to specifying a specific *learning mechanism* associated with the acquisition of such representations, and in offering an overall framework that relates

this cognitive domain and its representations to other cognitive domains in the mind; Peirce's work in this area thus offers to extend and connect to work in the sociology of cognition.

There is, however, another way to look at these extensive fields; and it is to realize that Peirce's "efforts", which capture transitions in feelings, or two sides of an instant, are referring to the perception of a *relation*. That is, they capture the *association* between one feeling and another that is established by an experience that remains external to cognition. Peirce takes the view that such relations – two sides of an instant or transitions between feelings– are acquired by the mind through an act of *immediate perception* (EP2:155, 1903). For Peirce, consequently, just as we have an immediate perception of feelings– the mind's innate internal meanings; we also have an immediate perception of *relations* among feelings. In the immediate perception of relations among feelings, the feelings themselves remain unrepresented by the mind in terms of internal meanings. Consequently, instead of taking feelings *qualitatively*, in the immediate perception of relations (or transitions between feelings), instantaneous states of the nervous system are taken *quantitatively*. This means that Peirce's "efforts" are immediate cognitions of external relations.

It is in this way, I argue, that Peirce addresses Kripke's challenge for a theory of reference. What determines the reference, or wide content, of a concept? For Kripke, wide content cannot be determined by intension, or qualitative states of "body or brain" (Kripke 1972:213). Such qualitative states are *epistemological* states, which must, for that reason, be accidental or contingent. It is for this reason that Kripke maintains that definitions, descriptions, and explanations cannot determine indexical representations whose content to the mind is the extension they point to. Such an extension, we saw, is an external relational structure. Peirce, and I argue Bourdieu, land upon a response to this challenge. It is that the mind not only perceives *qualitative* or *epistemological* states of body and brain; but that it also perceives *quantitative* or *metaphysical* states of the body and brain. Such quantitative states are *relational structures*– in particular, relational *orders* – that can be grasped immediately and without discrete representations by conditioning the body's distributed *muscular* system of memory to organize itself according to the same order that organizes the external system of relational. In other words, in this mode

of cognition, the body and brain are treated purely as “blind” systems of relations that can take analogous dispositions to the external relational systems. In this way, the *internal* relational system of the body and brain come to *mirror the ordering* of the external relational systems in the world.

This distributed, relational, internalization of an external relational order takes place, for Peirce, as we saw in chapter 2, through the placing of certain “emphases” on representations, which yield habits of emphasizing representations involved in certain relations structures that have systematically, and ubiquitously, emphasized. This leads to habits that govern, and structure, attention, memory, and imagination, and impose a “compulsion” to put representational input from the world together in the mind in a certain way (EP1:261, 1887-8). Peirce refers to the mind’s immediate perception of marked, or emphasized, transitions in feelings in general as “sensations of reaction”, and (as I read him), to sensations of reaction that have been emphasized in the environment as “efforts”. A system of emphases in sensations of reaction, I argue, is what Peirce means by an “order”. I argue that Bourdieu’s habitus is such a physio-cognitive structure.

Peirce maintains that sensations of reaction can only be perceived over a continuous extensive field. Consequently, a prerequisite for the immediate perception of a relation, and for the acquisition of relational *orders*, such as the habitus, is that they are defined over a *metaphysically* continuous extensive field. I argue that Bourdieu comes to a similar conclusion, and makes the definition of an extensive field over which the representation of social class is defined a fundamental part of his theory of social class. As I read him, Bourdieu offers the material conditions of existence as such an extensive field.

Bourdieu’s Material Conditions of Existence Describe a Peircean (Continuous) Extensive Field

Bourdieu’s material conditions of existence refers to aspects of one’s environment that are part of our material or physical universe (Bourdieu 1984:77). For example, as I am typing these worlds, the material conditions of my existence include the feel of my clothes on my body, the parchedness of my throat, the texture of the chair I am sitting on, the smells and ambient noises in my environment, the glare of my

laptop screen on my eyes, the position of my laptop on the wooden dining table at an ergonomically unrecommended level below my natural line of sight, the late afternoon breeze and last rays of a sunset filtering in from tall west-facing windows that have been opened for fresh spring air. It also includes the view from my window, the color palette of my living room which is doubling up as my office, the style, fabric, and construction of furnishings, and the style of decorations – marked by their composition of colors, angles, textures, the books organized neatly in the bookcases lining up the walls and piled up on the floor, the papers strewn across the wooden table and nearby couch, as well as a myriad of other inputs from my senses.

However, it also includes interactions with other agents– whom, as part of my material environment– are also part of my material conditions of existence. It includes my interactions with my mother by phone, who recently gave me a call. The cadence of her voice, for example, and choice of words, the volume at which she speaks, and even the way her accent is affected by the way her mouth shapes the sounds she makes (from the front of her mouth– a vestige of a French-Caribbean accent). It includes how many people I've interacted with today; how close, or far away, I stood from them; as well as the frequency of physical touch in those interactions. The material conditions of existence thus include *every* aspect of an environment that can be felt, tasted or ingested, smelled, seen, and heard continuously over the course of an individual's life.

Bourdieu argues that the empirical measurement of these material conditions of existence is something that he himself does not conduct as part of his analysis, but instead relegates to an as-of-yet non-existent field of "social psychoanalysis". Such a field would concern itself with "grasp[ing] the logic whereby the social relations objectified in things and also…in people are insensibly internalized".

> If a group's whole life-style can be read off from the style it adopts in furnishing or clothing, this is not only because these properties are the objectification of the economic and cultural necessity which determined their selection, but also because the social relations objectified in familiar objects, in their luxury or poverty, their 'distinction' or 'vulgarity', their 'beauty' or 'ugliness', impress themselves through bodily

> experiences which may be as profoundly unconscious as the quiet caress of beige carpets or the thin clamminess of tattered, garish linoleum, the harsh smell of bleach or perfumes as imperceptible as a negative scent…Experiences of this sort would be the material of a social psychoanalysis which set out to grasp the logic whereby the social relations objectified in things and also, of course, in people are insensibly internalized, taking their place in a lasting relation to the world and, to others, which manifests itself, for example, in thresholds of tolerance of the natural and social world, of noise, overcrowding, physical or verbal violence-and of which the mode of appropriation of cultural goods is one dimension.
>
> (Bourdieu 1984:77)

In other words, such a non-existent field would concern itself with how the social order expressed in the material conditions of experience come to be learned or acquired as mental representations. Bourdieu establishes an important tenet of such a field, which is that this process of acquisition is closely associated with the "impression" of external relations "through bodily experiences", and occurs through a process that is "profoundly unconscious".

Bourdieu does not undertake this task directly– after all, it is doubtful whether the fledgling cognitive sciences of his days could have undertaken it. Instead, I argue that faced with the problem of conducting an analysis over data that is simply too complex to collect wholesale, Bourdieu relied on statistical tools familiar to him and turned them upon the task. When armed with a hammer, as the saying goes, everything begins to look like a nail. I argue that Bourdieu took a problem he did not know how to solve– the quantification of the complex material conditions of existence– and turned them into a problem he did know how to solve – the statistical analysis of a matrix of variables. Bourdieu takes an approach that is tandem to the *variabilization* of the material conditions of existence.

Seeking to construct a representation of social class that is "as homogeneous as possible with respect to the fundamental determinants of the material conditions of existence and the conditionings they impose" (Bourdieu 1984:106), Bourdieu crafts a *continuous* space. The axes of Bourdieu's "social space" correspond to meta-variables constructed over what is itself already a variabilization of the material

conditions of existence (Bourdieu 1984:131). Bourdieu, I argue, breaks up the material conditions of existence into three broad categories of material things or objects that are determined by the operation of the social order in what he calls "fields" of production and consumption (Bourdieu 1984:113)– objects as objects, objects as practices, and objects that are human agents. For this reason, each of these broad categories of materials correspond to a different kind of "capital" – economic, cultural, and social. Bourdieu's "capital" is a "social relation, i.e. an energy which only exists and only produces its effects in the field in which it is produced and reproduced" (Bourdieu 1984:113). Capital is thus a broad classification of the material output of "fields" (see next subsection) in which objects that express the social order are produced.

> Endeavouring to reconstitute the units most homogeneous from the point of view of the conditions of production of habitus, i.e., with respect to the elementary conditions of existence and the resultant conditionings, one can construct a space whose three fundamental dimensions are defined by volume of capital, composition of capital, and change in these two properties over time (manifested by past and potential trajectory in social space).
>
> (Bourdieu 1984: 114)

If we refer to Figure 14, toward the end of this section, we can see that Bourdieu is attempting to summarize as three continuous variables the material conditions of existence considered as *discrete outputs* of a production process that is determined by a relational structure which is derived from a cognitive structure. He does so rather than defining the material conditions of existence as the *continuous inputs* in a learning mechanism that gives rise to that cognitive structure in the first place. The two views thus correspond to two approaches to the material conditions of existence that relies on the relationship among Bourdieu's three aspects of social class — social class as material structure, social class as cognitive structure, and social class as relational structure.

Bourdieu thus constructs a representation of the material conditions of existence and its conditionings of the body-brain's distributed system of memory that accounts for the relationship of determination that is

present between social class as a relational structure and class as a material structure. In this way, he circumvents a direct representation of social class as a (*physio*-)*cognitive* structure. Bourdieu is very aware that this representation has its shortcomings (Bourdieu 1984:169). However, he is just as aware that this representation– as crude as it may be– has its uses. Bourdieu's representation of the material conditions of existence as a three dimensional social space constructed by three meta-variables (total amount of capital, composition of capital, and change in capital over time) has the advantage that it preserves a key aspect of an extensive field in that it is *continuous*. Therefore, the key feature of Bourdieu's social space, and why it can act as a representation of the material conditions of existence, is that the three meta-variables that constitute it are all *continuous* quantities. In this way, Bourdieu preserves the key property of extensive fields, which are for Peire a *pre-requisite* for the immediate perception of relations and the acquisition of relational structures as orders of "efforts", or as blind "habits".

A Peircean-Bourdieusian theory of reference and the learning mechanism behind the acquisition of Bourdieu's "habitus"

Bourdieu's "Conditionings" as Peirce's "Association by Contiguity"

I've shown that Bourdieu's view of social class involves a process of acquisition that is defined over a continuous extensive field. This is a hallmark of Peirce's learning mechanism degenerate in the first degree. This acquisition process gives rise to a mental structure based on "efforts" – emphasized sensations of reaction– that I argue Peirce is referring to when he speaks of the "order" of a denumeral collection which gives it its "sense" (EP2:101, 1901). This "order" yields mental representations that are "signs" and not symbols. Such representations have extension (broad or wide content), but no intension (deep or narrow content). Thus, they only possess content that involves the picking out of extensions – i.e. of collections of subjects. As we saw in chapter 2, orders of efforts are acquired through "association by contiguity", in which the mind acquires habits through its interactions with relations that are: 1) external to the mind, 2) ubiquitous (i.e. inferable from any cognitive input), and 3) considered to be metaphysically

real. These external relations impart to the mind a “habit” that compels it to put things together in a particular order. I argue that Bourdieu is describing a similar process with his reference to “conditionings” which the socially ordered material conditions of existence impart to the mind of individual agents.

I offer, in this section, a new theory about the learning mechanism underlying the acquisition of Bourdieu’s cognition of social class. I argue that Bourdieu’s social class representation is a indexical representation that is determined via the physio-cognitive structure that it references. This physio-cognitive structure is an order of “efforts”,or emphasized sensations of reaction. It is a distributed structure that, because it is not a discrete tokenized mental representation, remains unconscious. Moreover, it is a structure whose acquisition and inference is associated not with general cognition, but with the specialized cognitive faculty of Sensation of Reaction (Sensibility). The specialized (degenerate) learning mechanism in which it is involved is thus automatic, unconscious, and results in a conventional “sign” as its first, and only, *conscious* mental representation. I coin the term “group representations”, to refer to such representations; and the term “group cognition” to refer to the specialized cognition associated with their elaboration.

Sensations of reactions, as we just saw, are immediate cognitions of relations external to the mind which are experienced as *transitions* in instantaneous states of the nervous system– whether “muscular” (peripheral) or neural (central) (W8:103-4, 1890). Moreover, this means that efforts are acquired through a particular path through Peirce’s cognitive learning mechanism that is degenerate in the first degree. Because they internalize *orders* in external relational structures that are the result of an arbitrary convention, or agreement, among subjects, the representations that this degenerate version of the learning mechanism concludes (signs) are themselves arbitrary and conventional. I argue that this reading of Bourdieu’s theory of class within a Peircean specialized cognition framework goes a long way to explicate the implicit, and underspecified, learning mechanism that gives rise to Bourdieu’s “habitus”, and its effect on the mind of agents. This cognitive effect is an unconscious “sense”, or intuition, of the distributional properties that comes from the ordering of a class of discrete objects or elements. In other words, it is a sense of how to manipulate a set of objects in order to reveal properties that can only be observed as the result of that practical manipulation or “ordering”.

Bourdieu is explicit that he views the mental representation that results from this acquisition process involving the habitus (an "order" of efforts) to not be a full conceptual (linguistic) representation, but a *sign* (Bourdieu 1984:170). The meaning of this sign to the mind is the offering of a "sense", or an ability to "intuit" (Bourdieu 1984:466), rather than full conceptual knowledge. In this reading of Bourdieu that I offer, Bourdieu's description of the three aspects of the representation of social class– social class as an material structure, social class as a cognitive or mental structure, and social class as a social or relational structure–describes different *outputs* involved in a Peircean representational learning mechanism that is degenerate in the first degree. In this way, social class as a cognitive structure is the output of the *discovery step* in Peirce's learning mechanism. I argue that Bourdieu reserves the term "conditionings" for the mechanism that gives rise to this structure (Bourdieu 1984:101). Social class as a particular relational structure is the output of the *deductive or explicative step* in Peirce's learning mechanism. I argue that Bourdieu reserves the term "simple transfer" for the mechanism that gives rise to this structure (Bourdieu 1984:170). Lastly, social class as a material structure is the output of the *inductive or classificatory step* in Peirce's learning mechanism. I argue that Bourdieu refers to this process as the "application" of the particular relational structure outputted in the previous step (Bourdieu 1984:170).

I argue that Bourdieu's three specified operations that link these three structures – conditionings, (simple) transfers, and applications – correspond to the three arguments involved in Peirce's learning mechanism degenerate in the first degree. These are: association by contiguity, probable deduction, and quantitative induction. Moreover, I argue that Bourdieu's description of what I take to be cognitive processes are so well specified as to identify the particular kind of probable deduction involved in Peirce's learning mechanism degenerate in the first degree– probable deduction *proper*. Consequently, I make the case that Bourdieu's thorough descriptions of the cognitive behavior of social class offers a case study for the elaboration of what I call **"class" group representations**. However, I argue that this is *not* the only form that Peirce's degenerate learning mechanism (in the first degree) can take on. Unfortunately, a development of the second mode of Peirce's learning mechanism (degenerate in the first degree), and of the kind of group representation that it gives rise to, is outside the scope of this dissertation.

Lastly, I make the case that Bourdieu's theory of social class can be read as articulating a learning mechanism for the acquisition of a sign representation whose cognitive behavior is distinguished in two ways– first, by its particular path through Peirce's learning mechanism; and secondly, by the extensive field over which it is defined. I make the case that Bourdieu views the representation of social class as being defined over the *totality* of fields of material conditions of existence. This makes it the primary "principle of social division" (Bourdieu 1984:478), with other divisions – such as sex, age, and ethnicity– being only secondary principles of division or *secondary social classes*. Such secondary social classes (Bourdieu 1984:107), for Bourdieu, are defined over a subset of the totality of the extensive field of material conditions of existence. This makes Bourdieu's theory of classes not only a theory of social classes, but of class group representations as a whole.

