

The Metaphysics of Dappledness

Charles S. Peirce and Nancy Cartwright on the Philosophy of Science

by

Paul David Wilkinson Teel
B.Sc., Wheaton College, 1989
M.A., University of Victoria, 2006

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ABSTRACT

Contemporary philosopher of science Nancy Cartwright (b. 1944) has raised many an eyebrow with her books *How the Laws of Physics Lie* (1983) and *The Dappled World* (1999), among others. The primary task of this dissertation is to link her philosophy with that of Charles S. Peirce (1839–1914)—a link that includes Duns Scotus. My focus is especially on the criticism Peirce would have of Cartwright, and on the philosophical support he can offer her. The question is this: Given her stated philosophy of science, to what else must Cartwright be philosophically committed? This includes discussions of metaphysics, scholastic realism, laws of nature, and the very possibility of science. There are many striking similarities between Peirce and Cartwright, but I argue that he sees further and deeper into the metaphysical implications of her views on science.

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Dedication

To Heidi Laurel Ruth Wilkinson Teel,

with whom . . .

without whom . . .

(and to Esther-Ruth, Elanor, and Lúthien —
whose patience has been more than I could ask or imagine)

Introduction

The primary task of this dissertation is to link the thinking of Nancy Cartwright (a contemporary philosopher of science) with Charles S. Peirce (a philosopher of *everything*, who died in 1914). The chapters that follow are arranged as a trip to the past, and back to the present.

In Chapter 1, I introduce Cartwright's philosophy of science (and her metaphysics). I also introduce what I believe are some tensions within her work.

In Chapter 2, I introduce Peirce's Categories, a triadic metaphysics. Without a basic knowledge of the Categories, Peirce's philosophy cannot be adequately understood, so this chapter lays the necessary foundation for the chapters that follow.

In Chapter 3, I provide a short exploration of Duns Scotus's treatment of the problem of universals. Both Cartwright and Peirce proclaim an indebtedness to Scotus, and Peirce explicitly formulates some of his philosophy in response to Scotus's treatment of this problem.

In Chapter 4, I return to Peirce for a look at his critical interaction with Scotus, which helps us more fully understand Peirce's philosophical project.

Finally, in Chapter 5, I return to Cartwright for a look at her philosophy of science alongside Peirce's. The emphasis here is on the criticism Peirce would have of Cartwright, and on the philosophical support he can offer her.

Implied in all of this is an assertion of the importance of two 'underdogs' in contemporary philosophy of science: the history of philosophy, and metaphysics. The first is implied in our tracing of a contemporary discussion back to the groundbreaking

work of the medieval philosopher and theologian Duns Scotus. The second is quite obvious in the work of Peirce but less so in the work of Cartwright, who is sometimes reluctant to rise to the task of formulating a metaphysics that supports her views on science.

Earlier science is quite often rendered obsolete by later science, but such is not always the case with philosophy—not even with philosophy of science. The work of Duns Scotus, especially on universals, is still relevant and helpful today. The depth and breadth of Peirce’s wide ranging philosophy is still being fruitfully explored. It is my goal to set Cartwright’s philosophy of science in the rich context of these two thinkers.

This, as I say, is my primary task; it is what happens on the surface of this dissertation. But beneath that surface lie many other questions. What *is* science (and what is it *not*)? (This includes questions about what science does and does not do, can and cannot do.) What counts as success in science? What does the success of science—indeed, the very *possibility* of science—imply about the world, about us, and about our place in the world? What role does speculation (theological, metaphysical, and scientific) play in the development of human knowledge? And what does all of this imply about the very shape of the reality in which we live and breathe and have our being?

This dissertation does not explicitly address all of these issues, and it resolves none of them. But it does suggest the kind of roles they play in an adequate philosophy of science.

Chapter 1

Introduction to Nancy Cartwright's Philosophy of Science and Metaphysics

1. Realism, Philosophy of Science, and Nancy Cartwright

Philosophy of science is—despite its specific name—a wide ranging discipline; a historically complete summary would very likely approach 1000 pages (not including coverage of the various sub-disciplines: philosophy of biology, philosophy of sociology, philosophy of economics, and so on).¹ While an overview of the general issues in philosophy of science would be a helpful way to situate Nancy Cartwright (b. 1944) in her proper context, such an comprehensive introductory overview (even limiting ourselves to contemporary philosophers) would be too large and unwieldy, leaving us with a top-heavy project in danger of never getting to its point.

Nevertheless, a bit of context would help prepare the reader for what is to come, so I will introduce the most relevant issue in contemporary philosophy of science: the

¹ A helpful introduction to these sub-disciplines can be found in 2010's plurally titled *Philosophies of the Sciences: A Guide*, edited by Fritz Allhoff (see Allhoff 2010 in the Works Cited section).

question of *realism*.² Marc Alspector-Kelly describes the basic realistic position, beginning with realism in general and then moving toward its manifestation in philosophy of science:

[R]ealism always involves a mixture of *modesty* and *presumption*. The modesty in question is the conviction that the world described by the discourse is independent of us, that we discover rather than create truths about it. . . . Presumption, the other component of realism, is the conviction that, notwithstanding the domain's independence, we are nevertheless in a position to know, or at least be justified in believing, claims about it. This is not merely endorsement of the discipline that the discourse imposes but, in addition, a view about that discipline: it really does put us in contact with the kind of reality required by the modesty constraint. . . . For the realist in the philosophy of science, presumption is embodied in two claims. The first is that established contemporary scientific theories are approximately true (and so we are justified in taking them to be so). The second is that the history of science has consisted in a progression of theories that constitute closer and closer approximations to the truth.³

In general, then, the realist believes that there *are* scientific truths to be found about the world, and that we *can* discover them; these truths are *in* our minds but not *only* in our minds.⁴ In addition, the idea of a progression in science implies that while we *do* have real and direct access to the world 'out there' (what Peirce will later call the doctrine of immediate perception), it is *not* a perfect access (Peirce calls this admission *fallibilism*); nevertheless, through a proper methodology, the imperfections can (over time—even if a very long time) be discovered and corrected.

This leads directly to the question of the *nature* of those scientific truths. In the

² Despite the term “realism” (which, historically, has been paired with its opposite, “nominalism”), the question of realism in philosophy of science is not a straight reformulation of the medieval problem of universals, although we will see in subsequent chapters that the problem of universals is much closer to the contemporary discussion than we might first expect.

³ Alspector-Kelly 2009, 573–574.

⁴ By which I mean that the scientific truths in our minds accurately reflect (more or less) the extramental reality of the world. We will return to this in far greater detail later on.

passages that follow, we see Cartwright beginning to address that very question. She begins by distinguishing realism from instrumentalism:

Philosophers have tended to fall into two camps concerning scientific laws; either we are realists or we are instrumentalists. Instrumentalists, as we know, see scientific theories as tools, tools for the construction of precise and accurate predictions, or of explanations, or — to get down to a far more material level — tools for constructing devices that behave in ways we want them to, like transistors, flash light batteries, or nuclear bombs. The laws of scientific theory have the surface structure of general claims. But they do not in fact make claims about the world; they just give you clues about how to manipulate it.⁵

As Cartwright goes on to define the contrasting position, realism, she also lists what she sees as one of its tendencies:

The scientific realist takes the opposite position. Laws not only appear to make claims about the world; they do make claims, and the claims are, for the most part, true. What they claim should happen is what does happen. This leads realists to postulate a lot of new properties in the world. Look at Maxwell's equations. These equations are supposed to describe the electromagnetic field: **B** is the magnetic intensity of the field and **E**, the electric intensity. The equations seem to make claims about the behaviour of these field quantities relative to the behaviour of other properties. We think that the equations are true just in case the quantities all take on the right values with respect to each other. There is thus a tendency, when a new theory is proposed, to secure the truth of its equations by filling up the world with new properties.⁶

We will see that Cartwright's philosophical journey has been from a kind of anti-realism to a limited realism, but she has never warmed to the tendency to fill the world with new properties:

⁵ Cartwright 1999, 35. Even in this description, the problem of universals looms large (note the connection between scientific theories and general claims). Nominalism—the view that universals are *names* only—asserts about general terms what instrumentalists assert about scientific theories: they are merely *tools*. They are fictions, yes; but they are *useful* fictions.

⁶ Cartwright 1999, 35. Richard DeWitt writes that “instrumentalism and realism are neither scientific theories, nor parts of scientific theories. Instead, instrumentalism and realism are attitudes toward scientific theories, and philosophical attitudes at that” (DeWitt 2010, 23). His implication seems to be that the instrumentalism/realism debate does not affect the actual science itself. Cartwright, we will see, is sceptical about the separability of the debate from the science, especially if “science” is expanded to include the inevitably messy processes (including the politics of grants and funding) that lead to scientific discoveries.

It is this tendency that I want to resist. I want to defend the view that although the laws may be true ('literally' true), they need not introduce new properties into nature. . . . Laws can be true, but not universal. We need not assume that they are at work everywhere, underlying and determining what is going on. If they apply only in very special circumstances, then perhaps they are true just where we see them operating so successfully — in the artificial environments of our laboratories, our high-tech firms, or our hospitals. I welcome this possible reduction in their dominion; but the fundamentalists will not.⁷

We see that the debate over realism and the nature of scientific truth centres inevitably on the concept of a law of nature. This will be a focus of the chapters that follow, but as an introductory comment it will be sufficient to note that Cartwright is seeking a way for laws to be *true* without being *universal* (the universality involving the introduction of an unnecessary—and unwarranted, she will argue—new property into nature).⁸

As a result of this limited realism, Cartwright is often called an entity realist.⁹

According to Alspector-Kelly, entity realism involves the assertion that

belief in the existence of unobservables is a consequence of their experimental manipulation rather than the truth of the theories that refer to them. Entity realism was original developed in Hacking 1983 [*Representing and Intervening*] and Cartwright 1983 [*How the Laws of Physics Lie*].¹⁰

⁷ Cartwright 1999, 36–37. “Fundamentalist” is not just the pejorative term of a cranky philosopher (although there *is* a certain rhetorical advantage gained if one’s opponents can be labelled fundamentalists). As we will see, Cartwright offers reasons for the term, and they include (she will argue) blind faith in the face of contradictory evidence. Nevertheless, in Hofer’s 2008 essay “For Fundamentalism” we find a spirited defense of the view Cartwright finds so inadequate. Here is one excerpt, in which it is implied that Cartwright is arguing against the entire (successful) history of science: “These [*fundamental* laws of nature] are what physics has been seeking, and getting closer and closer to actually grasping, since the time of Descartes. They are truths, expressible in mathematical language, that accurately describe the behavior of all things in the physical world, at all times and places. This view has been standard among physicists, and most philosophers of science, for at least a hundred years” (Hofer 2008b, 308).