The Habitus as a Socially Constituted System of Dispositions

I begin with the discovery step that starts the learning process through which the representation of social class is acquired, and the kind of representation this first step gives rise to. Bourdieu argues that the "conditionings" of the material conditions of existence give rise to a mental structure called the **habitus**. According to my reading of him, Bourdieu's habitus is a "**system of dispositions**" (Bourdieu 1984:562, 570) which gives rise to **classificatory judgments** that turn classes of discrete objects into "distinctive signs" (Bourdieu 1984:170). How is such a mental structure learned? What kind of structure is it? And what are its cognitive characteristics? In offering an answer to these questions, I make the case that Bourdieu's habitus is a mental or cognitive structure that results from an association by contiguity of an order, and is thus the immediate cognition of a relational structure ubiquitous in the extensive field that is the material conditions of existence. Such a mental structure, I argue, is an "effort" also called a "sensation of reaction" or "habit"[30] (to use some of Peirce's other names for this structure). Moreover, as we will see, for both Bourdieu and Peirce, the habitus is unconsciously learned, unconsciously held, and

[30] I refer to Peirce's use of the term in 1867-8, not to be confused with Peirce's later use for this term as it relates to his genuine learning of the mechanism.

articulated not as a distinct representation, but as a structure associated with the distributed system of memory and its close relation to muscular and neural habituation.

According to Peirce, we acquire this mental structure without a conscious and controlled learning process, but through the habituation of our nervous system. This habituation is made possible due to our ability to perceive *transition*, or two sides of an instant, immediately– that is, as an immediate cognition that does not involve the use of inference or chains of representations. For Peirce, the ability to immediately perceive these transitions in feelings is tantamount to our ability to perceive a *relation* immediately (EP2:155, 1903). Orders of emphasized transitions are learned automatically and unconsciously, in a specialized Peircean framework, due to their *ubiquity* in an extensive field. By ubiquity, I mean that such mental structures can be inferred from every input.

Bourdieu demonstrates an affinity for this view of the acquisition of a relational structure in his work on the acquisition of the physio-mental structure called the “habitus”. Bourdieu emphasizes the unconscious process through which such a structure is learned, and refers to such a mode of acquisition as an “impress[ion]” that occurs through “bodily experiences” (Bourdieu 1984:77). The acquisition of the habitus thus involves a *bodily* conditioning of the senses that takes *ubiquitous relational aspects* of the sensory environment and represents them so that they are “insensibly internalized” (Bourdieu 1984:77). It is for this reason, I argue, that Bourdieu emphasizes the importance of bodily, sensory, experiences in the acquisition of the mental structure that is the habitus. It is a process that does not rely on a representational intermediary, but is transmitted directly “from body to body” (Bourdieu 1984:80). It thus avoids a learning process; which, by using explicit conceptual representations, would be controlled and conscious according to Peirce’s view of the distinction between conscious and unconscious reasoning that we saw in chapter 3. Thus Bourdieu’s view that the acquisition of the habitus is a process “below the level of consciousness and language” (Bourdieu 1984:466) is in line with Peirce’s view of association by contiguity and the acquisition of ordres of “efforts” or “habits”.

The relational structure which orders the material conditions of existence is learned through "conditionings" (Bourdieu 1984:56) that occur unconsciously and rely on bodily or sensory habituations. It is for this reason, I maintain, that Bourdieu refers to the habitus as "an internalized form of class condition" (Bourdieu 1984:101). This internalization of the relational structure that orders the material conditions of existence is made possible by the mechanisms that ensure the "ubiquity" of this ordering in the extensive field.

> Every group tends to set up the means of perpetuating itself beyond the finite individuals in whom it is incarnated. (This was one of Durkheim's fundamental insights.) In order to do so, it establishes a whole set of mechanisms, such as delegation, representation and symbolization, which confer ubiquity and eternity.
>
> (Bourdieu 1984: 72)

The ubiquity of a certain ordering of the material conditions of existence is thus essential to the acquisition of this relational structure as the habitus. Moreover, Bourdieu makes clear the role of timing of exposure in this kind of acquisition. He points to the importance of early childhood exposure to the acquisition of relational orders that are ubiquitous in the material conditions of existence (Bourdieu 1984: 70).

Because the habitus is a physio-mental structure, offering an explanation about the process through which it is acquired is tantamount to the articulation of a cognitive learning mechanism. It is for this reason, I argue, that Bourdieu makes the case, quite openly, that learning the system of dispositions – perceptual and evaluative "schemes"[31]– that constitute the habitus involves a "cognitive acquirement" (Bourdieu 1984:3). Bourdieu himself does not offer an explicit theory of this cognitive acquisition process, but his work on the habitus supports a Peircean theory of the acquisition of efforts that conclude in "sign" representations or indices.

[31] Again, while Bourdieu seems to be using Piaget's terminology, I argue that he is not using "schema" to mean the same mental structure. Bourdieu's "schemes" or schema do not involve the abstracting away from the bodily disposition to a higher order symbolic representational system.

Bourdieu argues that the habitus, acquired through a process of *bodily* conditionings— "is social necessity made second nature, turned into muscular patterns and bodily automatisms" (Bourdieu 1984:474). Bourdie writes:

> So nothing is further removed from an act of cognition, as conceived by the intellectualist tradition, than this sense of the social structure, which, as is so well put by the word taste– simultaneously 'the faculty of perceiving flavours' and 'the capacity to discern aesthetic values' – is social necessity made second nature, turned into muscular patterns and bodily automatisms. Everything takes place as if the social conditionings linked to a social condition tended to inscribe the relation to the social world in a lasting, generalized relation to one's own body, a way of bear ing one's body, presenting it to others, moving it, making space for it, which gives the body its social physiognomy.
>
> (Bourdieu 1984:474)

Here, Bourdieu is speaking of a *particular* disposition in the system of dispositions that constitutes the habitus – of a taste – which we will turn to shortly. However, this description of the acquisition of the particular disposition of taste is applicable to the acquisition of the whole unitary (Bourdieu 1984:507) system of dispositions that is the habitus.

Bourdieu argues that the "conditionings" associated with the material conditions of existence in which an individual originates "inscribe the relation to the social world in a lasting, generalized relation to one's own body" (Bourdieu 1984:474). This, he argues, gives rise to an act of cognition that is a "sense" and which differs from an "intellectualist" view of cognition; which he associates with the view that all knowledge is conceptual and involves the use of "linguistic" conceptual representations (Bourdieu 1984:483). For this reason, the habitus – the physio-mental structure that results from such a process of acquisition – is not a full conceptual representation, for Bourdieu, that gives rise to conceptual knowledge. Instead, the habitus is a mental structure that – not being a full conceptual representation – only *imparts "sense" (not knowledge), in an act of cognition*. This "sense", unlike full conceptual knowledge, imparts cognitive content that cannot be divorced from its application to a set of discrete individual objects.

Peirce, I argue, viewed in light of a specialized theory of cognition, can help us disambiguate what Bourdieu could mean here in his description of the habitus. This is in light of the striking similarities between the kind of cognition that Bourdieu is describing in his work on the habitus, and his descriptions of the acquisition of the "sense of social orientation" (Bourdieu 1984: 474); and the specialized cognition reading of Peirce that I've offered in this dissertation – in particular, the specialized cognitive domain of Sensation of Reaction (Sensibility). Both Peirce and Bourdieu, I argue, are describing the same cognitive domain – a domain that results in a representation that is a *sign* (instead of a full *conceptual symbol*) through an inferential process defined over sensations of reaction, efforts, and habits (in Peirce's terminology), or over the habitus (in Bourdieu's terminology).

Peirce's "sensations of reaction" have a close relation to bodily and muscular habituation that has much in common with Bourdieu's conditionings of the habitus. I reproduce from chapter 2, Peirce's description of "sensations of reaction".

> Besides Feelings, we have Sensations of reaction; as when a person blindfold suddenly runs against a post, when we make a muscular effort, or when any feeling gives way to a new feeling. Suppose I had nothing in my mind but a feeling of blue, which were suddenly to give place to a feeling of red; then, at the instant of transition there would be a shock, a sense of reaction, my blue life being transmuted into red life. If I were further endowed with a memory, that sense would continue for some time, and there would also be a peculiar feeling or sentiment connected with it. this last feeling might endure (conceivably, I mean) after the memory of the occurrence and the feelings of blue and red had passed away. But the *sensation* of reaction cannot exist except in the actual presence of the two feelings blue and red to which it relates.
>
> (W8:103-4, 1890)

Peirce's "sensations of reactions", or efforts, as we saw in chapter 2, are thus immediate perceptions of transitions in feelings, or two sides of an instant, associated with muscular efforts, as well as transitions in instantaneous neural states. Moreover, it is closely associated with *memory*, such that we maintain a

disembodied “sense” of the relation between two feelings – the feelings of “blue” and “red” in the passage above– even when those feelings are no longer immediately present. However, this sense remains and is triggered “in the actual presence of the two feelings”, should we encounter them again. Thus, in this example, blue has become associated (by contiguity) with red. In the cases that the two feelings and their relation is ubiquitous, we can infer the relation (e.g. between blue and red) from every perceptual input.

I argue that Bourdieu’s habitus is such a learned effort, or learned relation among instantaneous states of the nervous system. What does such a representation look like in the mind? Peirce argues that such a representation is a mental structure that is a rule or law which is viewed as being applicable to certain universes of hypotheses. Such a rule is initially articulated as habits of transitions in feelings. Such habits are not represented as “linguistic” or propositional representations, but are held in a distributed or associative form of memory. As we have seen, because the representational output of association by contiguity is *distributed* and not a discrete symbolic representation, this means that it is unconscious– as only linguistically explicated *propositional* representations are conscious in Peirce’s theory of cognition (EP2:227, 1903). A sign, consequently, for Both Peirce and Bourdieu is a representation that is unconscious and has its effect on cognition in an unconscious way.

It is for this reason, I believe, that Bourdieu refers to the habitus not as a representation but as a “disposition” or “single system of dispositions” (Bourdieu 1984:507). The habitus, then, is a habitual inclination or tendency to put certain things together in the mind according to a particular relational order. Bourdieu reserves the term “**socially constituted**” (Bourdieu 1984:107) to refer to this kind of automatic, bodily, acquisition process for the habitus, which he describes as a “system of dispositions” (Bourdieu 1984: 562). The habitus, then, in its process of acquisition is *constituted* by the external relational order, rather than being *learned* – a process that would involve an intellectual process, the use of discrete symbols, and a conscious and controlled process.

Bourdieu makes this aspect of the habitus particularly clear when he argues that the physio-mental structure that is the habitus is constituted by the “conditionings” of the material conditions of existence.

> The aesthetic disposition, a generalized capacity to neutralize ordinary urgencies and to bracket off practical ends, a durable inclination and aptitude for practice without a practical function, can only be constituted within an experience of the world freed from urgency and through the practice of activities which are an end in themselves, such as scholastic exercises or the contemplation of works of art. In other words, it presupposes the distance from the world (of which the 'role distance' brought to light by Erving Goffman is a particular case) which is the basis of the bourgeois experience of the world.
>
> (Bourdieu 1984:54)

The habitus is a mental structure that grasps not only the "intrinsic properties" (Bourdieu 1984:172) of the material conditions of existence in which an individual is brought up, but also, the "relational properties" (Bourdieu 1984:172) that situate these intrinsic material properties vis-a-vis the intrinsic properties of *other* material conditions of existence.

> As a system of practice-generating schemes which expresses systematically the necessity and freedom inherent in its class condition and the difference constituting that position, the habitus apprehends differences between conditions, which it grasps in the form of differences between classified, classifying practices (products of other habitus), in accordance with principles of differentiation which, being themselves the product of these differences, are objectively attuned to them and therefore tend to perceive them as natural.
>
> (Bourdieu 1984:172)

The habitus, then, is experienced as a natural sense of objects' relation to other objects – as a "social" sense (Bourdieu 1984:241) of classified objects, and of *oneself* as a classified object – i.e., of oneself as having "relationally defined positions" (Bourdieu 1984:246). Such a sense of social orderings of an uncountably infinite set of objects is taken as natural and intrinsic, and is thus a "misrecognition" (Bourdieu 1984:172) of the structured nature of the dispositions one feels to be the most "natural" and

authentic. Bourdieu is thus strikingly in line with Peirce regarding the process of acquisition of a sign– down to their choice of terminology for this kind of representation.

Bourdieu's habitus– as a distributed system of relations or associations inscribed in the body's own distributed system of muscular memory– thus maps onto Peirce's "association by contiguity". Such an association is simply an external compulsion to put things together in the mind in a certain *order*. It is not "learned" in the sense of being determined by an experience, but is rather *a priori* (in the Peircean sense) to any particular input. Instead of reflecting the learning of an attribute of an object of cognition, it *imposes* an interpretation onto that object that is *a priori* to it. Moreover, being a disposition, or habitual tendency, rather than a discrete symbolic representation, it never rises to the level of consciousness, or of explicit, propositional language; and never needs to be *explicated* by the mind. The only conscious articulation of this kind of cognition, as we will see, is at the end of the learning mechanism (degenerate in the first degree) – as a classifying judgment which is the first discrete representation involved in the process. The habitus is thus not yet a representation– not even a *sign.* Instead, it is simply a physio-mental associative disposition that can give rise to a sign as the result of a particular inferential process.

The habitus is thus a system of distributed position that gives rise to certain *relational* hypotheses about the world that are not a character of the object of cognition, but of the *subject* doing the cognizing. For this reason, the habitus is a structure that agents come to share and hold in common due to their participation in an *ordered* world, or an extensive field; in which every material aspect has been ordered so as to correspond to the abstract relational structure that is the social order. All subjects who are part of this field will share this "common character" (W1:328, 1865), since it is acquired automatically and unconsciously as part of being part of that extensive field, and in relationship with other members of the field – as cognizing subjects (agents) or as objects. This view is consistent with the view of Peirce's specialized cognition – Sensation of Reaction (Sensibility) – that we've seen so far in this dissertation.

Bourdieu agrees with this definition of subjects, and reserves the term "common-sense" to refer to a common representation held by all agents in a society that is a *sense* of the social order (Bourdieu

1984:468). Such a sense, as we are beginning to see, is cognitive content with extension and no intension. With this, I have proposed a much more specific theory about what Bourdieu means by "conditionings" that fills in the holes left by Bourdieu in a specialized Peircean framework. I argue that such a filling-in is warranted here because of the striking similarities in how Bourdieu approaches the representation of class to Peirce's view of the specialized cognition of Sensation of Reaction (Sensibility). However, Bourdieu, read in this light, also deepens our understanding of Peirce's association by contiguity and the process of acquisition that it describes– in particular with respect to the *bodily* aspect of this form of acquisition.

As a recap, I argue that the habitus is the same physio-mental structure as an "order" of ubiquitously emphasized sensation of reaction, or efforts. It is a learned association between instantaneous states of the nervous system that have come to be related due to the mind's ability to immediately perceive and encode relations between feelings that have not yet been made intelligible. In this way, Bourdieu helps give us a more precise way of thinking about Peirce's "association by contiguity", and how "efforts" can be acquired without going through a conscious and controlled process that involves explicit conceptual (or linguistic) representations. The habitus is thus not only unconscious, but *because* it is unconscious it is also *not* a representation. Instead, it is a system of distributed bodily (muscular) and neural habituations. Such distributed associations have not been discretized *as* a representation, per se, or as part of conscious reasoning. This, I argue, sets up the centerpiece for a theory of reference that meets Kripke's challenge that such a theory cannot rely on "qualitative" states of brain and body to fix a reference. Instead, Peirce (and, I argue Bourdieu) offer an answer in which what fixes the reference is instead a "quantitative" state of brain and body.

Bourdieu's Simple (Analogous) Transfers as Probable Deduction Proper

For Peirce, association by contiguity is a compulsion from "without" for one feeling to be followed by another. It is not yet articulated as a conscious representation. But is experienced as an "external compulsion" (EP1:261, 1887-8), "intuition" (W1:247, 1865), or "sense" (EP2:101, 1901) to put certain

things together in the mind in a particular *order*. These “things”, are perceptual inputs – a collection of discrete objects– that have not yet been cognized. Bourdieu agrees with Peirce’s assessment about the cognitive effects of the class sign, and even uses the same term– “sense”(Bourdieu 1984:466) – to refer to this cognitive effect.

As we saw, for Bourdieu, the habitus is also the principle of division that discretizes a continuous social space (Bourdieu’s 3D representation of the extensive field of material conditions of existence), or Peircean extensive field. It “draw[s] discrete units out of indivisible continuity, difference out of the undifferentiated” (Bourdieu 1984:478). It does so by leading agents to take on “dispositions” that orient their approach to a class of discrete objects or practices. Here is Bourdieu describing the “aesthetic” disposition that enables an individual to view objects as art or as cultural objects.

> At the same time, the aesthetic disposition is defined, objectively and subjectively, in relation to other dispositions…As the objective distance from necessity grows, life-style increasingly becomes the product of what Weber calls a 'stylization of life', a systematic commitment which orients and organizes the most diverse practices– the choice of a vintage or a cheese or the decoration of a holiday home in the country…Thus, the aesthetic disposition is one dimension of a distant, self-assured relation to the world and to others which presupposes objective assurance and distance. It is one manifestation of the system of dispositions produced by the social conditionings associated with a particular class of conditions of existence when they take the paradoxical form of the greatest freedom conceivable, at a given moment, with respect to the constraints of economic necessity.
>
> (Bourdieu 1984:55-6)

These particular dispositions form a unitary system that is the habitus. Dispositions, for Bourdieu, are “distinctive expression[s]” (Bourdieu 1984:56) of one’s position in social space (i.e. vis-a-vis the material conditions of existence), and thus a particular expression of the more universal disposition that is the habitus. Bourdieu argues that such particular dispositions, sometimes called “taste”, “unite and separate”

– leading to a re-ordering of a class of objects according to a precept (i..e method for the practical sampling of extension) that is the habitus.

> But it [the aesthetic disposition] is also a distinctive expression of a privileged position in social space whose distinctive value is objectively established in its relationship to expressions generated from different conditions. Like every sort of taste, it. Being the product of the conditionings associated with a particular class of conditions of existence, it unites all those who are the product of similar conditions while distinguishing them from all others. And it distinguishes in an essential way, since taste is the basis of all that one has– people and things– and all that one is for others, whereby one classifies oneself and is classified by others.
>
> (Bourdieu 1984:56)

The aesthetic disposition benign described here, is but one of a unitary system of dispositions that is the habitus. The habitus, or single system of dispositions, is akin to a universal rule or law and has a "generalizing" tendency (Bourdieu 1984, 23). It is a "transposable" disposition (Bourdieu 1984: 26), which can be applied to a *particular* class of objects by a process that Bourdieu calls a "simple transfer" (Bourdieu 1984:170). It "carries out a systematic, universal application–beyond the limits of what has been directly learnt" to new domains or classes of discrete objects.

> The habitus is necessity internalized and converted into a disposition that generates meaningful practices and meaning-giving perceptions; it is a general, transposable disposition which carries out a systematic, universal application–beyond the limits of what has been directly learnt–of the necessity inherent in the learning conditions. That is why an agent's whole set of practices (or those of a whole set of agents produced by similar conditions) are both systematic, inasmuch as they are the product of the application of identical (or interchangeable) schemes, and systematically distinct from the practices constituting another life-style.
>
> (Bourdieu 1984:170)

As a transposable system of disposition, the habitus is “armed with a set of perceptual and evaluative schemes that are available for general application” and “enables” the agent who holds it “to perceive, classify and memorize” differently (Bourdieu 1984: 26). Again I take Bourdieu to mean something different than Piaget’s “schema” here. In his description of how “schemes” work, Bourdieu emphasizes a limited role in memory, rather than pointing to the abstraction of higher level symbolic representations.

Much like with his “conditionings”, Bourdieu is not very clear about the cognitive mechanisms that underlie such “transfers”; and the role that its tendency to generalize plays in the cognitive behavior of the habitus. I argue, once again, that my Peircean lens of specialized cognition helps offer us an explanation that adds specificity and rigor to Bourdieu’s theory of class. I make the case that just as Bourdieu’s “conditionings” corresponded to the first step in Peirce’s learning mechanism (degenerate in the first degree) – to an association by contiguity; Bourdieu’s “simple transfers” correspond to the second step in Peirce’s degenerate learning mechanism – to some kind of probable deduction. In particular, I argue Bourdieu’s “simple transfers” correspond to Peirce’s probable deduction *proper*.

Through these transfers or transpositions, the habitus, which is perhaps initially acquired as a single disposition bound to a particular material context, becomes a *system* of dispositions that comes to be applied to an ever increasing number of different classes of objects. Once acquired, the habitus generalizes and comes to be applied to domains that were not involved in its acquisition. It thus becomes, indeed, a *unitary*, single, system of dispositions. In order to be applied, the unitary, generalized, system of dispositions that is the habitus must be adapted– or tailored– to a particular class of objects. For example, a disposition to select difficult to care for fabrics, associated with a childhood in which one’s material conditions of existence from necessity, must be transposed into a disposition to select shoes impractical for long walks on cobbled streets. How does such a transfer occur? And how do *particular* dispositions arise from the universal and *generalizing* system of dispositions that is the habitus?

In the following passage, Bourdieu attempts to describe the “simple transfers”, or transpositions, of the habitus.

> The habitus continuously generates practical metaphors, that is to say, transfers (of which the transfer of motor habits is only one example) or, more precisely, systematic transpositions required by the particular conditions in which the habitus is 'put into practice' (so that, for example, the ascetic ethos which might be expected always to express itself in saving may, in a given context, express itself in a particular way of using credit)...An obvious paradigm would be the disposition called 'handwriting', a singular way of tracing letters which always produces the same writing, i.e., graphic forms which, in spite of all the differences of size, material or colour due to the surface (paper or blackboard) or the instrument (pen or chalk) – in spite, therefore, of the different use of muscles– present an immediately perceptible family resemblance, like all the features of style or manner whereby a painter or writer can be recognized as infallibly as a man by his walk.
>
> (Bourdieu 1984:173)

Bourdieu emphasizes here the use of *analogous* manipulations of a class of concrete objects, referring to the transfers of the habitus as the generation of “practical metaphors”. He uses the example of handwriting to use the way in which the habitus – a universal and generalized disposition– is transposed to apply to “particular” contexts. In spite of the “different use of muscles” involved in writing instances that use different mediums, there remains an “immediately perceptible family resemblance” among the different particular applications of the generalized disposition of the habitus.

Here is an even more explicit example about the operation that constitutes the transposition or transfer of the habitus as a *particular* disposition.

> Unlike non-specific perception, the specifically aesthetic perception of a work of art (in which there are of course degrees of accomplishment) is armed with a pertinence principle which is socially constituted and acquired. This principle of selection enables it to pick out and retain, from among the elements offered to the eye (e.g., leaves or clouds considered merely as indices or signals invested with a denotative function– 'It's a poplar'. 'There's going to be a storm'), all the stylistic traits– and only those– which, when relocated in

> the universe of stylistic possibilities, distinguish a particular manner of treating the elements selected, whether clouds or leaves, that is, a style as a mode of representation expressing the mode of perception and thought that is proper to a period, a class or class fraction, a group of artists or a particular artist.
>
> (Bourdieu 1984:50)

Bourdieu is describing the transfer of the habitus as a "specifically aesthetic" disposition that applies to the "perception of a work of art" to be articulated as a "pertinence principle". This "principle of selection" allows the mind in an act of cognition to "pick out and retain, from among the elements offered to the eye…all the stylistic traits– and only those– which, when relocated in the universe of stylistic possibilities, distinguish a particular manner of treating the elements selected". Bourdieu, here, I argue, is describing a process that involves a principle for *ordering* a countably infinite collection of individual concrete objects, such that certain elements are "pick[ed] out and retain[ed]", while others fade from view. The elements that are pertained are those that are "pertinent" to the task of constructing a distribution of the elements in a way that maximizes differences, or distance, between some; and reduces differences or distances between others.

The particular dispositions structured by the habitus, I argue, can be interpreted as the conclusions of a deductive process that begins with an unconscious *a priori* (in the Peircean sense) representation considered to be a universal law or rule; and ends with an application of this rule as a transformation in how a given collection of inputs is *organized*. This way of thinking about the habitus can be particularly illuminating, and offers a more rigorous description than that provided by Bourdieu. The dispositions of the class sign (habitus) in a specialized Peircean view of cognition, are descriptions of how to *order* a particular collection of representational inputs in order to be *congruent* with the *a priori* representation that has been determined to be applicable to those inputs. In other words, they are what we have seen referred to as "precepts" of sampling (EP2:101, 1901).

Let's take an example from chapter 3 of this kind of inference.

> Take the "immediate inference," which is as truly a deduction as any other, from "There is a woman whom any Spaniard there may be adores," to "Any Spaniard there may be stands to some woman or other in the relation of adoring her." This inference may be drawn by a "rule of thumb"; that is, a habit may act to cause a feeling of confidence in the conclusion, without any deliberation or control….Yet even in that case, the habit is a universal rule in itself, although its operation may be hindered sometimes. But if the inference is drawn deliberately, the reasoner will consider that if the woman can be specified in advance of knowing what Spaniard is to be adduced, it can only make it easier to find such a woman if the Spaniard is fixed upon first; or in some other way, the case will be brought under a known or evident universal truth.
>
> (EP2:287-8, 1903)

Such a process, for Peirce (as we saw in chapter 3,), is a “Probable” Deduction and is an *immediate* inference. This immediate inference starts from a law, interprets it, and articulates its implications in a *particular* universe of hypothesis.

> Thus, the argument sets out from a law represented to be known actually to hold throughout the universe of the hypothesis, and in the conclusion interprets the effect of this law. As Professor Mitchell* profoundly said, the whole operation virtually consists in erasure.
>
> (EP2:287-8)

Peirce calls this kind of behavior an interpretation, and speaks of it as a kind of “immediate” process akin to Bourdieu’s “simple transfer” (Bourdieu 1984:170) or “transfer” (Bourdieu 1984:173). Because it is an “immediate” inference that does not involve the use of explicit representations, probable deduction is, like association by contiguity, an *unconscious* process.

The conclusions of Probable Deduction are the applications of the universal law, or rule, which had previously been un-explicated to a particular set of objects. This application takes the habitus from the internalization of a *continuous* extensive field, to its application to a *discrete* quantum field of objects. Bourdieu seems to be aligned with Peirce regarding this step during which the habitus plays a role in

bridging the continuous and universal to the particular and singular. Bourdieu makes the case that the dispositions of the habitus sign are principles of division that *discretize* what had previously been merely a continuous *distributional* internalization of social class into a material structure. However, in addition, he argues that a particular flavor of the ways in which the habitus makes its "direct transfers", or immediate inferences, is by articulating disposition that are poised to order a collection of objects. It does so by establishing a *distributional* order that relies on analogy– on putting part to part.

> The habitus continuously generates practical metaphors, that is to say, transfers (of which the transfer of motor habits is only one example) or, more precisely, systematic transpositions required by the particular conditions in which the habitus is 'put into practice' (so that, for example, the ascetic ethos which might be expected always to express itself in saving may, in a given context, express itself in a particular way of using credit)...An obvious paradigm would be the disposition called 'handwriting', a singular way of tracing letters which always produces the same writing, i.e., graphic forms which, in spite of all the differences of size, material or colour due to the surface (paper or blackboard) or the instrument (pen or chalk) – in spite, therefore, of the different use of muscles– present an immediately perceptible family resemblance, like all the features of style or manner whereby a painter or writer can be recognized as infallibly as a man by his walk.
>
> (Bourdieu 1984:173)

Because of the importance of analogous transfers in its functionings, Bourdieu's habitus thus operates in a way akin to Peirce's Probable Deduction *proper*. As we saw in chapter 3, Probable Deduction Pr*oper* is distinct from Statistical Probable Deduction because it works through analogy.

> A Probable Deduction proper is a Deduction whose Interpretant does not represent that its conclusion is certain, but that precisely analogous reasonings would from true premisses produce true conclusions in the majority of cases, in the long run of experience.
>
> (EP2:298)

The habitus, I argue, involves an immediate inference that relies on “analogous reasonings” or the manipulation of parts to parts. It is this kind of deductive inference that allows it to be “transferred” from a universal law or rule held in the body’s distributed memory (or conditionings) as an implicit system of dispositions, to the interpretation of this system to a particular material context which comes with its own universe specific universe of practical hypotheses.

In this guise, Bourdieu refers to the particularized disposition of the habitus (the overall system of dispositions) when attuned to a particular context or universe of hypothesis under different names – depending on the universe of hypothesis. I argue that he refers to it as “taste” – when dealing with a disposition articulated for a universe of objects as objects and their stylistic properties. Bourdieu is perhaps most articulate about particular dispositions that are “tastes”, and I want to take a moment to look more closely at the cognitive effects of tastes; which, as particular dispositions, I argue are outputs of a deductive inference– the immediate deductive inference that is probable deduction proper.

> Taste is an acquired disposition to 'differentiate' and 'appreciate', as Kant says– in other words, to establish and mark differences by a process of distinction which is not (or not necessarily) a distinct knowledge, in Leibniz's sense, since it ensures recognition (in the ordinary sense) of the object without implying knowledge of the distinctive features which define it. The schemes of the habitus, the primary forms of classification, owe their specific efficacy to the fact that they function below the level of consciousness and language, beyond the reach of introspective scrutiny or control by the will….Taste is a practical mastery of distributions which makes it possible to sense or intuit what is likely (or unlikely) to befall–and therefore to befit–an individual occupying a given position in social space. It functions as a sort of social orientation, a 'sense of one's place' , guiding the occupants of a given place in social space towards the social positions adjusted to their properties, and towards the practices or goods which befit the occupants of that position. It implies a practical anticipation of what the social meaning and value of the chosen practice or thing will probably be, given their distribution in social space and the practical knowledge the other agents have of the correspondence between goods and groups.
>
> (Bourdieu 1984:466-7)

In this passage, Bourdieu makes clear that the particular disposition that is a taste is “a process of distinction which is not (or not necessarily) a distinct knowledge”. He is clear that such a knowledge is not conceptual knowledge that involves explicit representation in terms of what he calls “linguistic” structure (Bourdieu 1984: 483). This kind of representation, he makes clear, “ensures recognition…of the object without implying knowledge of the distinctive features which define it”.

As we’ve seen, this is in keeping with Peirce’s “effort” or “habit”, which is an *a priori* representation which is a habituation that is prepared to recognize and manipulate perceptual inputs without encoding in explicit representational terms a symbolic representation of that knowledge. It is a knowledge of ‘how to’, that is held in distributed memory as the result of the conditionings of muscular and neural associations. Particular dispositions immediately deduced from the habitus– the system of dispositions– are experienced not as explicit conceptual knowledge but as a “practical mastery of distributions” of objects in a certain class of objects, “which makes it possible to sense or intuit what is likely (or unlikely to befall”. This distributional sense about classified objects can also be extended to agents (including the subject themselves) *as* classified objects and experiences as a “sense of one’s place”. This is, so far, well in line with the reading that I have been developing that Bourdieu’s theory of class is describing a path through Peirce’s learning mechanism that is degenerate in the first degree and involves the use of probable deduction proper.

However, tastes and dispositions are not the only kinds of particular dispositions that can be inferred from the habitus. I argue that Bourdieu reserves the term “bodily hexis” for dispositions that are much more intimate and relate to agents’ own bodies. Bourdieu argues that the social conditionings of the material conditions of existence are not only internalized as the system of dispositions that is the habitus, but are also inscribed “in a lasting, generalized relation to one's own body”, making “bodily hexis” another “basic dimension of the sense of social orientation” (Bourdieu 1984:474). Bourdieu thus argues that we no longer have a “sense” or intuition about concrete objects, which results from the acquisition of the habitus, but that we have a sense about our own bodies as a universe of objects that can also be classified.