⁸ This is by way of introduction only. Cartwright’s position will become more clear as this chapter progresses.

⁹ For example: “Cartwright has always endorsed a form of entity realism . . .” (Hofer 2008a, 12 n. 2).

¹⁰ Alspector-Kelly 2009, 585.

This reference to Cartwright's 1983 book points us to an early passage in which she discusses the various (competing) explanations given for the motion that takes place in radiometer, "a little windmill whose vanes, black on one side, white on the other, are enclosed in an evacuated glass bowl. When light falls on the radiometer, the vanes rotate."¹¹ After describing the explanations, she tells us which one she favours, and why:

The molecules in [the] radiometer are invisible, and the tangential stresses are not the kinds of things one would have expected to see in the first place. Yet . . . I believe in both. I believe in them because I accept Maxwell's causal account of why the vanes move around. In producing this account, Maxwell deploys certain fundamental laws, such as Boltzmann's equation and the equation of continuity, which I do not believe in. *But one can reject theoretical laws without rejecting theoretical entities.* In the case of Maxwell's molecules and the tangential stresses in the radiometer, there is an answer to van Fraassen's question [which was, "What has explanatory power to do with truth?" (Cartwright 1983, 4)]: we have a satisfactory causal account, and so we have good reason to believe in the entities, processes, and properties in question.

*Causal reasoning provides good grounds for our beliefs in theoretical entities.*¹²

Stathis Psillos, in his 2008 essay "Cartwright's Realist Toil: From Entities to Capacities," describes Cartwright's entity realism as a potentially unstable hybrid of opposing views:

Nancy Cartwright has been both an empiricist and a realist. Where many philosophers have thought that these two positions are incompatible (or, at any rate, very strange bedfellows), right from her first book, the much-discussed and controversial *How the Laws of Physics Lie*, Cartwright tried to make a case for the following view: if empiricism allows a certain type of method in its methodological arsenal (inference to the most likely cause), then an empiricist cannot but be a scientific realist—in the metaphysically interesting sense of being ontically committed to the existence of unobservable entities.¹³

But as Psillos's title implies, Cartwright's position may be evolving. And it may be

¹¹ Cartwright 1983, 5.

¹² Cartwright 1983, 5–6. Emphases mine (to make clear why her position is called *entity realism*).

¹³ Psillos 2008, 167.

evolving, says Psillos, because its original formulation was nearly impossible to maintain:

Cartwright's advertised entity-realism underplays her important argument for ontic commitment. In offering causal explanations, we are committed to much more than entities. We are also committed to laws, unless of course there is a cogent and general story to be told about causal explanation that does *not* involve laws.¹⁴

Psillos's analysis forecasts much of what will follow in this project. Through an exploration of the work of Scotus and Peirce, I will examine the question he raises: Given her stated philosophy of science, to what else must Cartwright be philosophically committed? This will include discussions of metaphysics, scholastic realism, laws of nature, and the very possibility of science.

Our introduction to Cartwright's philosophy will come in two major sections: the first will look at her philosophy of science, the second at her metaphysics. In each case, we will look at the development of her views over the course of 27 years and four books. Those books are: *How the Laws of Physics Lie* (1983), *Nature's Capacities and Their Measurement* (1989), *The Dappled World* (1999), and *Hunting Causes and Using Them* (2007). Each section will be comprised of a 'sweep' through these books—the first sweep focussed on philosophy of science, the second on metaphysics;¹⁵ in addition, each sweep will conclude with a brief look at some of the commentary found in *Nancy Cartwright's Philosophy of Science* (2008), a collection of essays by contemporary

¹⁴ Psillos 2008, 171.

¹⁵ I do this, fully aware that the two foci are not as separable as some may think. In fact, if I may get ahead of myself and use some Scotistic terminology, I suppose that my argument could be framed to say that they are only *formally* distinct. I say this somewhat lightly, and I do not wish to undertake a philosophical defense of the claim; I only wish to make the point that I believe philosophy of science and metaphysics are inseparable in reality (even by God!—as Scotus would say).

philosophers of science about Cartwright's work. In neither of these two initial surveys will I offer much in the way of critical analysis; rather, my primary intention is to present the reader with a clear picture of Cartwright's philosophy. I *will* present my own criticism, of course, but only after a journey through Peirce to Duns Scotus and back again to Peirce.

2. Nancy Cartwright's Philosophy of Science

We turn now to Cartwright's basic philosophy of science.

How the Laws of Physics Lie (1983)

This book's controversial and somewhat inflammatory title does not disappoint.

Cartwright's main thesis in the book is that

the fundamental laws of physics do not describe true facts about reality. Rendered as descriptions of facts, they are false; amended to be true, they lose their fundamental, explanatory force.¹⁶

"Facts" and "reality" here refer to measurable, physical phenomena that are actually experienced (and information about such phenomena), and it seems that Cartwright has limited reality to facts.¹⁷ We will return to some implications of this conflation of facts and reality shortly, but in the meantime I will explain Cartwright's thesis.

She begins with a distinction: "In modern physics, and I think in other exact sciences as well, phenomenological laws are meant to describe, and they often succeed

¹⁶ Cartwright 1983, 54.

¹⁷ And, in this passage at least, to actuality—although, as we shall see, that is a limitation she does not (and cannot) sustain.

reasonably well. But fundamental equations are meant to explain”¹⁸ The problem,

Cartwright says, is this:

We have detailed expertise for testing the claim of physics about what happens in concrete situations. When we look to the real implications of our fundamental laws, they do not meet these ordinary standards.¹⁹

Fundamental laws, in order to be true,

should give a correct account of what happens when they are applied in specific circumstances. But they do not. If we follow out their consequences, we generally find that the fundamental laws go wrong; they are put right by the judicious corrections of the applied physicist or the research engineer.²⁰

The ‘catch-22’ for fundamental laws is found precisely in those judicious corrections.

Once we allow for case-by-case adjustments, the law is no longer fundamental.

And that is just for single-theory scenarios. The problems multiply when multiple theories interact,²¹ primarily because each theory is, by its very nature, only applicable to single-theory situations:

When different kinds of causes compose, we want to explain what happens in the intersection of different domains. But the laws we use are designed only to tell truly what happens in each domain separately.²²

In fact, says Cartwright, “The general lesson is this: where theories intersect, laws are usually hard to come by.”²³

¹⁸ Cartwright 1983, 3.

¹⁹ Cartwright 1983, 3.

²⁰ Cartwright 1983, 13.

²¹ For example: an iron object is dropped in a vacuum chamber with a powerful magnet installed just under the floor. There are now two forces (and two theories—gravity and magnetism) interacting to influence the motion of the iron object.

²² Cartwright 1983, 12.

²³ Cartwright 1983, 51.

The typical practice in multiple-theory scenarios is to ‘add’ the theories. (Gravity pushes this way; magnetic force pushes that way. Use vector addition to arrive at the ‘net’ force.) However, Cartwright points out the ‘metaphorical’ nature of this vector addition argues against the truth of the fundamental laws involved:

It is implausible to take the force due to gravity and the force due to electricity literally as parts of the actually occurring force. Is there no way to make sense of the story about vector addition? I think there is, but it involves giving up the facticity view of laws. We can preserve the truth of Coulomb’s law and the law of gravitation by making them about something other than the facts: the laws can describe the causal powers that bodies have.²⁴

And now we return to Cartwright’s understanding of *reality* and of *facts*. An obvious implication of the above quotation is that the causal powers of bodies are *not* the facts. The facts, as we have seen, are what we can measure as *actually* happening. Causal powers, on the other hand, are only what can *potentially* happen. This means, it would seem, that (for Cartwright) they are less real or perhaps even not real at all. And indeed, Cartwright herself says, “I argue in these essays for a kind of anti-realism”²⁵

Nature’s Capacities and Their Measurement (1989)

Six years later she returns to these causal powers with a very different attitude. Renamed “capacities,” they become, for Cartwright, the most fundamental aspect of physical reality. “Science is measurement; capacities can be measured; and science cannot be understood without them. These are the three major theses of this book.”²⁶ Not

²⁴ Cartwright 1983, 61.

²⁵ Cartwright 1983, 2.

²⁶ Cartwright 1989, 1.

only that: “The third thesis could be more simply put: capacities are real.”²⁷ The pendulum seems to have swung rather thoroughly indeed.²⁸

Nevertheless, Cartwright still argues strenuously against the Humean understanding of natural laws, in which laws are considered linguistic shortcuts used to describe regularities or associations: “The bulk of this book is directed against the Humean empiricist, the empiricist who thinks that one cannot find out about causes, only about associations.”²⁹ In opposition to the Humean view, Cartwright says, “The generic causal claims of science are not reports of regularities but rather ascriptions of capacities, capacities to make things happen, case by case.”³⁰

The primary reason Cartwright feels motivated to make this claim—and justified in doing so—is linked to her view of what philosophy of science ought to be: careful thinking not just about the *content* of science but also about the *activity* of science:

I arrive at the need for capacities not just by looking at the laws, but also by looking at the methods and uses of science. I maintain, as many do today, that the content of science is found not just in its laws but equally in its practices.³¹

Looking at what science is *and* does, Cartwright advises “accepting that capacities and causings are real things in nature. There is, I think, no other view of nature that can give

²⁷ Cartwright 1989, 1.

²⁸ Whether it has or not will become more clear as this introductory survey unfolds.

²⁹ Cartwright 1989, 71.

³⁰ Cartwright 1989, 2–3. Later in this chapter, her statement will be explained and explored in some detail. For now, it is sufficient to understand that she is de-emphasizing regularity theory and is preparing to propose something (what I will call her doctrine of the primacy of capacities) to take its place.

³¹ Cartwright 1989, 1.

an adequate image of science.”³²

Clearly, then, we need an understanding of what Cartwright means by “capacities.” Oddly, she does not provide a definition until the fourth chapter (“Capacities”) of the book. In the introduction to that chapter, she writes:

I maintain that the most general causal claims—like ‘aspirins relieve headaches’ or ‘electromagnetic forces cause motions perpendicular to the line of action’—are best rendered as ascriptions of capacity. For example, aspirins—because of being aspirins—can cure headaches. The troublesome phrase ‘because of being aspirins’ is put there to indicate that the claim is meant to express a fact about properties and not about individuals: the property of being an aspirin carries with it the capacity to cure headaches.³³

Later in the chapter, Cartwright claims that these capacities are stable without being static:

[Capacities] do indeed endure; on the other hand, their characteristics may evolve naturally through time, and they may be changed in systematic, even predictable, ways as a consequence of other factors in nature with which they interact. All this speaks in favour of their reality.³⁴

This limited mutability supports rather than undermines the reality of capacities, says Cartwright, because that matches our experience of nature itself, which is mutable and sometimes even unruly.