> Thus one can begin to map out a universe of class bodies…The social representation of his own body which each agent has to reckon with, from the very beginning, in order to build up his subjective image of his body and his bodily hexis, is thus obtained by applying a social system of classification based on the same principle as the social products to which it is applied. Thus, bodies would have every likelihood of receiving a value strictly corresponding to the positions of their owners in the distribution of the other fundamental properties–but for the fact that the logic of social heredity sometimes endows those least endowed in all other respects with the rarest bodily properties, such as beauty (sometimes 'fatally' attractive, because it threatens the other hierarchies), and, conversely, sometimes denies the 'high and mighty' the bodily attributes of their position, such as height or beauty.
>
> (Bourdieu 1984:193)

Bourdieu's bodily hexis, is thus the application of a particular disposition that pertains to the classification of bodies– including one's own body– according to the habitus and the relational social world that it internalizes.

Lastly, Bourdieu argues that not only can we have particular dispositions oriented at objects, including our own bodies, we can also have particular dispositions oriented at *practices* or ways of doing things. Such particular dispositions are oriented at the organization of *manners*, including the ways in which we've come to acquire a set of particular dispositions in the first place.

> Knowing that 'manner' is a symbolic manifestation whose meaning and value depend as much on the perceivers as on the producer, one can see how it is that the manner of using symbolic goods, especially those regarded as the attributes of excellence, constitutes one of the key markers of 'class' and also the ideal weapon in strategies of distinction, that is, as Proust put it, 'the infinitely varied art of marking distances'.
>
> (Bourdieu 1984:66)

Thus, the *way* of arriving at a disposition– revealed by manners– is also subject to the classificatory scheme of a particular disposition. In this way, objects, agents (considered as objects), and practices all come to articulate universes of inputs to which the system of dispositions that is the habitus can be transposed. The particular dispositions that are immediately inferred from the habitus, I argue, via probable deduction proper, set up the scene for the final inference involved in Peirce's learning mechanism (degenerate in the first degree). They set up the scene for the classificatory judgment of induction which concludes in the first, and only, discrete and conscious mental representation in the entire cognitive process. I now turn to this final inferential step.

Applications of Dispositions to Bourdieusian Fields with Specific 'Logics' and Quantitative Induction

In addition to reflecting the internalization of an external system of relations as a unitary system of dispositions, the habitus is externalized, or expressed, as *particular* dispositions tailored to a particular domain or "universe" of discrete material objects. In its guise as taste, bodily hexis (particular dispositions towards human bodies as classifiable objects), and even manner, habitus is transposed into a particular "practical" distributional sense or intuition. The effect of such a "practical mastery of distributions" (Bourdieu 1984:466) on cognition, I argue, is that of the conclusion of an immediate deductive inference – probable deduction proper. It acts as a "pertinence principle" (Bourdieu 1984:50), which is a "principle of selection" that enables the "pick[ing] out and retain[ing]" of elements from a collection of discrete elements. I've argued that such a "pertinence principle" is analogous to Peirce's "precept of sampling", which I argued in chapter 3 begins the inductive step in his learning mechanism (degenerate in the first degree).

The output of the deductive step in this degenerate version of Peirce's learning mechanism is also not a discrete representation. Being the result of an unconscious process– an *immediate* deduction– that does not make use of representations, the particular dispositions that result from the "simple" transfer of the habitus to a particular class of concrete material objects is also unconscious. Consequently, just as individual agents are unconscious of the universal and generalizing system of dispositions that is the

habitus, they are also unconscious of the particular disposition that orients their approach to a class of objects as taste, bodily hexis, or manner. Individual agents, in this reading of Bourdieu's theory of class according to my specialized Peircean framework, do not become conscious of any result of the specialized cognition associated with the acquisition of social class until they reflect upon a classificatory judgment that they have made. Such a classificatory judgment is the representational output of an inductive inference. I argue that given my hypothesis that Bourdieu's social class is analogous to a path through Peirce's learning mechanism that is degenerate in the first degree, we are dealing with a *quantitative* induction.

Quantitative induction, as we saw in chapter 3, begins with a precept of sampling (corresponding to Bourdieu's "particular" distributions), and a "universe of hypotheses" or specified domain which it seeks to order according to the precept (EP2:288, 1903). Since the kind of conceptual content that the particular dispositions (or precepts) of the habitus imparts to cognition is distributional, it depends on such a domain in order to express its content, which is a "sense" or "intuition" for how the domain of concrete objects should be organized by the mind. The only content, consequently, that this kind of distributional structure can be said to have is a way or manner of ordering elements in the mind. This is in line with Peirce's definition of association by contiguity – as an external compulsion to put things together in the mind in a certain order. How, then, does this implicit sense get raised to the level of consciousness?

Peirce and Bourdieu are once again in agreement that the "habit" or "effort" (Peirce) or "habitus" (Bourdieu) only comes to consciousness in its guise as the result of a classificatory judgment. Such a judgment, however, is an "application" (Bourdieu 1984:170) of an order over a set of objects which already have their own relational structure which is not social. Consequently, the application of the particular disposition inferred from the habitus involves the application of the *social* relational structure to a pre-existing relational structure. Peirce is explicit about this aspect of classification, and also uses the term "application" to refer to this imposition of a class over a collection of objects which already have their own relational structure or logic.

> If the regulation in a *plan* be conceived of simply and absolutely, that is if the determination of the material by its function be fully carried out, it will cease to have any substantiality….The function must not determine the purely substantive material but the latter must be subjected to other functions as conditions and the function must *apply* itself to them. There must be *application*; or there must be equations of condition to satisfy, and these must standing in place of the material receive the *plan*. The different applications of the same plan constitute its classes. They do not have reference to different materials but different applications to material generally speaking….The plan in as much as it *determines* matter may be regarded as a force and is so in a broad sense; that against which it applies itself not directly but in its effect of working out the abstraction, may be re- garded as a passive quality of the matter whether it is so or not. This quality in so far as it constitutes a different working of the force—constitutes the class-characteristic.
>
> (W1:1864, 150-1)

In this passage, Peirce argues that the "class-characteristic", or the determining force of a "plan" which is the abstraction of an idea, cannot be "fully carried out" in material substances. If a chair is only blue, it will cease to be a chair, or any material substance. In order for the *chair*, or any substance, to be blue, it must be something *else* as well – it must be determined by class-characteristics other than 'being blue'. To the extent, consequently, that we view objects as being part of a class, we are looking at them through the prism of that particular class-characteristic, above other class characteristics that they also possess. We thus "apply" the pertinent class-characteristic to them. This process of "application" involves "equations of condition to satisfy" – that is, we must account for the other class-characteristics that a thing possess in order to apply to it a quality, or class-characteristic, that is more relevant to the mind. Such "equations of condition" correspond closely to Bourdieu's ideas of "logics" of fields, which must be taken into account in order to apply a particular disposition to that field.

Thus, the input of Peirce's learning mechanism (degenerate in the first degree) is a class of objects already governed by a relational order, to which a second relational order that is *a priori* to the *subject*, or interpreting mind, is applied. It is to this process that I believe Bourdieu is referring when he speaks of the "logic" that governs "fields" of application.

> It is the specific logic of the field, of what is at stake and of the type of capital needed to play for it, which governs those properties through which the relationship between class and practice is established….In practice, that is, in a particular field, the properties, internalized in dispositions or objectified in economic or cultural goods, which are attached to agents are not all simultaneously operative; the specific logic of the field determines those which are valid in this market, which are pertinent and active in the game in question, and which, in the relationship with this field, function as specific capital–and, consequently, as a factor explaining practices.
>
> (Bourdieu 1984: 112-3)

Note here that while Bourdieu, like Peirce, also sees an analogy between his fields of applications and fields of physics, he is using the term "field" differently from Peirce. Here, Bourdieu is not referring to *extensive* fields, which are continuous. Instead, he is referring to fields which, involving an indeterminate number of discrete objects or elements, are *countably* infinite; and for this reason, cannot be continuous. They would correspond to what Peirce calls "quantum fields" (W3:69, 1873). For Bourdieu, a field is a class of discrete objects governed by their own "logic". The particular disposition of the habitus, is actualized by the *application* of that disposition in a countably infinite collection of concrete objects. Once again, there is striking congruence between Peirce and Bourdieu here. Peirce, like Bourdieu, maintains that the application of the precept– the output of probable deduction– occurs over a countably infinite (denumeral) collection.

We thus get a better sense of how Peirce and Bourdieu's two "fields" differ. I argue that the two fields are describing two sides of the "objective" that is the material conditions of existence. Viewed as a system of relations external to the mind that, yet, condition it through immediate perception, the material conditions of existence are a continuous, extensive, field. However, viewed as the output of a classificatory process– a countably infinite (denumeral) collection – the field is a field of application that is discrete, or as Peirce would call it, "quantum" (see Figure 14 below). Thus the continuous Peircean extensive field and the Bourdieusian discrete (quantum) field of application are two views on the same structure. That structure is

the material conditions of existence, which is both the first and last structure of the process of acquisition described by Peirce's learning mechanism (degenerate in the first degree); and echoed by Bourdieu.

Bourdieu's discrete, or quantum, fields of application subdivides into two kinds – fields of consumption and fields of production (Bourdieu 1984:226). Both are governed by dispositions, in the former case, particular dispositions lead to the picking out of objects to consume based on certain relational properties. In the latter case, particular dispositions lead to the picking out of *relational* stylistic elements in the production of objects. In keeping with the view that his fields are analogous fields in physics, Bourdieu describes the process through which his discrete, quantum, fields of production operate and give rise to classificatory judgments.

> The dispositions constituting the cultivated habitus are only formed, only function and are only valid in a field, in the relationship with a field which, as Gaston Bachelard says of the physical field, is itself a 'field of possible forces', a 'dynamic situation', in which forces are only manifested in their relationship with certain dispositions. This is why the same practices may receive opposite meanings and values in different fields, in different configurations or in opposing sectors of the same field.
>
> (Bourdieu 1984:94)

We see that for Bourdieu, such a process involves the assignment of specific "*values"*. The last step, then, for Bourdieu that constitutes the application of a particular disposition inferred by "simple transfer" from the system of dispositions that is the habitus is that of the assignment of a specific value to elements in the field that have been picked out and ordered according to the method specified by the particular disposition. In this way, Bourdieu is once again, strikingly aligned with Peirce. For Peirce, as we've seen, such a step corresponds to quantitative induction.

Peirce's quantitative induction, as we saw in chapter 3, involves the calculation of a value over a countably infinite collection (denumeral collection) that has been ordered according to a precept of sampling. Based on Peirce's work on infinities – which has since been validated in modern mathematics –

the ordering of infinities is *arbitrary*, in that an infinity can be ordered in a myriad of ways that give the *appearance* of a finite ratio. Peirce's example, as we saw, was to show that we can order a countable infinity to give the appearance of a finite ratio of ½ or of ⅓; yet, neither ordering could be said to be the true or proper one. Both are equivalent. In this way, what is being implemented in the final inferential step of quantitative induction is an arbitrary ordering of a collection of objects such that an arbitrary ratio of frequency or value *can* be assigned to it. This is the case because, from the perspective of the subject (the agent doing the cognition) this is the *social* reality that is of relevance for their choices and behaviors.

This ordering has been made relevant by a material world organized systematically and ubiquitously according to this relational order, such that to make sense of it and to function in this world, the inference of this arbitrary order has become necessary. Living in a material world that has been organized according to a social order requires the acquisition of a social "sense" to calculate values that can otherwise not be derived. Thus we see the importance of "practical mastery" to Bourdieu's theory of class, because the kind of cognitive content that the distributed representation of social class (the habitus) offers is inseparable from the practical *manipulation* of objects – or their re-ordering in the mind according to a pre-established, *a priori*, scheme. It is only upon a re-ordered collection of discrete objects or elements that a ratio of frequency can be calculated, and a value assigned to a set of elements or objects. These values, then, are taken in relation to one another, influencing a discrete *choice* or classificatory *judgment*. Peirce, I think in keeping with Bourdieu, treats the terms "judgment" and "representation" as synonymous. Thus, Bourdieu is again strikingly aligned with Peirce in making the case that the process of acquisition, transposition, and application of social class ends in a discrete mental representation that is the classificatory judgment.

The particular inferred disposition from the habitus class sign (the system of dispositions is actualized over a field – over objects with their own dispositions which must be taken into account in the application of the classificatory act determined by the habitus. I argue a classificatory act is referred to *both* by Bourdieu and by Peirce as a "judgment". For Peirce, a judgment is a representation that is the result of induction (W1:285, 1865), which is an act of classification. I argue that it is to this kind of "judgment" – the

classificatory act that follows the articulation of a particular disposition (e.g. a taste) – that Bourdieu refers to in the title of his work “Distinction: A social critique of the judgment of taste”. Bouridieu does not explain this title, and only mentions the word “judgment” once in that entire text – in an endnote (Bourdieu 1984:600). However, the title of this work begins to explain itself in light of a Peircean specialized theory of cognition.

Peirce uses the terms “judgment” to refer to the result of classificatory acts that conclude a cognition. For this reason, for Peirce, a judgment is an act that results in a full conceptual – explicit and linguistic– representation (W1:285, 1865). Consequently, in the degenerate version of Peirce’s learning mechanism (degenerate in the first degree), the first conscious experience of the sign occurs in the application of it in a classificatory judgment. Note the late stage at which such a classificatory judgment appears in Peirce’s learning mechanism (degenerate in the first degree), compared to the genuine version of his learning mechanism. In the genuine version of Peirce’s learning mechanism, the first judgment that gives rise to a full, explicit, representation occurs as the conclusion of Abduction (association by contiguity). In other words, at the end of the first argumentative step. In the degenerate version in the first degree which we have been elaborating in this section, this first representation occurs as the conclusion of the *last* argumentative step.

Thus, I argue, Bourdieu’s work on the judgment of a particular disposition inferred from the habitus sign (the system of dispositions) sheds some light on Peirce’s learning mechanism (degenerate in the first degree) as it relates to the point at which what is an unconscious process becomes conscious and results in a classificatory judgment – or conceptual representation involved in conscious reasoning.

I thus make the case that the application of a particular disposition of the habitus (system of classification) in Bourdieu’s theory of class is an act of *quantitative inductive inference*. As we saw in chapter 3, this kind of inference involves the actual carrying out of the precept of sampling concluded at the end of probable deduction (a deduction that occurs immediately, unconsciously, and without the use of explicit representation). Quantitative inductive inference takes a sample from a collection and calculates a ratio of

frequency. However, in the case of countably infinite (denumeral) collections, the sampling is an *ordering* of the countably infinite connection according to an "order" (EP2:99, 1901) associated with the collection that is taken to give it its "sense" (EP2:101, 1901). Since, in my reading of him, Peirce's quantitative induction follows probable deduction in his learning mechanism (degenerate in the first degree), quantitative induction has as its starting premise the output of probable deduction. This output, we have seen, is, for Peirce, the interpretation of the associative rule or law held in distributed memory (muscular or neural) transposed or to a particular universe of hypotheses. In keeping with Bourdieu's work on fields and Peirce's own work on the application of classifications, this universe of hypotheses would consist of a class of discrete objects with their own order or "logic", to which the social classification must be applied.

Quantitative induction uses the output of Probable Deduction Proper in order to pick out an extension by the manipulation, or ordering, of a countably infinite collection of discrete objects or elements. It then calculates a ratio of frequency for the distribution of a "predesignate character" over the now ordered "denumeral" collection, which is the quantum (Bourdieusian) field over which the inference takes place. Pierce refers to this collection as the "universe of hypothesis" (EP2:288, 1903). Let us take an example to elucidate this process.

An Example of Quantitative Induction Involving the Social Class Habitus

Let's say that the predesignate character of interest in this induction is the choice of a particular fabric for a coat – let's say lambswool. This choice is a discrete choice defined over a countably infinite set of possible stylistic characteristics that fabric can have (Bourdieu 1984:50). Even though the actual choice of fabric at this event is small and finite, the set of possible *stylistic attributes* for all fabrics is infinite. This is because, even discounting rapid innovations in technology, with arbitrary decisions about which distinctions go on to make different fabrics *different* (e.g. 170 thread-count sheet versus a 480 thread-count, infinitesimal differences in color, etc.) there is a countably infinitely large set of stylistic fabric elements to choose from. Pierce's statistical quantitative induction orders the space of possible stylistic attributes a fabric can have according to the dispositional output of Probable Deduction Prober, such that

certain attributes of the fabric are ordered to seem closer to one another in the space of possibilities than others, based on properties picked out by the particular disposition as more “pertinent”. What stylistic attributes that are seen as “pertinent” will depend on the particular disposition that the agent brings to the situation, which is immediately deducted from the agent’s habitus.

Statistical quantitative induction, then, gives a specific value to the limited number of individual existing fabrics available, based on where they fall in this computation over a reordered space of stylistic possibilities that prioritizes certain stylistic attributes over others. It does this reordering, and the scoring of coats as the weighted average (for example) of their score on the most pertinent stylistic attributes according to the agent’s ordering of the stylistic possibilities, in accordance to the particular disposition inferred from their habitus. The stylistic attributes that are more pertinent, however, are implicitly held to be more pertinent by the re-ordering of attributes automatically and unconsciously in cognition, in such a way that maintains the maximal distance between the agent’s habitus and the habitus associated with *other classes*. In other words, the precept of sampling that results from probable deduction proper *requires the re-ordering of the total space of possibilities, in order to focus on a particular part of it that results in an explicit classificatory judgment.* In this case, that classificatory judgment is the choice of coat based on its fabric. It is for this reason that Bourdieu systematically argues that the habitus encodes not only the conditionings from the intrinsic properties of one’s material conditions of existence, but also the *relative* properties of one’s own material conditions of existence vis-a-vis others (Bourdieu 1984:172).

This operation can also be reversed, instead of picking out a coat of a certain fabric, let’s say that the agent is looking at another agent making that choice. They can infer the probability of someone with their own habitus making that choice, and classify an agent as being part of their own class or of a different class based on that same method of constructing a ratio of frequency. In this way, Peirce’s statistical quantitative induction is an inferential process that results in a classificatory judgment. In this way, the first explicit representation that results from Peirce’s degenerate learning mechanism in the first degree is that of a discrete classificatory judgment which is a discrete choice over a universe of hypotheses or possible

choices. However, due to the unconscious nature of the entire process of inference, this choice is not felt to be one. It is experienced as natural and out of one's control.

In this way, Peirce and Bourdieu again strikingly aligned on the underlying mechanism through which the habitus (class sign) is acquired, the nature of this sign, how the habitus (a distributed system of dispositions) is transposed to a particular field of discrete choices as a particular distribution (i.e. as taste, manner, or capital), and lastly, how the distributional nature of this disposition is discretized in action or choice. In include below an updated version of Figure 13 which makes explicit these equivalences between Bourdieu's "*conditionings*", "*dispositions*", *applications* of dispositions to fields of consumption or production with the three inferences involved in Peirce's learning mechanism degenerate in the first degree: *association by contiguity*, *probable deduction proper*, and *statistical quantitative induction*.

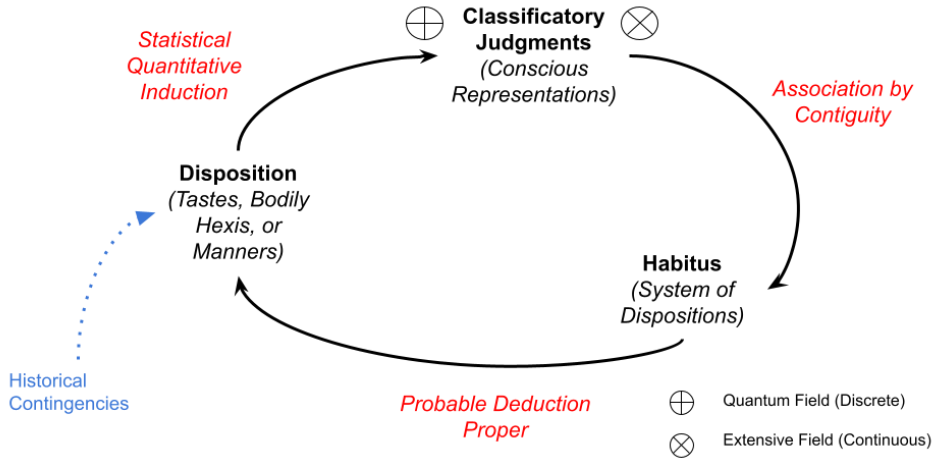


Figure 14: Bourdieu's theory of class characterized as a path through a version of Peirce's learning mechanism that is degenerate in the first degree. Note that two fields are involved in this process. A continuous (extensive) field that constitutes the habitus. As well as a quantum (discrete) field that is the result of the application of a particular disposition of the habitus to a specific class of discrete objects.

Bourdieu's theory of class seems to have many fundamental similarities to a specialized reading of Peirce's theory of cognition. Read in a Peircean light, Bourdieu's work on class becomes much more explicit about the *processes* that lead to the acquisition and functioning of the habitus. At the same time,

read in a Bourdieusian light, the Peircean specialized theory of cognition that I've offered in this dissertation becomes much more grounded in an application.

The ontology of 'social kinds' as group or indexical representations

The Rationalization of the Habitus and Putnam's Social Division of Linguistic Labor

I close this section on Bourdieu's theory of class, and its correspondence to my reading of Peirce as offering a specialized theory of cognition, by focusing on areas where Bourdieu goes further than Peirce. I argue that this is the case in Bourdieu's work on how social class – an indexical representation determined by its reference to a *quantitative* state of brain and body– comes to be associated with *qualitative* states of brain and body that do not determine it. Bourdieu speaks of how the distributed "sense" associated with the habitus can be *rationalized*.

Bourdieu makes the case that social institutions, in particular the *educational system*, play a role in *rationalizing* the distributed physio-mental structure that is the habitus. Bourdieu's description of the rationalization process sounds a lot like Wittgenstein's work on the infinity of explanations that can be constructed for rules *when needed*.

> By providing the means of expression which enable practical preferences to be brought to the level of quasi-systematic discourse and to be consciously organized around explicit principles, the educational system makes possible a (more or less adequate) symbolic mastery of the practical principles of taste. As grammar does for linguistic competence, it rationalizes the 'sense of beauty', in those who already have it, giving them the means of referring to principles (of harmony or rhetoric, for example), precepts, formulae, instead of relying on improvisation; it substitutes the intensional quasi-systematicity of a formal aesthetic for the objective systematicity of the 'aesthetic-in-itself' produced by the practical principles of taste.
>
> (Bourdieu 1984:67)

The rationalizing of the habitus gives to those who already possess this unitary system of dispositions "the means of referring to principles…precepts, formulae, instead of relying on improvisation". In keeping with Kripke, Putnam, and Wittgenstein, however, the rationalization of the habitus by associating it with descriptions, definitions, and explanations do not determine it. The habitus remains the legitimate reference that underlies and determines these rationalized descriptions. It remains the more legitimate "mode of acquisition" of the class sign (Bourdieu 1984: 68-9).

For Bourdieu, social class as a sign (the determination of the habitus) is acquired in early childhood (Bourdieu 1984: 70) subliminally and without conscious effort; while social class as a rationalized conceptual representation is acquired through an arduous, time consuming process, and conscious process.

> Paradoxically, precocity is an effect of seniority: aristocracy is the form par excellence of precocity since it is nothing other than the seniority which is the birthright of the offspring of ancient families (at least in societies in which age and aristocracy–virtually equivalent notions–are recognized as values). And this initial status-derived capital is enhanced by the advantages which precocious acquisition of legitimate culture gives in learning cultural skills, whether table manners or the art of conversation, musical culture or the sense of propriety, playing tennis or pronunciation. The embodied cultural capital of the previous generations functions as a sort of advance (both a head-start and a credit) which, by providing from the outset the example of culture incarnated in familiar models, enables the newcomer to start acquiring the basic elements of the legitimate culture, from the beginning, that is, in the most unconscious and impalpable way-and to dispense with the labour of deculturation, correction and retraining that is needed to undo the effects of inappropriate learning.
>
> (Bourdieu 1984: 70-1)

Bourdieu argues that these two kinds of representations of social class – one as a sign and the other as a rationalized conceptual representation – hold different weight in the classificatory judgments of others.

The class sign is still considered to be the genuine class representation because it is the “bedrock” (Wittgenstein 1968/53:217, Taylor 1993:31) of the derived rationalizations of it.

Bourdie argues that the educational system is not only involved in the rationalization of the habitus, but that it rationalizes it *in order to transmit it*.

> Not that the educational system ever entirely fulfils [sic] its rational function: the essential part of what schools communicate is again acquired incidentally, such as the system of classification which the school system inculcates through the order in which it inculcates knowledge or through the presuppositions of its own organization (the hierarchy of disciplines, sections, exercises etc.) or its operation (mode of assessment, rewards and punishments etc.). But, in order to transmit at all, it has to perform a degree of rationalization of what it transmits. Thus, for example, in place of practical schemes of classification, which are always partial and linked to practical contexts, it puts explicit, standardized taxonomies, fixed once and for all in the form of synoptic schemas or dualistic typologies (e.g., 'classical'/'romantic'), which are expressly inculcated and therefore conserved in the memory as knowledge that can be reproduced in virtually identical form by all the agents subjected to its action.
>
> (Bourdieu 1984:67)

Bourdieu’s views on rationalization here, and the role of the educational system in coming up with explanations, descriptions, or definitions associated with the habitus that do not determine it. Nevertheless, such rationalizing efforts generate “knowledge” or conceptual representations that “can be reproduced in virtually identical form by all the agents subject to its action”. This role of the educational system, for Bourdieu, is closely associated with its conference of degrees and certifications that consecrate “experts” who have learned explicit conceptual representations associated with the habitus. These experts are now certified, in a way, to hold a professed understanding of the necessary and sufficient definitions for recognizing which objects fall within our outside of a particular social class.

Bourdieu's view on the educational system and its certification of "experts" who hold rationalized definitions or explanations of the habitus fits in nicely with Putnam's view of a social division of labor. Putnam makes the point that these is a "division of linguistic labor" in societies such that while the knowledge of how to determine the extensions of a concept is not present in every individual, it is present in a subset of the population called "experts" or a "special subclass of speakers".

> The last two examples depend upon a fact about language that seems, surprisingly, never to have been pointed out: that there is *division of linguistic labor*. We could hardly use such words as 'elm' and 'aluminum' if no one possessed a way of recognizing elm trees and aluminum metal; but not everyone to whom the distinction is important has to be able to make the distinction….It is not at all necessary or efficient that every one who wears a gold ring (or a gold cufflink, etc.), or discusses the "gold standard," etc., engage in buying and selling gold…every one to whom gold is important for any reason has to *acquire* the word 'gold'; but he does not have to acquire the *method of recognizing* whether something is or is not gold. He can rely on a special subclass of speakers. The features that are generally thought to be present in connection with a general name–necessary and sufficient conditions for membership in the extension, ways of recognizing whether something is in the extension, etc.-- are all present in the linguistic community *considered as a collective body*…
>
> (Kripke 1973:287)

Putnam "sociolinguistic hypothesis" has always seemed at odds, to me, with his work on indexical representations. After all, if an indexical representation is determined by its extension, what role do a subclass of "experts"– with their "necessary and sufficient" explanations for how to classify an individual as within the concept or outside the concept– play in the process? Bourdieu helps answer that question.

In my reading of him, Bourdieu is arguing that the educational system plays a role in certifying experts who are sanctioned to hold (and define) the *rationalized* descriptions associated with the indexical representation. These sanctioned experts go on to confer legitimacy to classifications that are only ever

informal, implicit, and conventional. The true determinations of the classification are *not* the explanations or formal definitions by experts, but are ever and always the relational order that legitimized these "experts", and which they legitimize in turn.

These "experts" have been sanctioned to offer rationalizations of something that lies entirely outside the intellect (but not outside of cognition). For this reason, the role of these experts is *not* to 'fix' the reference, but to rationalize it – or identify accidental qualitative properties and definitions to it. For this reason, while the definitions, explanations, and "theories" by these experts change continuously, these changes do not mean changes in the indexical representation itself. This is because the experts, and even the educational institutions that sanction them, are not the lever of change, because they are not what determines the indexical representation in the first place.

I argue that Bourdieu's work on rationalization describes how rationalizations of indexical representations enter into the consciousness of a *society* as a whole. However, he is missing a theory of when and how conceptual representations, which in a Peircean specialized cognition framework are *propositional* and involve *both* an icon (narrow content) and index (wide content), come to leverage indexical representations. This makes sense because Bourdieu's focus is not on general cognition and its outputs as conceptual representations, but on the specialized cognition that gives rise to representations that are *not* conceptual. However, in light of a Peircean specialized view of cognition– and Bourdieu's compatibility with such a view– we must address how it is that some indexical representations *remain* purely indexical, while others are incorporated in conceptual representations that are determined by *both* their reference to entities outside the head, as well as to meanings within.

I argue that the connection I find between Bourdieu's work on rationalization and Putnam's social division of linguistic labor can give us a clue. I argue that Bourdieu's social class is a "social kind" that differs even from "natural kinds" (Kripke and Putnam's example of an indexical representation) in that they rae representations that are associated with (non-determining) definitions at a *societal* level rather than at an

individual level. While this is not a full answer, it helps explain important differences between mental representations for “working class” and “cat”.

‘Social Kinds’ vs. Natural Kinds and the Social Division of Linguistic Labor

Kripke and Putnam, in their work on indexical representations, focus on what are called “natural kind” concepts – concepts that refer to an extension in the world. However, Kripke and Putnam are not saying that such conceptual representations *are* indexical representations. But only that they have an “indexical component” that had gone “unnoticed” (Putnam 1973:290). However, in the case of Bourdieu’s social class, and I argue other concepts that have traditionally been called “social” (e.g. race, gender, social age, etc.), it is not only the case that such representations *have* an indexical component. Rather, they *are* the indexical component. I argue that such representations are representations that, unlike “natural kinds”, possess *only* wide content (or extension), but *no* narrow content (or intension). Like demonstrative nouns such as “this” or “here” – they are *purely indexical* representations.

I choose to call representations that are purely indexical, and which are referencing a *social* relational order, “social kinds”. I am not the first to use the term (see Khalidi 2013), but I offer here a particular meaning for the term. I consider “social kinds” to be a subcategory of “group” or “indexical” representations, and to be inferred by the specialized cognition of “group cognition”. They, in this way, differ from “natural kinds”, which are full conceptual representations and elaborated in general cognition. Social kinds, as “group” representations that reference social orders, are of particular interest to sociology and the social sciences. For this reason, I reserve the name “social kind” for this subclass of group or indexical representations.

Social kinds, and other group representations, I argue, differ from representations that form the “indexical” component of conceptual (propositional and thus composite) representations. For example, the indexical component of social kinds is integrated with its iconic component, such that both come to co-determine the representation. However, this is not the case with social kinds. While iconic meanings may be

associated with social kinds, this meaning never comes to *determine* these representations. Why would that be the case?

I do not offer a full answer here, but I consider the importance of the social division of linguistic labor in formulating such an answer. Social kinds come to possess their accidental, associated, narrow content in societies that transcend individuals' own personal rationalizations of these kinds of meaning-less representations. I argue that while this rationalization may occur at the level of the individual, they are never *legitimated*. Legitimated rationalizations of social kinds must occur by *legitimated* sub-classes of users of the representation, and thus occurs due to a division of labor akin to that pointed out by Putnam.