So, too, with capacities. Unlike Humean treatments of cause and effect, the capacity account proposed by Cartwright can include ‘causes’ that do not always lead to their effects. Using the aspirin example again (it runs through the book), Cartwright says:

‘Aspirins relieve headaches.’ This does not say that aspirins always relieve headaches, or always do so if the rest of the world is arranged in a particularly felicitous way, or that they relieve headaches most of the time, or more often than

³² Cartwright 1989, 170.

³³ Cartwright 1989, 141.

³⁴ Cartwright 1989, 157.

not. Rather it says that aspirins have the capacity to relieve headaches, a relatively enduring and stable capacity that they carry with them from situation to situation; a capacity which may if circumstances are right reveal itself by producing a regularity, but which is just as surely seen in one good single case.³⁵

Notice that these capacities are carried “from situation to situation.” This talk of relative endurance and portability comes up somewhat frequently in her book.

And, finally, these capacities are responsible for the regularities we do occasionally experience in nature or (more frequently) in the laboratory:

Capacities are at work in nature, and if harnessed properly they can be used to produce regular patterns of events. But the patterns are tied to the capacities and consequent upon them What makes things happen in nature is the operation of capacities.³⁶

These statements on the primacy of capacities border on the metaphysical, and we will return to that in the ‘metaphysics sweep’ through Cartwright’s books. Nevertheless, we should pause and explore her response to a criticism she anticipates: the complaint that, in her emphasizing capacities over the regularities found in the measured data, Cartwright is developing a philosophy of science that is tending away from the strictly empirical toward the somewhat speculative.³⁷ Cartwright’s response to this anticipated criticism employs two strategies: first, by arguing that her capacity-driven view is not any more problematic than the standard empiricist accounts, and second, by arguing for a “practical empiricism” that takes into account the way science is actually done and that, accordingly, lets in just the right amount of metaphysics.

³⁵ Cartwright 1989, 3.

³⁶ Cartwright 1989, 36.

³⁷ As we will see, this is a criticism that would bother Cartwright. It is clear that she sees herself in the analytical tradition, that her empiricist credentials matter very much to her, and that she does *not* want to be guilty of unnecessarily multiplying entities.

The first strategy is really just a double negative: the capacity account is *not* any more *problematic* than other accounts. Here are two examples:

Causal laws can be tested and causal capacities can be measured as surely—or as unsurely—as anything else that science deals with.³⁸

The pure empiricist should be no more happy with laws than with capacities, and laws are a poor stopping-point. It is hard to find them in nature and we are always having to make excuses for them³⁹

And these are related to the second strategy: determining the type of empiricism appropriate for a philosophy of science. Before describing the empiricism Cartwright advocates, we will first look at two forms of empiricism she rejects.

The first is Humean empiricism, which she characterizes as substituting regularity for causation.⁴⁰ She rejects this view in large part because it cannot account for the fact that scientists sometimes discover causes through a *single* experiment. (We will explore this in some detail when we get to *The Dappled World*.) This disconnect between Humean empiricism and the activity of science, according to Cartwright, is too important to be ignored: “Hume’s own view that we can lay our philosophy aside when we leave the study and enter the laboratory is ultimately unsatisfactory.”⁴¹ One possible response to this would be to advocate an even more radical form of empiricism. This “radical empiricism” rejects “the whole fabric of causal concepts, and all the layers of modality as well: there are just isolated empirical happenings, and nothing more. All the rest is

³⁸ Cartwright 1989, 7.

³⁹ Cartwright 1989, 8.

⁴⁰ Cartwright 1989, 91.

⁴¹ Cartwright 1989, 94.

talk.”⁴² Cartwright argues against this radical empiricism, as well:

There is one further point about radical empiricism that I should like to make, and that is to stress what a poor reconstruction of science it provides. There is now fairly widespread agreement that Carnap’s project to build the claims of science systematically from some acceptable empirical core upwards cannot work. Nothing remotely like the science that we have can be arrived at in this way.⁴³

Again, Cartwright’s rejection of radical empiricism is based on its lack of fit with the practice of science as we find it.

In place of Humean and radical empiricism, Cartwright advocates what she calls a “practical empiricism”:

I want to insist that the practical empiricism of measurement is the most radical empiricism that makes sense in science. And it is an empiricism that has no quarrel with causes and capacities.⁴⁴

The most stringent kind of empiricism that seems to me to make sense is the empiricism of practice that I advocate throughout; the empiricism that demands that each quantity be measured and each claim be tested. And the principal argument of this book is that causes and capacities are as empirical in that sense as it is possible to be.⁴⁵

Notice that these passages combine the two strategies I’ve mentioned: Cartwright describes her own type of empiricism *and* claims that capacities present no problems any

⁴² Cartwright 1989, 167.

⁴³ Cartwright 1989, 167–168.

⁴⁴ Cartwright 1989, 6–7.

⁴⁵ Cartwright 1989, 167. While Cartwright herself does not use the term, it seems to me that her “practical empiricism” is quite close to Peirce’s pragmatic theory of meaning, in which the meaning of a concept is inextricably bound with the habits it produces, and whose habits can only be discovered through a scientific experimental method—“this experimental method being itself nothing but a particular application of an older logical rule, ‘By their fruits ye shall know them’” (*CP* 5.465). Both Cartwright (in science) and Peirce (in meaning) allow, in a limited way, for the reality of unseen entities (capacities for Cartwright, concepts for Peirce); but both insist that these unseen entities be linked with results we can explore empirically, lest they become idle and fruitless speculation. This idea—that a shared pragmatism links Cartwright and Peirce—will be explored in the chapters to come.

worse than those found in other versions of empiricism.

Finally, before moving on to *The Dappled World*, here is a glimpse of the larger project that appears to motivate the writing of *Nature's Capacities*: the replacement of laws with capacities.

The point of this book is to argue that we must admit capacities, and my hope is that once we have them we can do away with laws. Capacities will do more for us at a smaller metaphysical price.⁴⁶

The more general picture I have in view takes the capacities which I argue for in this book not just to stand alongside laws, to be equally necessary to our image of science, but rather to eliminate the need for laws altogether.⁴⁷

In this and later chapters, we will return to the assumption that metaphysics is a “price” to pay.⁴⁸ For now, notice that the ‘anti-law’ stance from *How the Laws of Physics Lie* is still alive and well. However, even while downplaying the significance of laws, Cartwright admits that they may still be of some limited use in our search for capacities:

Laws of association are in fact quite uncommon in nature, and should not be seen as fundamental to how it operates. They are only fundamental to us, for they are one of the principal tools that we can use to learn about nature's capacities; and, in fact, most of the regularities that do obtain are ones constructed by us for just that purpose.⁴⁹

That last idea—that the laws of regularities we often attribute to *nature's* laws are more correctly attributed to our own engineering—will be more fully developed in Cartwright's next book.

⁴⁶ Cartwright 1989, 8.

⁴⁷ Cartwright 1989, 36.

⁴⁸ And we will find Peirce arguing that this assumption is *itself* metaphysical in nature.

⁴⁹ Cartwright 1989, 182.

The Dappled World (1999)

Ten years later, in *The Dappled World*, Cartwright's philosophy of science becomes more clearly developed. As we will see, it combines a less sceptical version of *How the Laws of Physics Lie* with a more sceptical version of *Nature's Capacities and Their Measurement*—by which I mean that Cartwright appears less sceptical about the importance of laws and more sceptical that laws can be replaced entirely by capacities. In *The Dappled World*, Cartwright presents a philosophy of science that is as 'positive' as it is 'negative,' and she articulates her understanding of what the laws of nature *are* as well as what they are *not*. The pendulum has found its centre.

The treatment of this book will take significantly longer than the treatments of her other books (including her 2007 *Hunting Causes and Using Them*). Having read through her various works, it is my view that *The Dappled World* represents the fullest expression of her philosophical project; my energies have been focussed accordingly.

In *The Dappled World*, as in her two previous books, Cartwright maintains that natural laws are not usually natural—which is to say that she denies that natural laws are special rules (perhaps even divinely ordained) that are always and everywhere obeyed by natural objects. But in this book she goes on to explain what, precisely, she thinks laws of nature *are*. According to Cartwright, the term “natural law” describes a particular sort of outcome that results from a specially contrived and controlled arrangement of natural objects, an arrangement that produces regular and therefore predictable results. She calls this sort of arrangement a “nomological machine,” which she defines as

a fixed (enough) arrangement of components, or factors, with stable (enough) capacities that in the right sort of stable (enough) environment will, with repeated operation, give rise to the kind of regular behaviour that we represent in our scientific laws.⁵⁰

The solar system is an example of a naturally occurring nomological machine, whose existence gives rise (among other things) to Kepler's three *laws* of planetary motion. A vacuum chamber is an example of a manmade nomological machine, in which the *lawful* behaviour of gravity can be observed when a feather falls at the same rate as a hammer.

The idea of a nomological machine is crucial to Cartwright's philosophy of science, so we should spend some time understanding what is assumed and implied by it. Particularly, we should look at two related concepts: *capacities* and *shielding*.

First, capacities. We have already been introduced to capacities in *Nature's Capacities and Their Measurement*, where Cartwright seemed to find them difficult to define precisely (resorting instead to examples, such as the aspirin example). In *The Dappled World*, Cartwright continues to struggle with the task, offering up a variety of definitions of capacities, in large part because she believes capacities themselves are widely varied in their nature. To help us understand what she means by *capacities*, Cartwright contrasts them with *disposition terms*:

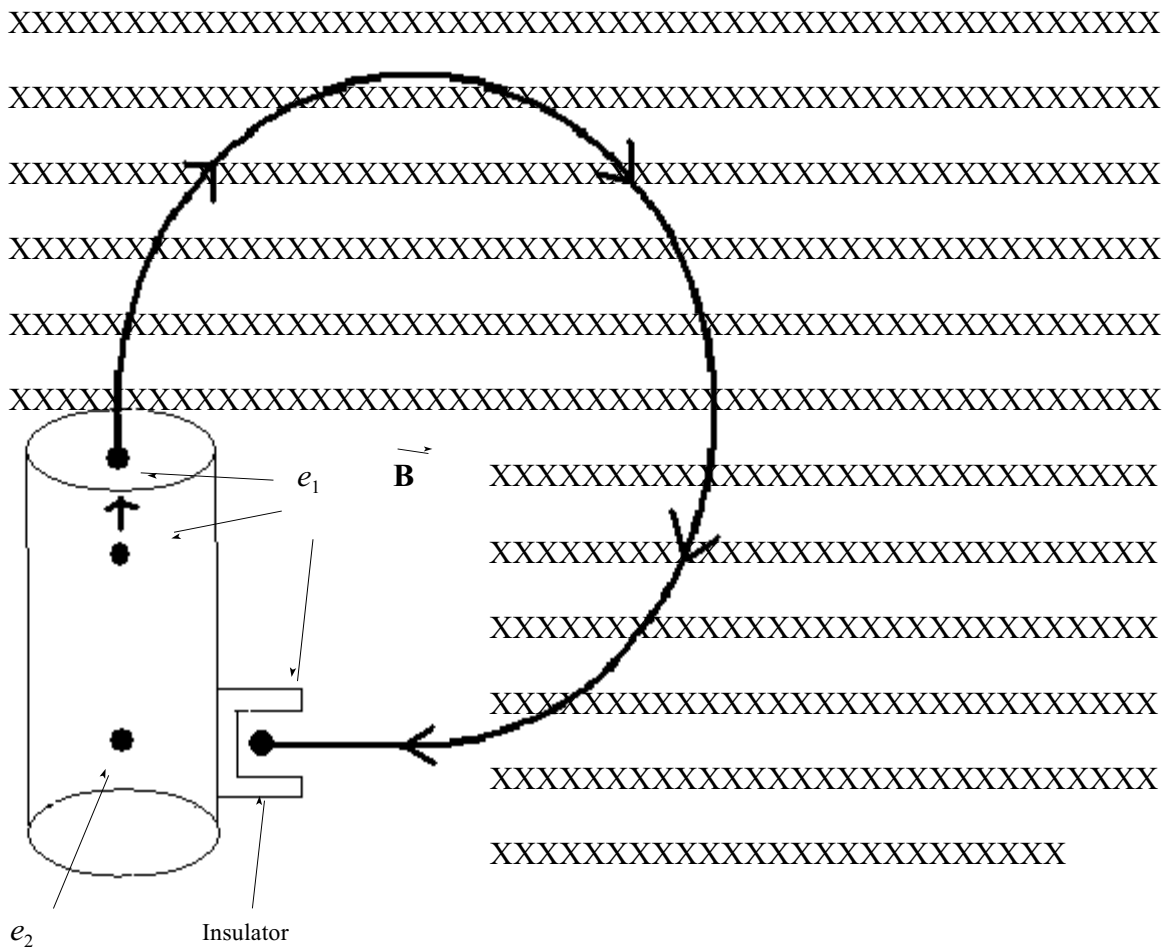
Disposition terms, as they are usually understood, are tied one-to-one to law-like regularities. But capacities, as I use the term, are not restricted to any single kind of manifestation. Objects with a given capacity can behave very differently in different circumstances.⁵¹

In order to demonstrate what she means by this, Cartwright gives us two examples. In the

⁵⁰ Cartwright 1999, 50.

⁵¹ Cartwright 1999, 59.

first, she describes a relatively simple arrangement involving two electrons, a cylinder, and an insulator, as portrayed in the diagram below.



When the two electrons in this diagram⁵² are released from their initial positions, the movement that results brings them *closer* to each other than they were at the start.

Cartwright describes the scenario:

Two electrons e_1 and e_2 are released from rest into a cylinder as in Figure 3.1b. The cylinder is open from one side only, and it is open to a unified magnetic field

⁵² Reconstructed from Figure 3.1b on Cartwright 1999, 61.

directed towards the negative z-axis. The initial distance between the two electrons is r_1 . According to the laws of electromagnetism, the force between the two electrons is a repulsive force equal to

$$F = \frac{1}{4\pi\epsilon_0} \frac{e_1 e_2}{r_1^2} = m_e a_a$$

Whereas e_2 will be locked inside the cylinder, e_1 will enter the magnetic field \mathbf{B} with a certain velocity v_1 . The magnetic field on e_1 will move it in a circular motion (as in the figure) with a force equal to

$$F = e v_1 \otimes B$$

This will take the electron e_1 into an insulated chamber attached to the cylinder. The dimensions of the cylinder and the chamber can be set so that the distance between the final position of e_1 and e_2 is less than r_1 .⁵³

In other words, although in general we say that similarly charged particles have the *capacity* to repel each other, “There is no one fact of the matter about what *occurs* when charges interact. With the right kind of structure we can get virtually any motion at all.”⁵⁴ This demonstrates the difference between a *disposition term* (linked with a particular outcome) and a *capacity* (linked with a variety of possible outcomes, depending upon the dappledness of the situation). Here is Michael Esfeld’s succinct formulation of the difference as he understands it in Cartwright’s work:

A capacity is more general than a disposition: It is not tied to any single kind of manifestation. In other words, capacities are determinable, whereas dispositions are determinate.⁵⁵

It is precisely this generality that will become important in chapters to come.

In Cartwright’s second example, which we will not explore in detail here, she

⁵³ Cartwright 1999, 60. She credits this example to Towfic Shomar.

⁵⁴ Cartwright 1999, 59.

⁵⁵ Esfeld 2008, 327.

presents a relatively simple economic model in which—contrary to the widely accepted *capacity* of taxes to raise prices—the application of taxes actually decreases prices.⁵⁶

These examples demonstrate Cartwright’s general meaning by the term *capacity*:

The point I want to stress is that capacities are not to be identified with any particular manifestations [as are disposition terms]. They are rather like ‘know,’ ‘believe,’ ‘aspire,’ ‘clever’ or ‘humorous’ in Ryle’s account: ‘They signify abilities, tendencies, propensities to do, not things of one unique kind, but things of lots of different kinds.’⁵⁷

Roughly and informally, then, we might say that capacities refer to what a natural object is *trying* to do, but not necessarily to what actually occurs (which depends upon the environment in which the capacities are situated).

We will return to a more detailed treatment of capacities shortly, but first we should discuss the second, and related, concept of *shielding*.

Shielding, in general, is Cartwright’s way of describing how *unwanted capacities* are prevented from actually manifesting themselves in ways that would be disruptive to any particular nomological machine. Perhaps the best way to describe *shielding* as it relates to Cartwright’s philosophy of science is to return to the two early examples of nomological machines: the solar system and the vacuum chamber. In the solar system example, other large masses outside the solar system have the *capacity* to affect the planets’ motions, but the planets are *shielded* from those effects because the other large masses are, by natural happenstance, far enough away. In the vacuum example, the

⁵⁶ Cartwright 1999, 60–64.

⁵⁷ Cartwright 1999, 64. Cartwright is here quoting Gilbert Ryle’s *The Concept of Mind* (1949), p. 119.

chaotic patterns of wind and the effects of air resistance are artificially kept away from the feather and hammer.

According to Cartwright, both of these examples need shielding because “built into the mechanical concept of *force* is the assumption that in the right circumstances a force has the capacity to change the state of motion of a massive body.”⁵⁸ That is, forces are always ‘trying’ to change the motion of a body, but various conditions may prevent them from succeeding. That is why we need shielding: to allow only the capacities of experimental interest to ‘succeed.’

To summarize: Cartwright’s view is that there are *all sorts* of capacities. Natural laws, as understood by Cartwright, occur only when the kinds of capacities science ‘likes’ (that is, those capacities describable by numbers) are arranged in such a way so as to produce reliable results. Cartwright believes that natural laws “are transitory and epiphenomenal. They arise from—and exist only relative to—a nomological machine.”⁵⁹ Since nature does not usually provide the shielding necessary for the running of a nomological machine, Cartwright argues that, in general, the laws of nature truly apply only in the laboratory or some other such shielded environment. Natural laws are *not*, she asserts, law-like regularities found everywhere in nature. To claim that they are is a “fundamentalism”⁶⁰ counter to the empirical spirit of science.

⁵⁸ Cartwright 1999, 51.

⁵⁹ Cartwright 1999, 121.

⁶⁰ Cartwright 1999, 34. Her reasons for using this term will be explained shortly. This idea—that the scientific community is being shaped and guided by a strong (but empirically unsupported) belief in the universal coverage of natural law—is an important theme in

As an example, Cartwright refers to a thought experiment put forth by Otto Neurath⁶¹ in his 1933 article, “United Science and Psychology,” in which a one thousand dollar bill is swept away by the wind in Saint Stephen’s Square. Cartwright says that those of us brought up within what she calls the “fundamentalist canon”⁶² know through Newton’s second law that force equals mass times acceleration. This law applies to falling objects; the thousand dollar bill is a falling object; therefore, the physicist should be able to predict where the bill will land. But, in practice, the physicist cannot. Cartwright says that Newton’s second law does not apply to this situation, because (like all scientific laws) it applies only in models that have been deliberately set up so that, *all things being equal*, the law holds. These models invariably involve shielding, which keeps out things like wind (or even air), magnetic fields, sound, or whatever else might interfere with the particular law at work. Cartwright writes that many scientists would object here and say that “there is in principle . . . a model in mechanics for the action of the wind, albeit probably a very complicated one that we may never succeed in constructing.”⁶³ But Cartwright says this objection is based on a fundamentalist faith rather than on any evidence we actually have.

Cartwright’s philosophy of science.

⁶¹ Described by Cartwright as the “hero behind this book” (Cartwright 1999, 5).

⁶² Cartwright 1999, 25. By which she means: the collection of writings infused with the optimistic view (fundamentalist faith, Cartwright calls it, since it is held in the face of non-existent or even contradictory evidence) that scientific laws are (1) sufficient to describe or explain any physical system, and (2) always and everywhere obeyed. According to this view, *there is no unlawful behaviour*. Any physical system not currently susceptible to lawful explanation must be awaiting the discovery of additional laws (or a fuller understanding of current laws).

⁶³ Cartwright 1999, 27.

This is why Cartwright argues that the world, rather than being homogenous under a universal rule of law, is dappled. She acknowledges that natural laws are real⁶⁴ and are useful. But she insists they are limited to shielded models that do not always match real-life circumstances. Others, she says, disagree:

Fundamentalists want more. They want laws; they want true laws; but most of all, they want their favourite laws to be in force everywhere. I urge us to resist fundamentalism. Reality may well be just a patchwork of laws.⁶⁵

I said earlier that in *The Dappled World*, we find ‘positive’ and ‘negative’ philosophy of science in nearly equal parts. Cartwright’s account of nomological machines provides the ‘positive’; her strident criticism of scientific fundamentalism provides the ‘negative.’

There are two major motivations for Cartwright’s opposition to scientific “fundamentalism.” The first is a concern that the drive toward all-encompassing theories (“take-over theories,”⁶⁶ she calls them) results in the neglect of less ‘exciting,’ yet more effective, research. For example, in the field of medicine Cartwright worries that a focus on genomics (the take-over theory in this case) is hurting research into the possibility that women can *prevent* breast cancer through the lowering of estrogen levels. This diversion of resources is happening despite the fact that there is already very strong evidence that this kind of prevention would be very effective.

I care about our ill supported beliefs that nature is governed by some universal theories because I am afraid that women are dying of breast cancer when they need

⁶⁴ Given her anti-realist stance in *How the Laws of Physics Lie*, this may sound like a surprising, because perhaps contradictory, statement. I will clarify this a bit later.