We could very well incorporate this theory of social kinds that I've proposed as another "kind syndrome" in Carey's Quinian bootstrapping. But my point here is that we may not have to. I argue that social, natural, and a variety of other "kinds" fall out naturally from Peircean synthesis, without the imposition of syndromes, or the hand-crafting of different classes of innate systems of referential roles to supplement the learning mechanism. I turn to this topic in section 4.4.

The Origin of 'Social Kinds' (Group Representations) and Conceptual Change

The earlier discussion on Bourdieu's work on the rationalization of the habitus, and the status of the habitus as a group or indexical representation, raises a question regarding *conceptual* change and the *origin* of such representations. According to the reading I provided, social kinds such as social class are inferred through immediate deductive inference. As we saw earlier in this chapter and in chapter 3, such inferences begin with a rule and apply it to a case. But, the denial of the case– or the failure to apply the rule– fails to change the rule. If social kinds, as group or indexical representations, do not change due to changes in their explanations or definitions, and do not change due to their failure to explain the world, how is it that they come to change at all?

I argue that Bourdieu is aligned with Peirce in his views on the question of *change* for these kinds of representations. However, unfortunately, both offer but a limited answer. Like Peirce, Bourdieu emphasizes the importance of historical contingencies in leading to the construction of the social structure in the first place, and the role of institutions in the rationalization of what is a fundamentally "bodily" representation.

Peirce's learning mechanism (degenerate in the first degree), and Bourdieu's description of the cognitive development of the habitus, both resolve themselves in a conscious representation that is a "sign". Such a sign is a classificatory judgment that positions an individual existing object in an ordered, discrete, and countably infinite field of elements vis-a-vis which it gains whatever "meaning" it can be said to hold to the mind.

Bourdieu is once again strikingly aligned with Peirce about the *origins* of signs as kinds of mental representations. Both Bourdieu and Peirce refer to signs as "arbitrary" (W1:469, 1866; Bourdieu 1984: 39) and as being the result of historical processes. Peirce, in particular, explicates what this arbitrary, or historical, origin of the sign means from the perspective of cognition. Peirce calls the sign a "conventional" representation (W1:469, 1866), and points out the historical *agreement* among human beings necessary for such a representation to arise in the first place.

> The second kind of representations are such as are set up by a convention of men or a decree of God…The peculiarity of these conventional signs is that they represent no character of their objects…. And yet how is such a convention made? The men all look upon or think of the thing and each gets a certain conception and then they agree that whatever calls up or becomes an object of that conception in either of them shall be denoted by the sign….we have several different conceptions —the conceptions of different men—and the conventional sign stands for whatever is an object of either of them.
>
> (W1:467-469, 1866)

As a note, Peirce allows the possibility for conventional signs whose origins are not man-made. For example, he speaks of conventions of “God” or nature, by which he seems to be referring to the conventions of space and time. Peirce, thus, takes the stance that human beings are not born with an innate representation of space and time, but that such representations are learned from being ubiquitous in our physical environment. Thus, for Peirce, human cognition is capable of learning *different* orders of space and time, if such a thing were to even be possible.

Such a conventional representation, particularly when it relates to *human* convention is a *historical* concept, whose meaning – to the extent it can be said to have any in the notion of “sense” or “ordering” that it imparts to cognition– is the result of historical contingencies that had to be *established* at a particular place, or time, for particular reasons which lie outside of cognition are are thus considered to be “arbitrary”. Bourdieu takes a strikingly similar view regarding the origins of the social convention that results in the distinctive signs of class.

> Every essentialist analysis of the aesthetic disposition…is bound to fail. Refusing to take account of the collective and individual genesis of this product of history which must be endlessly 're-produced' by education, it is unable to reconstruct its sole raison d'etre, that is, the historical reason which underlies the arbitrary necessity of the institution.
>
> (Bourdieu 1984: 29)

While Bourdieu speaks to the *origin* of ‘social kinds’ or group representations, in keeping with Peirce, he does not offer an explicit theory of how such indexical representations can *change*. Such a theory, I argue, is needed to complete the work that a Peircean-Bourdieusian view of conceptual content and reference affords. However, a discussion about such a theory of conceptual change falls outside the scope of this dissertation. What Peirce and Bourdieu make clear, however, is that the levers of conceptual change or development, in the case of purely indexical representations, may well lie in processes “arbitrary” to the process of cognition.

4.4 Peircean Synthesis vs. Quinian Bootstrapping

Introducing 'Peircean synthesis' as a domain-general learning mechanism

Bourdieu, I argue, can be read as offering a theory of reference that evokes a broader tradition in the sociology of cognition in distributional or "topological" conceptual content. I argue that Bourdieu, however, transcends a descriptive account of such representations and offers a theory of the *acquisition* of such distributional content and their resulting representations. Bourdieu's theory of reference and the acquisition of distributional representations marked by having only extension and no intension, I argue, is strikingly aligned with Peirce's specialized cognitive faculty of Sensation of Reaction (Sensibility), and the learning mechanism associated with this kind of acquisition. Armed with this theory of reference, we can now return to Carey's challenge in articulating a concept learning mechanism whose treatment of wide content does not fly in the face of Kripke and Putnam.

In this section, I argue that the Peircean-Bourdieusian theory of reference and the acquisition of sign representations – representations with extension but no intension– plays an important role in articulating a domain-general learning mechanism that is an alternative to Carey's Quinian bootstrapping. I call this alternative, Peircean synthesis. Unlike Carey's Quinian bootstrapping, my Peircean synthesis is grounded in not one but *two* specialized cognitions– in a version of core cognition that does not include innate wide content, and in what I call 'group' cognition. Group cognition corresponds to Peirce's specialized cognitive faculty of Sensation of Reaction (Sensibility) and the learning mechanism fleshed out by Bourdieu. Consequently, social class and other social groups are *group* representations that are acquired through *group cognition*. That is, they are acquired purely through the degenerate version of Peirce's learning mechanism (degenerate in the first degree) that we saw in the last section. Core representations are acquired through *core cognition*, which are evolutionarily bequeathed associations among instantaneous states of the nervous system that can be characterized in terms of systems of conceptual roles.

In Peircean synthesis *both* core and group cognition collaborate in the elaboration of the full, genuine, version of the concept learning mechanism– resulting in representations that have both wide and narrow content. Only conceptual representations that are the result of the domain-general concept learning mechanism possess both wide and narrow content and can properly be called 'concepts'. I do not undertake to offer a full overview of Peircean synthesis in this dissertation– this falls outside the scope of an already ambitious project. However, I want to take a page from Kripke's book in attempting to paint an overall 'picture' of what such a concept learning mechanism looks like. And in particular, highlight the places where it differs from Quinian bootstrapping.

'Peircean synthesis' vs. Quinian bootstrapping

Leveraging the specialized cognition reading of Peirce's work that I offered in chapters 2 and 3, I paint a broad picture of Peircean synthesis as a domain-general concept learning mechanism. Firstly, Peircean synthesis is not committed to a linguistic determinism like Quinian bootstrapping. It argues that any external representations in the world – so long as they are ordered according to some kind of relational structure – can be referenced. They can be referenced in a way that allows for meaning to be attributed to them in the case that the learner is *surprised*. Surprise, in a Peicean framework, occurs when a pre-existing theory of the world fails to explain the fact. In this way, Peircean synthesis is in alignment with Quinian bootstrapping about the importance of incommensurability as a trigger for conceptual change. Surprise, as we saw in chapter 3, is a trigger for switching from an unconscious mode of reasoning, to one that is conscious, controlled, and involves the use of discrete mental symbols. Surprise, then, in this framework, is a precondition for conceptual *learning*, as opposed to the automatic and unconscious acquisitions of core and group cognition.

While this would seem an answer to my earlier discussion on conceptual change in the context of social kinds or group representations. However, remember that such representations are the result of a learning process that involves *immediate* deduction, which defies the revision of the rule in the face of falsifying evidence. Thus failure to apply the rule does not lead to change, but rather in further explication or

elaboration of the group representation into *new* rules, that, nevertheless, are consistent with the underlying determining extensive reference of the representation. Thus I conclude that we must look elsewhere for a theory of change in the context of group or indexical representations.

The Peircean domain-general learning mechanism can be thought of in terms of central cognitive processes that integrate the outputs of the specialized cognitions of core (feelings) and group (sensation of reaction) cognition. This learning mechanism, I argued in chapter 3, can be characterized in terms of psychological essentialism (Gelman 2004). In this way, psychological essentialism– the hypothesis that something seen is matched by a hidden or unseen rule or process– is a hallmark not only of natural kinds with which it has been associated (Carey 2009; Macnamara 1982; Laurence and Margolis 1998), but with *all* conceptual representations.

The domain-general learning mechanism begins with the hypothesis of psychological essentialism– that something seen is matched by something unseen, or that facts are governed by a general process that is *inferable*. This opening hypothesis feeds into subsequent hypotheses that altogether map onto Peirce's five universal categories. In addition to the general hypothesis that something seen is matched by an unseen explanatory process, we have secondly, the hypothesis of an iconic internal meaning (innate or synthesized from a set of innate core iconic meanings) that can be used to interpret the facts in light of a general theory. Third, the hypothesis of an indexical relation to the world that can be deduced from the iconic internal meaning and articulated in terms of "relatives", which I interpret as referential roles to the world. Fourth, the hypothesis of a representation of the iconic hypothesis and its indexical characterization in an interpretant that performs the task of *actually* acting out the hypothesized indexical relations to the world in order to assess to what extent our hypothesis about the world can be matched up to the "blind", or external, facts about the world that are only captured as external "accidents". Consequently, the process resolves in a fifth and final hypothesis that there is a substance out there in the external world to which the relational order in the external "accidents" present to the mind corresponds.

As I argued in chapter 3, Peirce's five universal categories thus correspond to five, linked, hypotheses that something seen is matched by something unseen. Each hypothesis supposes an additional thing unseen that must be discovered all the way from the hypothesis of an explanation to the hypothesis of a thing explained.

I argue that these chained hypotheses describe a domain-general hypothesis-testing conceptual learning mechanism that, first, constructs an iconic hypothesis; then deduces a hypothesized behavior in the world from this hypothesis referred to in Figure 15 as the "noumenon"; and lastly, matches up this hypothesized behavior up against the *actual* behavior internalized in terms of a distributed "effort" or "habitus" of the body. The first hypothesis that begins the process links the concept to the mind's internal meanings, while the last hypothesis links the concept to a relational order internalized as blind, external, "accidents" of the entity in the world on the body. The relational order of the thing in the world, and our ability to internalize that international order *blindly* – that is without attributing any qualitative meanings to this relational order internalized *as* external to the mind– thus plays an important role in the conceptual learning mechanism.

The result is a learning mechanism that does not put so much weight on the definition of "determined" in order to avoid stipulating that extension is being determined by intension. Peircean synthesis is a learning mechanism that takes explicitly into account the idea that whatever relation between intension (things in the head) and extension (entities in the world) must be *hypothetical*. intension in this framework (the iconic hypothesis *and* the deduced relational articulation of it) result in a *hypothesis* about how the hypothesized entity in the world will behave kept as something *external* to the mind. intension thus determines a *hypothesized referent* (the noumenon), and not the hypothesized external substance. This leads to a difference in how Peircean synthesis and Quinian bootstrapping think about the idea of the placeholder structure. In Peircean synthesis, the placeholder structure – articulated in terms of mental symbols– can be thought of as the hypothesized referent (the noumenon) hypothesized by things in the head. However, it remains distinct from the internalized external relational structure – the habitus or effort which are articulated as a distributed system of intellectualized "accidents".

In Peircean synthesis, the equivalent to a placeholder structure– the noumenon, which is a *relational hypothesis* determined by intension, is distinct and separate from the habitus or effort. The habitus is an *actual relational structure* that has been *internalized* in a distributed fashion from the conditionings of the external world on the nervous system. The process of concept learning, then, boils down to aligning these two fundamentally different relational structures – one determined from within, and the other acquired from without. Based on the Peircean learning mechanism that I derive in chapter 3, the first relational structure (determined from within) corresponds to the hypothesis of the noumenon; while the second relational structure (determined from without) corresponds to the hypothesis of the substance (see Figure 15). This avoids the apparent magic trick in Quinian bootstrapping in which the same placeholder structure is simultaneously in and out of consciousness as if bridging alone the mind-body distinction.

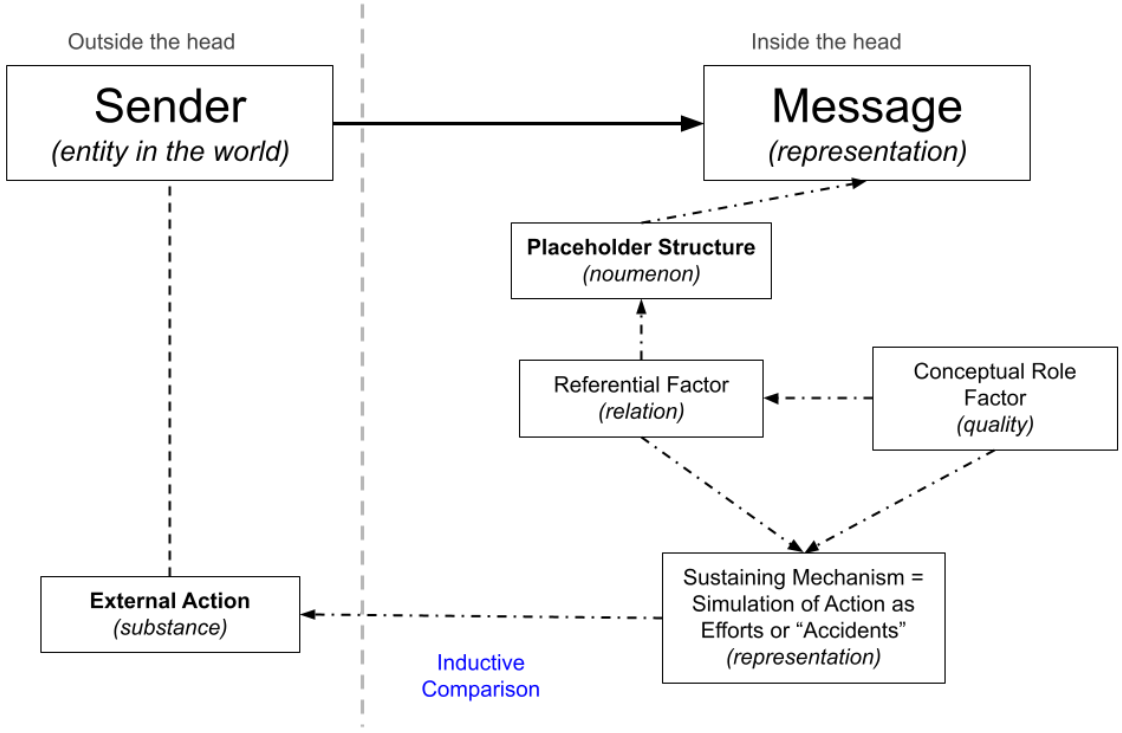


Figure 15: The Peircean synthesis concept learning mechanism articulated in terms of a communication problem where the receiver is out of view.

The habitus, taken as an internalized metaphysically real relational order, allows us to part ways with Quinian linguistic determinism; and the constraint that the only concepts that can be learned are those that can be articulated in language or in another explicit symbolic system. *Any* relational order in material conditions of existence that are defined over the continuous extensive fields of space and time can be learned in Peircean synthesis. For this reason, the same concept learning mechanism that is responsible for learning natural kind concepts is also responsible for learning concepts that are defined over symbolic systems that are (and must) be expressed in tangible, material ways– such as linguistic concepts and mathematical concepts. Moreover, the same concept learning mechanism, in the absence of either intension and extension can still run in a *degenerate way* so as to still acquire some kind of conceptual content. Because the acquisitions of intension and extension operate independently, I argue that we have a learning mechanism that can acquire purely group representations. such as what I call “social kinds”, which includes the representation of social class.