⁶⁵ Cartwright 1999, 34.

⁶⁶ Cartwright 1999, 17.

not do so because other programmes with good empirical support for their proposals are ignored or underfunded.⁶⁷

In another example from the world of economics, Cartwright worries that theories based on models far removed from the empirical reality ‘on the ground’ are being used “to admonish the government [particularly in the developing world] against acting to improve social welfare.”⁶⁸

The second motivation for Cartwright’s opposition to scientific fundamentalism is that it leads to what she calls “imperialism”: the view that a scientific theory “provides a complete description of everything of interest in reality.”⁶⁹ Science, Cartwright says, *can*

produce exact and precise predictions. This is in itself an amazing and powerful achievement, for it allows us to engineer results that we can depend on. But it is a long distance from [the] hope that *all* situations lend themselves to exact and precise prediction.⁷⁰

In other words, science must remain true to its empirical commitments⁷¹ and—*based on the evidence of how science works and in which situations it achieves success*⁷²—

⁶⁷ Cartwright 1999, 18.

⁶⁸ Cartwright 1999, 18.

⁶⁹ Cartwright 1999, 232.

⁷⁰ Cartwright 1999, 188.

⁷¹ While these commitments are not spelled out in any detail, Cartwright seems to mean that the empirical data ought to be the final arbiter when debating the accuracy and/or the domains of scientific theories.

⁷² Of course, what counts as *evidence* depends upon what counts as *science working*. This is a very large question, but one which we need not pursue in great detail, because Cartwright’s point is simply this: scientific fundamentalism is not entitled to its own belief in the universal coverage of natural law, for the reason that its fundamentalist understanding of *science working* (explaining all physical phenomena as predictable, lawful behaviour) does not match the available *evidence* (not all law-based predictions are supported by the empirical results, and not all physical phenomena are susceptible to prediction). Cartwright’s solution to this disconnect is to limit the boundaries of science; hence, she argues that we should throw out the fundamentalist belief that natural laws are always and everywhere obeyed, and we should replace it with the

remember the boundaries of its domain. Cartwright's anti-fundamentalist and anti-imperialist concerns are ultimately practical: an awareness of the boundaries of science can help direct limited resources to where they will be most effective.

This, in general, is the shape of Cartwright's project in *The Dappled World*. We proceed now to look at her analysis of capacities in more detail.

3. Capacities

Looking more closely, we will explore (a) the terminological link between capacities and natures, (b) why she thinks capacity concepts are necessary parts of any explanation of natural law, and (c) why she thinks capacities are "more basic" than laws.

Capacities and Natures

Recall that a natural object's capacities refer to the things that the object is 'trying' to do. This tendency or trying is linked to what Cartwright calls the *nature* of the object:

My use of the terms *capacity* and *nature* are closely related. When we ascribe to a feature (like charge) a generic capacity (like the Coulomb capacity) by mentioning some canonical behaviour that systems with that capacity would display in ideal circumstances, then I say that that behaviour is *in the nature of* that feature.⁷³

For Cartwright, then, the statement that "X has the *capacity* to Y" is equivalent to "Y-ing is in the *nature* of X." For example, "Planets have the capacity to attract each other" is equivalent to "Attracting each other is in the nature of planets." The interchangeability of

doctrines of (1) the primacy of capacities and (2) the dappledness of the world.

⁷³ Cartwright 1999, 84–85.

these terms will be important as we proceed.

Capacity Concepts Necessary when Explaining Natural Laws

Once we accept that laws come from nomological machines, Cartwright says, there are two ways in which capacity concepts are inevitable: (1) in describing the *building* of nomological machines and (2) in describing the *running* of nomological machines.

First, the building of nomological machines. Consider measurable properties: positions, velocities, accelerations, electrical charges, etc. There is nothing in this list, argues Cartwright, that tells us what masses *do* to one another—or ‘try’ to do. Measurement alone is not enough. Instead, we inevitably need sentences like these: ‘Masses attract one another.’ ‘Similarly charged masses repel one another.’ In these sentences we see capacity concepts, and Cartwright says that these capacity concepts allow us to understand the components of nomological machines in such a way that we can build the nomological machines with some confidence in our ability to predict the resulting, regular behaviour.

Second, the *running* of nomological machines. Consider a simple nomological machine involving two components. According to Cartwright, there are three assumptions at work in the successful operation of this nomological machine: First, that there is nothing inhibiting the two objects from exerting force on each other. Second, that no other forces are exerted on either object. And third, that everything that affects the motions of the two objects can be represented as a force. Cartwright argues that we cannot make any sense of these assumptions without capacity concepts, primarily because

we need shielding in order to run a nomological machine. Shielding makes sense only in the context of allowing objects to exercise their capacities, to actually ‘accomplish’ that which they are ‘trying’ to do. In other words: no successful operation of a nomological machine without shielding; no shielding without capacity concepts; therefore, no successful operation of a nomological machine without capacity concepts.

Capacities “More Basic” than Laws

Cartwright clearly feels that capacities are *necessary* for understanding the building of nomological machines, the sources of our natural laws. However, she is very careful about wording the relationship between capacities and laws, settling on the phrase “more basic”:

[L]aws in the sense of claims about what regularly happens are not our most basic kind of scientific knowledge. More basic is knowledge about capacities, in particular about what capacities are associated with what features.⁷⁴

Cartwright says that she does not mean “more basic” *epistemologically*: “capacity knowledge and knowledge of regularities are on an equal footing—neither is infallible and both are required if we are to learn anything new about the other.”⁷⁵ Nor does she mean “more basic” *ontologically*: claims about regularity are “neither more nor less true nor more nor less necessary”⁷⁶ than claims about capacities. Rather, Cartwright means “more basic” *practically*: “knowledge of capacities is more basic in that it is both more

⁷⁴ Cartwright 1999, 77.

⁷⁵ Cartwright 1999, 77.

⁷⁶ Cartwright 1999, 77. Whether this is an adequate view of what ontology *is* may be another question.

embracing and more widely useful than knowledge of regularities.”⁷⁷

At this point, there arises a particular objection, which one can imagine being voiced this way at a philosophy colloquium: ‘Thank you for your presentation, Nancy. I found it very clear. However, while you’ve convinced me that nomological machines (as you understand them) depend in some way upon capacities and that capacities are therefore “more basic,” I’d like to know just *how* it is you are learning of those capacities. I have a suggestion: through observable experiences, through empirical data gained in scientific experimentation. So show us those empirical results and we can explain everything simply from the regularities we find there; we need no talk of capacities or natures.’

Cartwright anticipates this objection, and her response is that *laws* alone (at least, laws in the Humean, regularity sense put forth by her interlocutor), will not be enough to adequately describe the scientific project. She presents two arguments in support of this assertion. The first makes use of an historical case study concerning the nature of light, and the second involves the repeatability of an experiment (and the generalization that can be made from it).

Case Study

First, the case study from the history of science: Goethe’s critique of Newton’s prism experiment—the experiment leading to Newton’s proposal that white light is made

⁷⁷ Cartwright 1999, 77.

up of other colours. Newton carefully set up one experiment and then generalized, believing he had uncovered the *nature* of light. As Cartwright words Newton's conclusion: "the tendency to produce colours is entirely in the nature of the light."⁷⁸

Goethe strongly objected to this procedure. For Goethe,

the point is not to find some single set of circumstances that are special but rather to lay out all the variations in the phenomena as the circumstances change in a systematic way. Then one must come to see all the interrelated experiments together and understand them as a whole.⁷⁹

In other words, Goethe—a regularity theorist—felt that Newton needed far more data before he was warranted in drawing any conclusions. In fact:

Goethe was appalled at the small amount of information that Newton collected, and he argued that Newton's claim was in no way adequate to cover the totality of the phenomena. What looks to be the best hypothesis in a single case can certainly look very different when a whole array of different cases have [*sic*] to be considered.⁸⁰

This is similar to the objection raised above in our imaginary philosophy colloquium: we don't need capacities at all. We can simply appeal to the facts and to the regularities we find there (after all, tendencies are discovered through regularities). But Cartwright says that contemporary modern science—even while sometimes speaking the language of regularity theory—actually follows Newton rather than Goethe:

Modern experimental physics looks at the world under precisely controlled or highly contrived circumstance; and in the best of cases, one look is enough. That, I claim, is just how one looks for natures and not how one looks for information about what things do.⁸¹

The idea of *natures*, then, says Cartwright, is an indispensable part of the scientific

⁷⁸ Cartwright 1999, 99.

⁷⁹ Cartwright 1999, 96.

⁸⁰ Cartwright 1999, 100.

⁸¹ Cartwright 1999, 102.

project as we actually find it.

This leads to another important aspect of Cartwright’s philosophy of science: the attention paid to the actual practice of scientists.⁸² Cartwright connects herself with what is called the ‘Stanford School’ of philosophers,⁸³ which is described by Carl Hoefer in this way:

One thing that unites Stanford School practitioners is a strong respect for scientific practice—*actual* scientific practice, as displayed in the best examples of scientific discovery and creation. If science has delivered genuine knowledge about our world—as it surely has—then studying its actual practices is the surest guide to an understanding of how that knowledge is gained. Case studies are indispensable for philosophy of science. Though not an end in themselves, they are invaluable for keeping our metaphysical and methodological speculations on track with real science.⁸⁴

In this very way, Cartwright has appealed to an important moment in the history of science—Newton’s prism experiment, as criticized by Goethe—to support her claim that there are indeed *natures* and *capacities* in our scientific world picture, and that we do not simply work from the regularities we find in nature.

This is one of the arguments Cartwright gives to support her view that Humean regularities *alone* are insufficient to adequately describe the modern scientific project.

⁸² Again, as mentioned earlier, the “actual practice” of scientists is a matter of debate, related to the debate of what science itself *is* (and what the limits of its domain might be). In later chapters we will be exploring these very issues from the perspectives of Cartwright and Peirce. For now, let us limit ourselves to the rough and approximate understanding that science is linked with prediction, and that “science” refers to both the *set* of successful predictions and the *work* done to arrive at them.

⁸³ “This book is squarely in the tradition of the Stanford School and is deeply influenced by the philosophers of science I worked with there” (Cartwright 1999, *ix*).

⁸⁴ Hoefer 2008a, 1–2.

Repeatability

The second argument we will explore is more broad: limiting ourselves to Humean regularities may actually be *impossible* to reconcile with science as we find it. In order to understand this, we need to discuss the ideas of *repeatability* and *generalization* when discussing a scientific experiment or a nomological machine.

Ronald Giere introduces us to Cartwright's thinking on these ideas:

As Cartwright notes, there are two ways of generalizing about a nomological machine, which I will call 'internal' and 'external' respectively. Internal generalization concerns repetitions of the same nomological machine. External generalization goes from one instance of a nomological machine to other, relevantly similar, nomological machines.⁸⁵

Internal repeatability means that if we were to run a particular experiment or nomological machine again, we would get the same result. The repetition is 'internal' to the experiment itself. External repeatability means that 'inside' an experiment there is a higher-level principle at work, such that if we were to run a different-but-related second experiment, we would be able to generalize that higher-level principle from the first experiment and predict the results of the second experiment.

Armed with these definitions, we are now ready to explore Cartwright's second argument, which itself comes in two parts (corresponding with the two types of repeatability or generalization). Cartwright first argues that external repeatability simply *cannot* be done within a purely Humean framework, because there are too many factors in any single experiment to know which may represent a higher-level principle applicable to

⁸⁵ Giere 2008, 125.

any other experiment.⁸⁶ (Goethe’s argument against Newton took precisely this approach.) But Cartwright also argues that *even internal repeatability* needs capacity concepts:

How do we know which generalisation, in this low-level [internal] sense, the experiment is testing? Not every feature of it is necessary to ensure its repeatability. The answer requires the notion of *natures*; the features that are necessary are exactly those which, in this very specific concrete situation, allow the nature of the process under study to express itself in some readable way. No weaker account will do.⁸⁷

Cartwright concludes this way: “Without the concept of *natures*, or something very like it, we have no way of knowing what it is we are testing.”⁸⁸

The reason for this is what she calls the Humean dilemma, in which the data alone (for reasons given above) cannot help get us from experiments to laws; instead, abstractions must be used. But then, “once we have climbed up into this abstract level of law, we have no device within a pure regularity account to climb back down again.”⁸⁹

The reason for that is found in the process of abstraction itself: some causes have, by definition, been left out. The Humean will find it impossible to put them back in, because

there is never any recipe for how to get from the abstract theory to any of the concrete systems it is supposed to treat. We have only the trivial advice, ‘Add back all the causes that have been left out and calculate the total effect by combining the

⁸⁶ This is closely related to Pierre Duhem’s views on *underdetermination* (a theory is described as underdetermined if the experimental evidence in its favour is also compatible with at least one other theory which is itself incompatible with the first theory) and the subsequent impossibility of the *crucial experiment* (in which one theory wins out over all competing theories), as described in *The Aim and Structure of Physical Theory* (see Duhem 1954 in the bibliography). Cartwright does not mention Duhem in *The Dappled World*, but she does make many references to his views in *How the Laws of Physics Lie* (see Cartwright 1983, 4, 76–77, 87–97), although she does not agree with some of his conclusions (see Cartwright 1983, 89).

⁸⁷ Cartwright 1999, 90.

⁸⁸ Cartwright 1999, 90.

⁸⁹ Cartwright 1999, 95.

capacities.⁹⁰

In other words, Cartwright is saying, experimental data is *never* enough. We will always need capacity concepts.

Nancy Cartwright's Philosophy of Science (2008)

In 2008, editors Stephan Harmann, Carl Hoefer, and Luc Bovens saw the publication of their book, *Nancy Cartwright's Philosophy of Science*, a collection of essays about Cartwright's work, each followed by a brief response from Cartwright. In the book's introduction ("Introducing Nancy Cartwright's Philosophy of Science"), Carl Hoefer affirms much of what we have seen (directly and indirectly) in this primary sweep.

First, that Cartwright's philosophy of science is unsettling for many:

The fundamental role (or better, *roles*) played by causation in scientific practice is undeniable; what Cartwright does, then, is reconfigure empiricism from the ground up based on this insight. In the reconfiguration process, many mainstays of the received view of science take a beating; especially, as we will see, the fundamentality of laws of nature.⁹¹

Second, that the doctrine of dappledness is crucial to her views:

The two central features of [Cartwright's] worldview are the insistence on the reality of causation (and of causal capacities, or powers, etc.) and the insistence that so-called fundamental laws are no genuine, true part of nature. A *consequence* of these tenets is one of the Stanford School's central views, the *disunity of science*.⁹²

And third, that her unsettling philosophy is unsettling for political and moral goals:

⁹⁰ Cartwright 1989, 185. This is not a typographical error; I am indeed quoting from *Nature's Capacities* here, even though I am supposed to be explicating *The Dappled World*. The reason: Cartwright herself, in *Dappled*, refers the reader to *Nature's Capacities* for a fuller explanation. I have followed that lead and included what I think is the relevant passage.

⁹¹ Hoefer 2008a, 1.

⁹² Hoefer 2008a, 2.

Cartwright argues that if we adapt our aims and our methods to those apt for a dappled world, governed at best by a patchwork of laws, we are likely to make better practical progress and not waste time and money pursuing reductionist/fundamentalist pipe dreams. . . . [A]s an observer of both science and human nature, I think she is right in thinking that a shakeup in the metaphysical worldview we attach to science would be a very good thing. Cartwright deserves thanks and high praise for her attempts to shake the philosophy of science out of its current dogmatic slumbers.⁹³

This reference to a “shakeup in the metaphysical worldview we attach to science” brings our attention to our next major task. Having now swept through four books⁹⁴ with the purpose of introducing Cartwright’s philosophy of science, we will now return to the beginning and do another sweep, this time focussing on Cartwright’s metaphysics.

4. Nancy Cartwright’s Metaphysics

This sweep will be a bit trickier, as Cartwright has been somewhat inconsistent in her willingness to discuss metaphysics. She herself says, “I am disappointing from the metaphysician’s point of view.”⁹⁵ And yet, as we will see, other philosophers of science see a metaphysical project in Cartwright’s work. Not only that, but we will also see that as recently as 2007, Cartwright herself seems to acknowledge the need for a metaphysical scheme that will support not only her philosophy of science, but the scientific project generally (as she conceives it). However, in the following year Cartwright affirms that

⁹³ Hofer 2008a, 12.

⁹⁴ Three by Cartwright, and one *about* Cartwright. I have deliberately excluded Cartwright’s 2007 *Hunting Causes and Using Them* from this initial sweep, as I feel it does not contribute much of interest to our treatment of her philosophy of science. (In short, she combines her doctrine of dappledness with the claim that there is a wide variety of capacities in nature. The result is a call for causal pluralism: she cautions the community of philosophers of science against focussing on too few models of causation.) However, we *will* return to *Hunting Causes*, albeit briefly, in our survey of Cartwright’s metaphysics.

⁹⁵ Cartwright 2002b, 272.

The Dappled World was a metaphysical project while at the same time showing (once again) a strong reluctance to engage in traditional metaphysics.⁹⁶ Clearly, Cartwright's own understanding of her relationship with metaphysics is somewhat unsettled.

Two final points before we begin. First, part of Cartwright's metaphysical unsettledness may have something to do with a lack of clarity about the nature of metaphysics itself. It seems that she uses the term in two different ways: (a) to refer to the set of *presuppositions* assumed by the practitioners and/or philosophers of science, and (b) to refer to speculations about the nature or structure of reality (both seen and unseen). We will return to these two conceptions in later chapters, but as an introductory and general comment, it seems that Cartwright would like to limit herself to type (a) but finds to her own discomfort that she must engage (in a limited way, at least) with type (b). Second, our metaphysical survey of Cartwright's work will include some quotations with 'God talk.' In presenting these passages, I want to be clear that I am not attempting to reconstruct Cartwright's faith commitments or, indeed, to attribute *any* faith commitments to her. Rather, I think that these comments, even if tongue-in-cheek, *are* intended to be illustrative; as such, they *do* give us glimpses of her metaphysical outlook.

How the Laws of Physics Lie (1983)

Early on, in the introduction to this book, Cartwright lets us in on what some of her metaphysical commitments might be:

⁹⁶ Which she understands as being concerned with "realism, universalism, unification, simplicity, and the like . . ." and with "Truth, Unity, and Beauty, which I ought to have had no truck to begin with . . ." (in Hartmann, *et al.* 2008, 389–391).

The divide between theoretical and phenomenological commonly separates realists from anti-realists. I argue in these essays for a kind of anti-realism, and typically it is an anti-realism that accepts the phenomenological and rejects the theoretical.⁹⁷

Later she explains this distinction: “phenomenological laws are about appearances; theoretical ones about the reality behind the appearances. That is the distinction I reject.”⁹⁸ And again: “there is only what happens, and what we say about it. Nature tends to a wild profusion, which our thinking does not wholly confine.”⁹⁹

Cartwright briefly explains the metaphysical commitments behind her anti-realism:

The metaphysical picture that underlies these essays is an Aristotelian belief in the richness and variety of the concrete and particular.¹⁰⁰ Things are made to look the same only when we fail to examine them too closely.¹⁰¹

She follows this with the first of her ‘theological’ illustrations:

Pierre Duhem distinguished two kinds of thinkers: the deep but narrow minds of the French, and the broad but shallow minds of the English. The French mind sees things in an elegant, unified way. It takes Newton’s three laws of motion and turns them into the beautiful, abstract mathematics of Lagrangian mechanics. The English mind, says Duhem, is an exact contrast. It engineers bits of gears, and pulleys, and keeps the strings from tangling up. It holds a thousand different details all at once, without imposing much abstract order or organization. The difference between the realist and me is almost theological. The realist thinks that the creator of the universe worked like a French mathematician. But I think that God has the untidy

⁹⁷ Cartwright 1983, 2.

⁹⁸ Cartwright 1983, 19. By “appearances,” it seems that Cartwright means those *actual* events that we can *actually* measure. Again, as foreshadowing, this collapsing of the distinction between reality and appearance can be linked to pragmatism’s insistence that unseen entities be connected to implications that are empirically available for exploration.

⁹⁹ Cartwright 1983, 19.

¹⁰⁰ Whether this is an adequate understanding of Aristotelianism is a question to which we shall return in later chapters.

¹⁰¹ Cartwright 1983, 19.

mind of the English.¹⁰²

Later, Cartwright elaborates further, when she describes

an extreme metaphysical possibility, in which I in fact believe. Covering-law theorists tend to think that nature is well-regulated; in the extreme, that there is a law to cover every case. I do not. I imagine that natural objects are much like people in societies. Their behaviour is constrained by some specific laws and by a handful of general principles, but it is not determined in detail, even statistically. What happens on most occasions is dictated by no law at all.¹⁰³

Cartwright is quick to add:

This is not a metaphysical picture that I urge. My claim is that this picture is as plausible as the alternative. God may have written just a few laws and grown tired. We do not know whether we are in a tidy universe or an untidy one.¹⁰⁴

One of the reasons that she feels “this picture is as plausible as the alternative” comes from her tendency to develop a philosophy of science based on the study of science as it is actually practised (a tendency we have already seen described as essential to the so-called Stanford School):

How unified is our knowledge? Look at any catalogue for a science or engineering school. The curriculum is divided into tiny, separate subjects that irk the interdisciplinist. Our knowledge of nature, nature as we best see it, is highly compartmentalized. Why think nature itself is unified?¹⁰⁵

This reluctance to believe in the unification of nature—or even to insist upon its opposite—is, for Cartwright, linked with her metaphysical reluctance in large part because of a confusion that metaphysics involves a series of either-or commitments:

In metaphysics we try to give general models of nature. We portray it as simple or

¹⁰² Cartwright 1983, 19.