Lastly, Peircean synthesis raises the importance of a kind of inference that gets discounted in Quinian bootstrapping– and that is deductive inference. The hypothesized relational structure that is the “noumenon”, which I argue corresponds to Carey’s “placeholder structure”; also resembles in many ways the innate “syndromes”, and other learned referential roles, that Carey describes in Quinian bootstrapping. The hypothesized relational structure that is the noumenon determines a *referent* (but not a *reference*). However, unlike Carey’s syndromes, it is not innate, but is inferred from the iconic hypothesis that is being tested in the domain-general concept learning mechanism. Deduction, consequently, plays an important role in translating conceptual roles into referential roles in Peircean synthesis. It transforms meanings into appeals to *referents*, which due to the nature of the internalization of *references*, must be articulated in terms of relations and relational structures. Deductive inference, thus offers an additional tool to those who wish to continue to work within a Quinian bootstrapping framework, by offering a theory about how conceptual role factors come to “determine” referential role factors in a Blockian dual-factor framework. This connection between conceptual and referential factors is an area that seems to remain underspecified in that tradition.

4.5 Conclusion

I focused in this chapter on the implications of my reading of Peirce as offering a specialized theory of cognition for the cognitive sciences and sociology. In particular, I focused on the question of wide conceptual content as an area where sociology has much to contribute to the cognitive sciences. I argued that my reading of Peirce is in line with a prominent contemporary view in the cognitive sciences– dual factor theory– which argues that a concept is determined in the mind in two ways– via its connection to entities in the world, and via its connections to symbols or meanings in the mind. Thus, to speak of conceptual *knowledge* and conceptual representations is to articulate the *reference* as well as the *meaning* of a concept.

I showed how this view is very much in line with the specialized cognition reading of Peirce that I develop in the dissertation. I also show how it is in line with my work articulating a learning mechanism based on Peirce's five universal categories. I coined the term "Peircean synthesis" for this concept learning mechanism, and I compare it to "Quinian bootstrapping" – a contemporary learning mechanism developed recently in the cognitive sciences which also grounds itself in a *specialized* view of cognition. I argue that although Quinian bootstrapping has many strengths, its weakness comes from being grounded in a view of specialized cognition that only elaborates *one* specialized cognitive faculty– that of "core" cognition. I argue that while core cognition is very much in line with Peirce's specialized faculty of Feeling, it confounds in an important way wide and narrow content, such that it flirts with a position that runs afoul of a fundamental tenet in the philosophy of mind and language– Kripke's and Putnam's insistence that intension (or narrow content) *cannot* determine extension (side content).

I offer an alternative theory of reference– a theory for how wide content enters the mind– based on the work of sociologist Pierre Bourdieu and Peirce's work on "sensations of reaction". In

doing so, I integrate an important tradition in the sociology of cognition into a theory of conceptual development that puts inference and learning mechanisms front and center. I argue that just as “core” cognition forms a specialized cognitive faculty that provides the narrow content of a concept, what I call “group” cognition forms a second specialized faculty that provides wide content. In addition, I engage in work elaborating the cognitive characteristics of mental representations that are constrained to this second specialized faculty — ‘group’ or indexical representations. I argue that such include the representation of social class, and most likely, other sociological representations such as race, gender, and social age.

In this way, I argue that not only is my reading of Peirce as offering a specialized cognition incredibly relevant for the contemporary context in the cognitive sciences and sociology; but that working under a framework that maintains *two* specialized cognitive faculties redefines the relationship between the two disciplines in a fundamental way. If we indeed have two specialized cognitive faculties– each equipped with their own learning mechanism– that collaborate in the elaboration of conceptual representations, it would mean that a *theory of reference* (such as that offered in this dissertation) plays as important a role in the determination of conceptual content and conceptual knowledge as a *theory of meaning*.

Chapter 5: Conclusion

Re-stating the argument of this dissertation

This dissertation develops a theory of cognition based on a specialized reading of American pragmatist philosopher, Charles Sanders Peirce. It argues that Peirce's work could be read as a specialized theory of cognition that maintains that we have two specialized cognitions– one providing narrow content (the faculty of feeling), and the other providing wide content (the faculty of sensation of reaction)– that collaborate in the articulation of conceptual representation and knowledge. It points to two traditions in the contemporary context– one in developmental psychology and the cognitive sciences (core cognition), and the other in the sociology of cognition (what I call "group" cognition)– that capturePeirce's views on these specialized faculties of cognition. In addition, it develops a learning mechanism based on Peirce's work by re-interpreting our understanding Peirce's five universal categories as a domain-general learning mechanism grounded in the idea of psychological essentialism– the mind's empirically proven tendency to hypothesize that everything seen is matched by an unseen process that can be explained (Gelman 2004). I call this learning mechanism, Peircean synthesis.

In elaborating its theory of the specialized cognitive faculty of *group* cognition, this dissertation draws from a tradition in the sociology of cognition that includes the work or Pierre Bourdieu and Eviatar Zerubavel who both take the view that our cognitions of what are traditionally called social "concepts" are not linguistic or explicit representations in the mind. Instead, they take a view that the representations associated with group cognition are distributed, dispositional, and topological. Bourdieu, in particular, takes the view that these distributed group representations have a close relationship to the human body and its ability to internalize an external relational order. I make the case, not only that Zerubavel and Bourdieu are very much aligned with a specialized Peircean perspective on cognition, but that Bourdieu in particular, offers a view on the *acquisition* of such representations that is in line with Peircean synthesis. In this way, Bourdieu's work, when read in light of a specialized Peircean view of cognition adds

something currently missing from the sociology of cognition: a theory of conceptual development that takes into account causal inferential mechanisms.

Moreover, I argue that Peirce and Bourdieu's work on the nature of group representations, and the process through which they are acquired, articulates a theory of reference that addresses a challenge raised by Kripke and Putnam in the philosophy of mind and language. This challenge pertains to the nature of the wide content of concepts and what determines it. Kripke and Putnam call for a theory that elucidates how the mind makes its references to the world that, nevertheless, does not advocate for the determination of extension (entities in the world) by intension (things in the head). This is tantamount to making the case that a reference to the world cannot be fixed by a definition, description, or any qualitative*,* epistemological, state of brain and body. I argue that my Peircean-Bourdieusian theory of reference meets these standards by making the case that the minds' references to the world can be fixed by the *quantitative* states of brain and body– the systems of bodily muscular dispositions that do not rely on internal qualitative meanings, but instead directly encode entire external relational orders without any act of conceptualization or intellectualization. By fixing its references to the world, the mind treats the material body as a "memory pad" (Bourdieu 1990:68), or self-index, which, through its own participation in the extensive field of relations that makes up the world, acts as an index for the entire external relational order.

Lastly, this dissertation makes a contribution to the development of a conceptual learning mechanism that faces the challenging task of balancing wide and narrow content. In so doing, it offers an alternative to one of the few theories of learning mechanisms in the cognitive sciences to have made an attempt to think carefully about Kripke and Putnam's stipulation that intension cannot determine extension. It looks closely as the learning mechanism of developmental psychologist, Susan Carey– Quinian Bootstrapping. While it agrees with Carey's treatment of narrow content in that learning mechanism, it makes the case that despite efforts to maintain the distinction between wide and narrow content, Carey's learning mechanism comes close to making intension determine extension in its treatment of the placeholder

structure– a mental structure that seems to have a foot in the mind and a foot in the body without a clear theory for how such a structure can sustain this unstable position.

In addressing this issue, I argue that Carey's placeholder structure is conflating what is in Peircean synthesis two distinct, if related, structures. I argue that it conflates, on the one hand, a *hypothetical* relational structure that is a *referent* (or set of referential roles) which is determined by intension, but does *not* have a sustaining mechanism to the world (remaining squarely in the mind). And, on the other hand, an *actual* external relational structure that is the *reference*, and which is inscribed on the body. The former corresponds to the *noumenon* in the Peircean learning mechanism that I offer in this dissertation. The latter corresponds to the *substance*. In this way, I offer the learning mechanism of **Peircean synthesis** as a viable alternative to Carey's **Quinian bootstrapping**, which shares much in terms of their philosophical and theoretical grounding, but which make different assumptions about a theory of reference.

A specialized cognition reading of Peirce, and its contributions to discussions on the language of thought

This dissertation derives its theory of specialized cognition, its theory of reference, and its articulation of a domain general learning mechanism (Peircean synthesis), from its reading of the work of C.S. Peirce as a *specialized* theory of cognition. It faces the task, then, of explaining why such a reading of Peirce's work was not undertaken before. It argues that early interpretative work on Peirce conflate three triads in Peirce's work on cognition. This conflation assumes that Peirce is describing the same level triad in his theory of cognition when he speaks of: 1) three specialized domains of cognition (the three specialized faculties of "Feeling", "Sensation of Reaction" or "Sensibility", and "Understanding" or "General Cognition"), 2) three representational domains involving three different kinds of representations (the three "impulses" of "I", "IT" and "THOU"), and 3) three collaborating inferential processes in a learning mechanism (phenomenal form or quality, phenomenal matter or relation, and phenomenal accidents of representation). Engaging with the large body of primary material form Peirce's earliest writings in 1857 to the early 1900s, this dissertation shows that an alternative reading of Peirce's work as describing three

different *levels* of triads– domains, representations, and inferential mechanisms defined over representations– offers a reading of Peirce that is much more coherent across time. Moreover, such a reading offers an appealing answer to an important question in the secondary literature on Peirce regarding his five universal categories, which he unveiled in 1867.

Peirce's five universal categories are widely seen as a cornerstone of his mature work, but a theory about what these categories are describing is still an interpretational challenge. My reading of Peirce in light of a specialized theory of cognition makes the claim that Peirce's five universal categories are describing a path through a *cognitive inferential learning mechanism*. Such learning mechanisms are at their core *hypothesis testing* mechanisms (Fodor 1975, Carey 2009). A challenge with articulating such a mechanism, is to articulate a theory about the *language* in which the hypothesis being tested is to be articulated. Carey's work on core cognition gives us a strong footing for articulating such a language of thought by articulating a set of innate domain-specific systems of representations. Such a view, as I showed, is equivalent to Peirce's description of the specialized faculty of feeling. However, Carey's work still struggles with the articulation of how such primitives come to form a *language*. If we can think of such innate primitives as the *vocabulary* of thought, what constitutes the regularizing *language* of thought? My work developing a learning mechanism from Peirce's five universal categories puts forward a tentative answer to this question.

I show that Peirce's five universal categories, when viewed through the lens of a specialized theory of cognition, describe a well-specified learning mechanism. To make this contribution to our understanding of Peirce's five universal mechanisms, I reconstruct Peirce's drafts leading up to his well-known 1867 publication unveiling his categories. I show that dropped from the final publication is a description of an information-carrying process specified in terms of hypothetical "marks" or external existential relations. These external existential relations, I argue, describe a *hypothetical language of thought* that structures the inferential process and gives it direction and form. This hypothetical language of thought is grounded in a psychological essentialism, which at every step, assumes something unseen from what is seen, thus propagating information forward and structuring thought's inferential process. I show not only that Peirce

maintains this view into the early 1900s (well into his mature phase), but that his description of a learning mechanism in terms of arguments (or chains of representations guided in a particular information carrying direction), is the equivalent of the information-carrying information mechanism that he describes in the late 1860s.

Integrating specialized and domain-general learning mechanisms through the idea of degeneracy

This dissertation offers a bridge between two approaches to cognition– one in developmental psychology (core cognition) and the other in the sociology of cognition (which I call “group” cognition)– that it maintains correspond to the Peircean specialized faculties of feeling and sensation of reaction.
In the theory of cognition that it develops based on the work of C.S Peirce, group cognition is seen as a distinct, and different, kind of specialized cognition than core cognition. Both play important, but different, roles and collaborate in general cognition– i.e. in the production of conceptual representations and conceptual knowledge. This Peircean specialized theory of cognition operates within a dual factor (Block 1986) framework of conceptual content. It proposes that group cognition provides extension, or wide content; while core cognition provides intension, or narrow content, to general cognition. Moreover, it offers a theory for a new inferential learning mechanism for group and core cognition that integrates learning mechanisms for group, core, and general cognition as part of one domain general learning mechanism.

Lastly, I introduce the Peircean idea of degeneracy as a way of integrating the two specialized cognitive faculties corresponding to core and group cognition, with the faculty of general cognition. I show that the feed-forward hypothetical inferential learning mechanism that Peirce developed in the 1860s, and preserves into the mature stages of his career, comes in *three* forms. I introduce the idea of “degeneracy” as an important concept in Peirce’s work, and show that in the late 1860s and in the early 1900s, Peirce described three paths through his learning mechanism. In the 1860s, these three paths are described in terms of three “grounds” of being — three ways in which a representation can come to stand for something to the mind. In the early 1900s, Peirce provides a taxonomy of different kinds of arguments

that I show describe three chains of arguments and three versions of a learning mechanism that involve each a discovery step (association by contiguity or abduction, association by contiguity, and association by similarity). In this way, this dissertation's work on Peirce's learning mechanism is also of interest to those interested in the logic of discovery and in Abductive reasoning specifically.

After presenting a specialized cognition reading of Peirce's work on mind and cognition that maintains three cognitive faculties or domains – as well as proposing a model of three learning mechanisms associated with these three cognitive domains – I make the argument that these specialized cognitive domains map onto two specialized theories of cognition found in the sociology of cognition and in the cognitive science. Lastly, I point to the implications of this view of specialized cognition – of distinct group and core representations– for the elaboration of a theory of general cognition and conceptual knowledge in which two kinds of specialized cognitions collaborate in the articulation of propositional knowledge.

Through the notion of *degeneracy*, this dissertation presents an alternative to the distinction maintained in many theories of cognitive learning mechanisms between domain *general* and domain *specific* learning mechanisms. The inferential learning mechanism involved in the specialized cognitions of group and core representations that I present in this chapter are both degenerate versions of the full version of the inferential learning mechanism involved in general cognition. In this way, the same domain general learning mechanism comes to articulate the *specialized* learning mechanisms associated with the specialized domains of group and core cognition

The bridge between sociology of cognition and the cognitive sciences

This dissertation offers a bridge between two communities that have so far worked largely independently from one another– sociology of cognition and the cognitive sciences. It does so by offering, first, a Peircean-Bourdieusian theory of reference that addresses a long-standing puzzle regarding the determination of the mind's references to the world. In doing so, it couches the work on distributed, dispositional, and topological representations in the sociology of cognition in discussions on wide content

and indexical representations within the philosophy of language and mind that center around the works of Kripke and Putnam. It reserves the term “group cognition” for the articulation of such a theory of reference as a theory of acquisition of wide conceptual content.

Secondly, it offers a learning mechanism that puts group cognition and core cognition into one framework. In this framework, group and core cognition work together in the elaboration of conceptual knowledge. In doing so, it contributes to the two literatures by addressing what might be considered as weak points in these communities. To the sociology of cognition, it posits an inferential learning mechanism for “group” attentional or distributional mental representations. In this way, it extends and deepens a longstanding legacy in sociology by matching theory to methodology. To the cognitive sciences, it not only contributes to a trend that seeks an alternative to Piaget’s theory of conceptual development; but also contributes to a more recent movement which, in accepting nativist theories of conceptual development as alternatives to Piaget’s theories, have been faced with the challenge of moving away from a “classical” model of cognition and cognitive representations that has systematically under-theorized wide content (i.e. the way the mind makes its references to entities in the world).