¹⁰³ Cartwright 1983, 49.

¹⁰⁴ Cartwright 1983, 49.

¹⁰⁵ Cartwright 1983, 13. This may not be the best argument available. Plato is criticised for moving from language to metaphysics. It is unclear that a university catalogue makes for a better starting point than language.

complex, law-governed or chancy, unified or diverse. What grounds do we have for our choices? *A priori* intuitions and abstract arguments are not good enough. We best see what nature is like when we look at our knowledge of it.¹⁰⁶

In later chapters, we will see that Peirce formulates a scientific metaphysics in which there is room for all the properties in Cartwright's either-or list; the mutual exclusivity she portrays, it turns out, is *not* the necessary metaphysical characteristic she describes. In the meantime, we can see that her relationship with metaphysics is tentative and uncertain.

Nature's Capacities and their Measurement (1989)

After what might be called—with tongue in cheek—the ‘lawless anti-realism’ of *How the Laws of Physics Lie*, the metaphysical picture in Cartwright's next book is rather surprising. There is a shift from anti-realism to realism. Or, rather, there is a clarification: the anti-realism about laws remains, with the addition of a realism about capacities. Along the way, we can tease out a transition from metaphysical hesitation to metaphysical proclamation.

We begin with the hesitation. Quite near the beginning of her book, Cartwright seems to lump metaphysics in with other ‘annoyances’ that often impose themselves upon

¹⁰⁶ Cartwright 1983, 13. As we have noted earlier in this chapter, appealing directly to “our knowledge” as if it were a universally acknowledged and objective *given* is inadequate: what qualifies as scientific knowledge is itself one of the unsettled issues here. Beyond that, even if a universal agreement about scientific knowledge were possible, there would be the problem that we will always have only a finite data set about nature. From this finite set, an infinite number of explanations will always be possible. So *how* do we pick? This, indeed, is the question. But pick we do (Cartwright included), and therefore we cannot help acting on metaphysical presuppositions about nature. One of Peirce's great contributions to Cartwright's project is his careful and logical exploration of those presuppositions and their various implications.

the work of understanding and interpreting the natural world: “Questions about nature should be settled by nature—not by faith, nor metaphysics, nor mathematics, and not by convention nor convenience either.”¹⁰⁷ Soon thereafter, while introducing the main theses of the book, she tries to help pave the way for her capacity-driven account by explaining, “Capacities will do more for us at a smaller metaphysical price.” So: anyone with antipathy toward metaphysics would, at the beginning of this book anyway, feel right at home. Metaphysics should butt out, and the less of it we can get away with, the better.

However, while discussing causal structures in general, Cartwright says something that appears to apply beyond the domain of those causal structures. It could certainly describe her approach to metaphysics over the course of this book, so I include it here. She complains about the assumption that

structures that are simple are more likely to be true than ones that are complex. I maintain just the opposite. In *How the Laws of Physics Lie* I have argued that nature is complex through and through: even at the level of fundamental theory, simplicity is gained only at the cost of misrepresentation. . . . Matters are always likely to be more complicated than one thinks, rather than less. . . . Simplicity is an artefact of too narrow a focus.¹⁰⁸

With this in mind, consider Cartwright’s comment about those with too much metaphysical reluctance:

What I have wanted to do in this chapter is to attack a position that seems far more widespread nowadays than that of radical empiricism, a view that tries to let in just enough metaphysics, but not too much—the view that adopts laws, so long as they are laws of pure association, but rejects causes and capacities.¹⁰⁹

Things are more complicated than these metaphysically-averse thinkers would like,

¹⁰⁷ Cartwright 1989, 4.

¹⁰⁸ Cartwright 1989, 72–3.

¹⁰⁹ Cartwright 1989, 180–1.

Cartwright is saying. She is going to try to ease the blow, however, by making “metaphysics seem less noxious by making it seem more familiar.”¹¹⁰

She does this by showing just how much metaphysics is *already* at play in the presuppositions of contemporary science:

the testing of causal claims at any level—whether claims about a single happening, about a more generic causal law, or about capacities and their operations—necessarily presupposes some metaphysical assumptions that cannot be tested by the same stringent logic. . . . Even what are supposed to be the ‘purest’ empirical assertions, like ‘this facing surface is red,’ employ concepts which cannot be given ostensively but only make sense relative to an entire structure of other concepts in which they are embedded. Nor can they be tested, as many hoped, by pure inspection, without a rich background of assumptions, both physical and metaphysical, assumptions not much different in kind from those necessary to test causal claims.¹¹¹

We do not (and cannot) have a presuppositionless science of nature, says Cartwright. As such, she feels justified in arguing—even from within a broadly empiricist tradition—for an acceptance of the assumption that natural objects have capacities or powers. “How seriously must we take this idea of powers? I have been arguing that modern science takes them very seriously indeed: that our methods and our use of science presuppose that tendencies, or ‘capacities,’ are real.”¹¹²

But Cartwright does not stop there, with a limited view of metaphysics-as-list-of-presuppositions. In at least one passage the word “presupposition” is notably absent: “I will argue that the metaphysics that underpins both our experimental and our probabilistic

¹¹⁰ Cartwright 1989, 142.

¹¹¹ Cartwright 1989, 180. Once again we see the influence of Duhem here—particularly, of his assertion that no single scientific concept can be tested in isolation.

¹¹² Cartwright 1989, 178.

methods for establishing causes is a metaphysics of capacities.”¹¹³ It is possible to interpret Cartwright as asserting in this sentence that the metaphysics in question is not just presupposed but is also *real*. And, in fact, in several places Cartwright says just that:

I advocate . . . accepting that capacities and causings are real things in nature. There is, I think, no other view of nature that can give an adequate image of science.¹¹⁴

[Capacities] do indeed endure; on the other hand, their characteristics may evolve naturally through time, and they may be changed in systematic, even predictable, ways as a consequence of other factors in nature with which they interact. All this speaks in favour of their reality.¹¹⁵

I want to explain why capacity claims should not be thought of as just higher levels of modality, but instead must be taken as ascriptions of something real.¹¹⁶

It comes as no surprise, then, that Cartwright—in a discussion of abstraction and concretization—refers in passing to her “doctrine of the reality of capacities.”¹¹⁷

We have come quite a long way from Cartwright’s first book. As promised, we have traced her movement from metaphysical hesitation to metaphysical proclamation. And what she proclaims is this: capacities are *real* and they are *primary*. Those fixated on laws are fixated on regularities. But, according to Cartwright, “The regularities are in no way ontologically fundamental. They are the consequence of the operation of capacities . . .”¹¹⁸ The implication here is clear: *capacities* are ontologically

¹¹³ Cartwright 1989, 136.

¹¹⁴ Cartwright 1989, 170.

¹¹⁵ Cartwright 1989, 157.

¹¹⁶ Cartwright 1989, 158.

¹¹⁷ Cartwright 1989, 185.

¹¹⁸ Cartwright 1989, 140.

fundamental.¹¹⁹ And just in case the message is not clear, Cartwright proclaims the following:

I want to urge a very different picture that is open to us once we admit capacities into our world. *It is not the laws that are fundamental, but rather the capacities.* Nature selects the capacities that different factors shall have and sets bounds on how they can interplay. Whatever associations occur in nature arise as a consequence of the actions of these more fundamental capacities. In a sense, there are no laws of association at all. They are epiphenomena.¹²⁰

This assertion—that capacities are primary, and laws secondary—is what I call Cartwright’s doctrine of the primacy of capacities, and there is no stronger statement of it than what we see here. Unless Cartwright currently feels her position has changed drastically from what we have just seen presented in *Nature’s Capacities*, it is very difficult indeed to understand how she can describe herself as metaphysically disappointing.

The Dappled World (1999)

As in our first ‘sweep’ through Cartwright’s books, once we get to *The Dappled World* Cartwright’s views become more moderate. In *How the Laws of Physics Lie*, her metaphysics was primarily ‘negative’: she was espousing an *anti*-realism; she was arguing that most events are determined by *no* laws; she was positioning herself *against* abstract order and organization; she was claiming that we do *not* know what kind of a

¹¹⁹ This appears to contradict what we saw earlier: that Cartwright does *not* feel that capacities are more basic *ontologically*. Keep in mind, however, that we are on our second sweep through Cartwright’s books. The current ontological proclamation is from a 1989 book; the more hesitant position we saw earlier is, for us in this second sweep, still ten years in the future.

¹²⁰ Cartwright 1989, 181.

universe we live in, etc. In *Nature's Capacities*, however, we have just seen a strongly 'positive' metaphysics that emphasizes the ontological primacy of capacities and proclaims all laws epiphenomena. In *The Dappled World*, I believe we will see that—when it comes to metaphysics—the pendulum has once again found its centre.

In *The Dappled World*, Cartwright is less militantly metaphysical than in *Nature's Capacities*. Her choice of the new book's title, for instance, seems to stem from an *anti*-metaphysical inclination:

This book takes its title from a poem by Gerard Manley Hopkins. Hopkins was a follower of Duns Scotus; so too am I. I stress the particular over the universal and what is plotted and pieced over what lies in one gigantic plane.¹²¹

And although Cartwright continues her general commitment to scientific realism, it is now clarified as a "local realism," which is "about a variety of different kinds of knowledge in a variety of different domains across a range of highly differentiated situations."¹²² This, she acknowledges, is a significant shift. Sixteen years earlier—in *How the Laws of Physics Lie*—she had advocated a kind of anti-realism. "Nowadays I think that I was deluded about the enemy: it is not *realism* but *fundamentalism* that we need to combat."¹²³ Cartwright confirms this realist stance in a response to a book

¹²¹ Cartwright 1999, 104. Notice that this statement only constitutes an *anti*-metaphysical statement if metaphysics is necessarily associated with an emphasis on universals over particulars. (And we have already seen that Cartwright does seem to link the two.) But notice, also, that Cartwright's own proclamation in favour of plotted and pieced particulars is *itself* a metaphysical statement.

Finally, Cartwright's reference to herself as a follower of Scotus is significant; we will return to its implications in later chapters.

¹²² Cartwright 1999, 23.