Secondly, the view of mental representations presented in this dissertation addresses burgeoning work in the cognitive sciences on the nature of cognitions about social groupings. It offers an alternative to the view that such groupings are part of core cognition, and bypasses the implications associated with such a view that human beings are born hardwired to discriminate. Instead, it advances a specialized view of cognition that sees group cognition as a distinct specialized cognition from core cognition. Unlike core cognition, group cognition is defined over different kinds of representational inputs– representations *as representations* and representations *as instances*. Representations *as representations* are representational inputs that are viewed qualitatively, or as having meaning. Representations *as instances* are representational inputs which are viewed quantitatively, or as making reference to a relational order. Its work in proposing different inferential mechanisms defined over these specialized faculties of cognition opens up fresh areas of investigation in cognition.

Lastly, the view of specialized cognition presented in this dissertation calls us to revise our definitions of conceptual *knowledge* and conceptual *representations*. By making the case that we have two other kinds of representations that are *not* conceptual because they involve either *only* extension or *only* intension, this dissertation calls for investment in theories of the *format* of conceptual representations that sees them as *propositional*. Such a view of the format of conceptual representations sees them as composite representations which alone are composed of both iconic and indexical representations.

This view of the format of conceptual representations is closely aligned with Peirce's work on "common sense" knowledge, which is also an area of interest to a contemporary audience (Zhu et al. 2020, Ullman et al. 2017). Peirce argues against the idea that we have innate knowledge because such knowledge, in order to be consciously available, would have to be propositional– involving both an icon and index, which, for Peirce, can only be the result of learning. Instead, Peirce takes a different view of what "common sense" is. According to such a view, common sense is an *immediate perception* that involves the immediate comparison of two things. It is in this way that the mind establishes both *difference* (or transitions in feelings) that enable it to have an immediate perception of relations; as well as an immediate perception of *similarity*, which allows it to be able to activate innate (evolutionarily bequeathed) meanings or primitives. A specialized cognition view of Peirce, consequently, holds implications for how a contemporary audience thinks about common sense knowledge and immediate perception.

Implications of this dissertation's argument

This dissertation changes how we think about groups – what they are as cognitive or mental structures, how they are acquired as such structures, and– by articulating a theory for the unit of analysis in such mental structures – it changes our understanding of how social groups can be studied. Instead of being existing collections or structures "out there", or conceptual knowledge "in here", groups are distributed systems of habituations acquired unconsciously from our environment via a particular learning mechanism. As we saw, this view is very much in line with the pivotal work on class group cognitions in sociology by French sociologist Pierre Bourdieu. However, by viewing group cognitions in an inferential

framework, we have gained a theory of the learning mechanism through which such cognitions are acquired and a potential new locus for intervention and empirical experimentation. For example, this framework could give us a way to think about the acquisition of other group representations– such as race, gender, and social age– that emphasizes the preconditions for the acquisition, inference, and application of the mental representations associated with these social phenomena.

In this same vein, the theory of cognition developed in this dissertation also suggests that we can expect different group representations to *differ* in particular respects due to differences in cognition. Moreover, because such theories are articulated as paths through a learning mechanism, they are poised for empirical investigation.

Secondly, this dissertation changes how we think about cognition in general by positing not one, but two specialized cognitive faculties. Such a view not only stands to change how we think about general cognition and the acquisition of learning, but perhaps even how we think about core or innate cognition in general. It pushes this literature to revisit the idea of core or innate *knowledge* towards a view that dispenses with the assumption that core or innate representations are *known*, consciously held, or consciously available. This is a trend that Carey's work on core cognition, with its focus on core systems of representations *capable* of giving rise to knowledge, as opposed to innate core knowledge *per se*, has has already begun. It puts out a challenge for such a literature to articulate how core representations (which are not propositional or conceptual) come to be so in the first place, instead of assuming the innateness of their compositionality.

An aim of this dissertation is to change the relationship that sociology– in particular the sociology of cognition– stands to have with the cognitive sciences. In light of this new framework, both communities stand to gain a common framework and a common language with which to talk about cognition. One that acknowledges the strengths that each community brings to the question of cognition, as well as what stands to be gained by their collaboration. For the sociology of cognition, the gain is methodological – the articulation of group cognition in terms of a cognitive learning mechanism offers a methodology in which

empirical hypotheses about group cognition can be articulated and *tested*. It finally offers this subfield, as well as sociology in general, a *unit of analysis* for the slippery conception of social "groups". For the cognitive sciences, the gain is theoretical – this dissertation answers a burgeoning question in the increasingly popular theory-theory paradigm in the cognitive sciences and the specialized theory of "core" cognition in that framework regarding the nature of groups as kinds of mental representations. Moreover, by articulating a learning mechanism that specifies two kinds of specialized cognitions involved in the articulation of general cognition, this dissertation also offers a new theory about cognition in general. Such a theory of cognition offers an alternative that could address some of the cognitive sciences' growing frustrations with the "classical" rationalist model of cognition; and could contribute to its search for an alternative.

This dissertation also offers some directions for future research. In particular, it establishes a framework in which the sociology of cognition and the cognitive sciences can collaborate in the development of theories of general cognition. Moreover, by bridging these two communities, it opens up new research questions in the sociology of cognition and in the cognitive sciences. For example, it opens up the possibility for empirical cognitive studies of group representations in studies that leverage some of the infrastructure developed in the cognitive sciences for the study of core cognition– with a clear theory of how we would expect group cognition to differ from core cognition. It points to the changes required to make methodologies developed for the study of core representations work for group representations. It also opens up new research questions for the cognitive sciences about the nature of the representations involved in core cognition, and how they differ from representations that result from the controlled and conscious learning process associated with general cognition and its propositional representations.

This dissertation offers a new theoretical framework for thinking about cognition, as well as the relationship between two kinds of specialized cognitions and cognition in general. It does not, however, offer any *empirical evidence*. It is not a theoretical framework that has been developed from empirical work. It thus stands in an awkward place halfway between philosophy and theory. Philosopher of cognition, Jerry Fodor, complained of the nebulous place that such work holds in between philosophy and

empirical theory; and reserved the term “speculative psychology” for this, at times, perilous and deeply uncomfortable space.

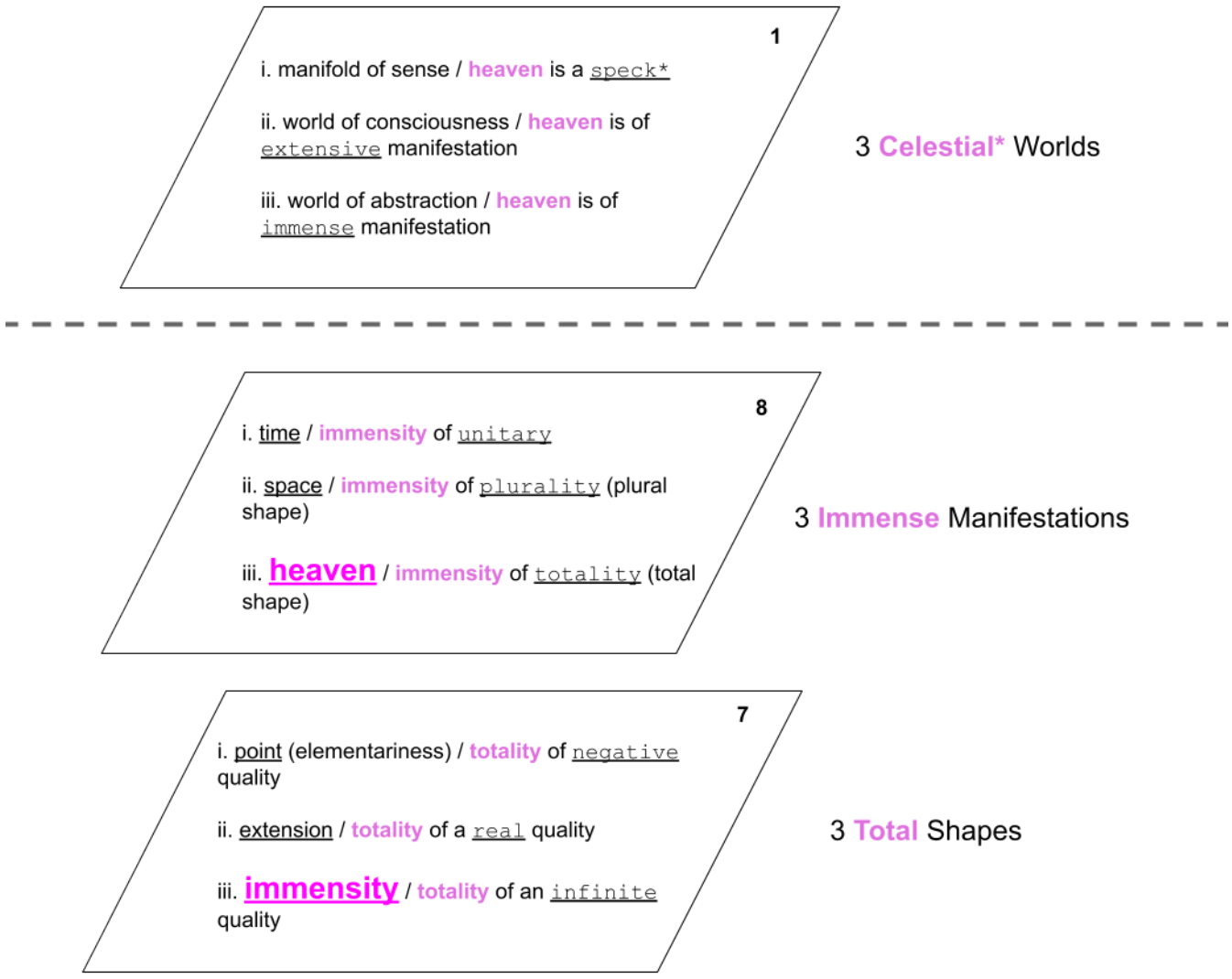
> There used to be a discipline called speculative psychology. It wasn’t quite philosophy because it was concerned with empirical theory construction. It wasn’t quite psychology because it wasn’t an experimental science. But it used the methods of both philosophy and psychology because it was dedicated to the notion that scientific theories should be both conceptually disciplined and empirically constrained.
>
> (Fodor 1975:vii)

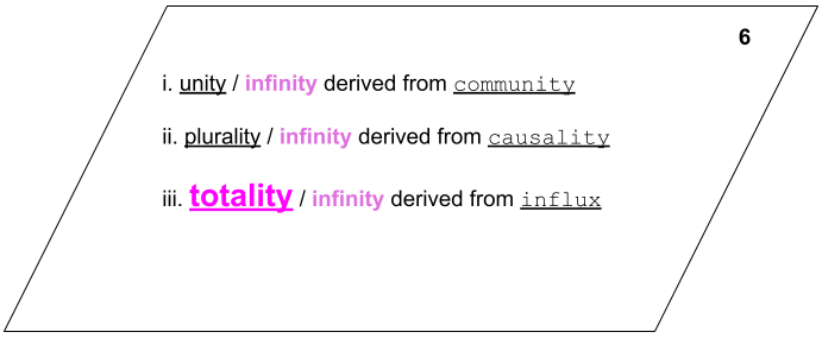
The merit of the theoretical framework put forward in this dissertation lies in the coherence of the theoretical framework that it presents, and the applicability of its stipulations to empirical investigation. For this reason, I have sought to show the coherence of this system both in the philosophical tradition from which it is drawn (the work of Charles Sanders Peirce over a lifetime); and to place upon it the greater burden of stipulating a full-blown learning mechanism. It is my hope that this work will lead to the articulation and testing of specific empirical hypotheses that can establish the viability of this theoretical framework as an empirical theory of cognition.

Sociology and the cognitive sciences are two communities that, despite overlapping subject matter, have not previously engaged in sustained collaborative relationships. It is my hope that the theoretical framework offered in this dissertation– a Peircean-inspired specialized theory of cognition– can offer a bridge between the two disciplines in a way that contributes to the productivity and explanatory power of both intellectual communities.

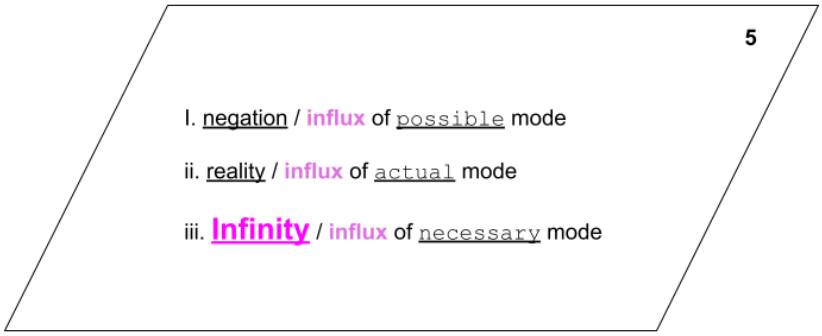
Appendix A

The Modus of IT: Unrolled. The algorithm that yields each next stage of the Modus of IT is depicted here. It is clear that the process requires three states (P_{n+1}, P_n, and P_{n-1}). Centering ourselves at state P_n, we see that the P_{n+1} (the next state) is defined in terms of P_n and the previous state.





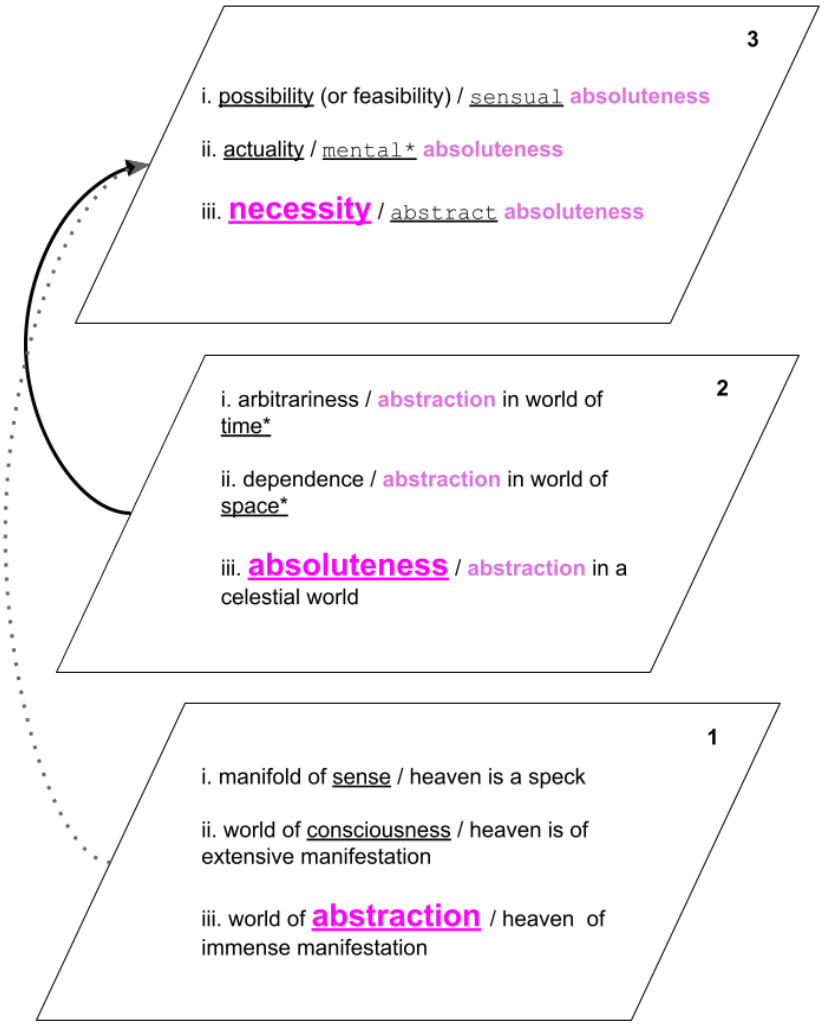
3 Infinite Qualities



3 Influxual Derivations



3 Necessary Modes



3 Absolute Existence

3 Abstract Revelations

3 Celestial Worlds

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