¹²³ Cartwright 1999, 23. She is referring to the scientific fundamentalism discussed above in our first sweep through her books.

review: “*The Dappled World* defends scientific realism: well-supported claims of science have as good a claim to truth as any”¹²⁴

Ultimately, however, Cartwright continues to affirm the complexity of “the messy world that we inevitably inhabit,”¹²⁵ affirming it now as a beautiful place:

I follow Gerard Manley Hopkins in feeling the beauty of *Pied Beauty*:¹²⁶

Glory be to God for dappled things—
For skies of couple-colour as a brindled cow;
For rose-moles all in stipple upon trout that swim;
Fresh-firecoal chestnut-falls; finches’ wings;
Landscape plotted and pieced – fold, fallow, and plough;
And áll trádes, their gear and tackle and trim.
All things counter, original, spare, strange;
Whatever is fickle, freckled (who knows how?)
With swift, slow; sweet, sour; adazzle, dim;
He fathers-forth whose beauty is past change:
Praise him.¹²⁷

Once again we find Cartwright using religious or theological language in her descriptions of metaphysics. Here is another quotation in which Cartwright, like Hopkins, links God with dappledness:

Here are two stories I used to tell when I taught about the Mechanical Philosophy of the seventeenth century. Both are about how to write the Book of Nature to

¹²⁴ Cartwright 2001, 495.

¹²⁵ Cartwright 1999, 18.

¹²⁶ “*Pied Beauty*” is the name of the Hopkins poem that follows. Of some interest for my project (linking Cartwright and Peirce, in part through Scotus): Bernadette Waterman Ward’s connection of Hopkins and Peirce, from her book *World as Word: Philosophical Theology in Gerard Manley Hopkins*. Her statement that “The risk of finding oneself wrong, or of being confronted with something other than oneself, attends the three-way negotiation among a person who says something, a person who receives the message, and the world they variously encounter” is followed by a footnote that says, “My phrasing derives from nineteenth-century U.S. Scotist Charles Sanders Peirce Hopkins, of course, knew nothing of Peirce; nevertheless, in their attention to multiplicity of meaning and the social dimensions of language, they have much in common” (Ward 2002, 17 and 17n33).

¹²⁷ Cartwright 1999, 19.

guarantee consistency. In the first story, God is very interested in physics. He carefully writes out all of its laws and lays down the initial positions and velocities of all the atoms in the universe. He then leaves to Saint Peter the tedious but intellectually trivial job of calculating all future happenings, including what, if any, macroscopic properties and macroscopic laws will emerge. That is the story of reductionism. Metaphysical pluralism supposes that God is instead very concerned about laws, and so he writes down each and every regularity that his universe will display. In this case Saint Peter is left with the gargantuan task of arranging the initial properties in the universe in some way that will allow all God's laws to be true together. The advantage to reductionism is that it makes Saint Peter's job easier. God may nevertheless have chosen to be a metaphysical pluralist.¹²⁸

And in the following quotation, Cartwright links God with nomological machines:

The claim I have been arguing is that we always need a machine like this to get laws—any laws, causal or otherwise. Sometimes God supplies the arrangements—as in the planetary systems—but very often we must supply them ourselves¹²⁹

So far, we have seen only vaguely positive metaphysical statements. To see anything more specifically positive, we will need to return to her discussion of capacities.

As we have already seen in our first 'sweep' through *The Dappled World*, Cartwright links the terminology of *capacities* to the terminology of *natures*. What we have not yet seen is that, in doing this, she also makes reference to Aristotelianism:

Most of my arguments about capacities could have been put in terms of natures had I recognised soon enough how similar capacities, as I see them, are to Aristotelian natures. On the other hand, the use of the term 'natures' would seem very odd in the contemporary philosophical literature on causation, and would probably divert attention from the central points I want to make there about capacities versus laws, so perhaps it is not such a bad idea to keep both terms.¹³⁰

Also, in analysing what scientific knowledge *actually is* and what we *actually do* when discovering laws of nature, Cartwright says, "I still think that the best worked out account

¹²⁸ Cartwright 1999, 33.

¹²⁹ Cartwright 1999, 122.

¹³⁰ Cartwright 1999, 85.

that suits our needs most closely is Aristotle's doctrines on *natures*"¹³¹ In fact, she says:

I reject the conventional categories of British empiricism and turn instead to more ancient ones. A concept like Aristotle's notion of *nature* is far more suitable than the concepts of *law*, *regularity* and *occurrent property* to describe the kind of knowledge we have in modern science: knowledge that provides us the understanding and the power to change the regularities around us and produce the laws we want.¹³²

In fact, it is precisely to make clear this distinction—between this British empiricism she is rejecting and the Aristotelian-like *natures* to which she turns—that Cartwright uses the historical case study of Newton's prism experiment (and Goethe's subsequent criticism).

We last concluded the discussion of this case study by explaining that, according to Cartwright, data is *never* enough and we will always need capacity concepts—capacities are *more basic* than laws. We can now add that Cartwright also asserts that these capacity concepts presuppose Aristotelian-like *natures*. For this reason, Cartwright can say that, although Aristotelianism may seem out of place in modern philosophy of science, "Still, I maintain, the use of Aristotelian-style *natures* is central to the modern explanatory programme."¹³³ In fact, she says, "the [thesis] that I am most prepared to defend follows Aristotle in seeing *natures* as primary and behaviours, even very regular behaviours, as derivative."¹³⁴ And in that single sentence we see Cartwright connecting a modified Aristotelianism with her account of the source of our natural laws (capacities

¹³¹ Cartwright 1999, 72.

¹³² Cartwright 1999, 78.

¹³³ Cartwright 1999, 81.

¹³⁴ Cartwright 1999, 149. We will explore the significance of this statement in later chapters.

and nomological machines), making a statement that seems to be a robustly positive metaphysics.

But Cartwright herself seems quite hesitant to admit to that. Two years after the publication of *The Dappled World*, in a response to what she perceives as an inaccurate book review, Cartwright begins by calling her book “a work of analytic philosophy, start to finish”¹³⁵ and ends by stressing her empiricist credentials:

Hypotheses must gain credibility only from the empirical evidence, not because they serve some favoured metaphysical or political scheme.¹³⁶

Here, as in *The Dappled World*, Cartwright distances herself from metaphysics, worried about losing sight of practical, methodological concerns.

But others do not see such a distance between Cartwright and metaphysics. One year later, there appears a “Book Symposium” in *Philosophical Books*. In this symposium, five consecutive articles show us a conversation between Cartwright and three interlocutors. Cartwright writes the introductory essay; L. A. Paul, Peter Lipton, and Peter Menzies each write an article focussing (in large part) on the metaphysics of *The Dappled World*; and Cartwright responds in the fifth article. Here, in brief, is what these authors find: Paul says that capacities as Cartwright describes them “are robustly ontological, i.e., they exist independently of anything pragmatic.”¹³⁷ Lipton, on the other hand, links (as I believe Cartwright intends) metaphysics with method. He reads

¹³⁵ Cartwright 2001, 495.

¹³⁶ Cartwright 2001, 497.

¹³⁷ Paul 2002, 252.

Cartwright as supporting her call for a change to scientific methodology by proposing “a metaphysics in which nomological models can have only a limited scope.”¹³⁸ In other words, Lipton says that Cartwright’s metaphysics is always and only in the service of supporting an alternative scientific methodology, one that is not driven by—or towards—what Cartwright calls take-over theories. Menzies makes the boldest claim of the three: “Cartwright proposes a novel metaphysics for science. . . . an Aristotelian metaphysics that assigns primacy to the capacities or causal powers enjoyed by objects and properties in virtue of their natures.”¹³⁹ In fact, Menzies feels Cartwright has gone too far, “drawing strong metaphysical conclusions”¹⁴⁰ from limited evidence.

Cartwright is reluctant to engage in this kind of metaphysical discussion, saying that many of the questions raised by her interlocutors are “grand metaphysical issues, and so long as we are loyal to our empiricist strictures we are likely not to find answers to them.”¹⁴¹ She goes on to say, “I am disappointing from the metaphysician’s point of view” and that she has “nothing of interest to offer about what an object *is*, what a property *is*, what a capacity *is* or what a law *is*.”¹⁴² In fact, in the same book symposium Cartwright repeatedly asserts that the questions of metaphysics are peripheral to the argument for dappledness; she believes that dappledness is metaphysically neutral (or nearly so):

¹³⁸ Lipton 2002, 259.

¹³⁹ Menzies 2002, 261.

¹⁴⁰ Menzies 2002, 269.

¹⁴¹ Cartwright 2002b, 271.

¹⁴² Cartwright 2002b, 272.

My view that laws associate capacities to properties should be consistent with a variety of different answers to these metaphysical questions.¹⁴³

In fact, she writes, “you can add [my views about dapppling] to your favourite metaphysics of substance, accident, object and property.”¹⁴⁴

Nevertheless, Cartwright *does* clarify her metaphysical approach. Reaffirming her practical (and pragmatic, in the sense that metaphysics should not be entirely divorced from empirical experience) concerns, she writes, “I engage in metaphysics myself primarily for methodological reasons.”¹⁴⁵ Having said that, she proceeds to revert to a primarily ‘negative’ metaphysics about laws: they are *not* what is commonly thought. In her introductory essay, Cartwright had already written that “what we are entitled to are just the law claims that are supported by [our] successes, not anything bolder or grander.”¹⁴⁶ In the concluding essay, Cartwright is still unwilling to commit to any more than that: “I have nothing to say about what makes a law a law, except to protest that most law claims in exact science will not come out true if we see laws as regularities.”¹⁴⁷

In all of this, Cartwright appears to have pulled back from her ‘positive’ statements about the way things *are*, for fear that such statements lead to fundamentalism and imperialism. She appears to have chosen instead to stick to ‘negative’ statements

¹⁴³ Cartwright 2002b, 272.

¹⁴⁴ Cartwright 2002b, 271.

¹⁴⁵ Cartwright 2002b, 271. Again, it is unclear whether Cartwright is using the term “metaphysics” to refer to presuppositions or to something more speculative. But while that question is unresolved, what is clear is this: whatever metaphysics is, it must bear empirically available fruit. This is what she has called “practical empiricism,” which I have previously linked with an aspect of Peirce’s pragmatism.

¹⁴⁶ Cartwright 2002a, 242.

¹⁴⁷ Cartwright 2002b, 272.

about the way things are *not*, hoping that such statements highlight the need for pragmatism and greater efficacy.

Hunting Causes and Using Them (2007)

But in 2007, Cartwright may have doubled back again. She expands the importance of metaphysics somewhat, wanting to connect metaphysics not only to *method* but also to *purpose*:

If causal claims are to play a central role in social science and in policy—as they should—we need to answer three related questions about them: What do they mean? How do we confirm them? What use can we make of them? The starting point for the chapters in this collection is that these three questions must go together. For a long time we have tended to leave the first to the philosopher, the second to the methodologist and the last to the policy consultant. That, I urge, is a mistake. Metaphysics, methods and use must march hand in hand.¹⁴⁸

She makes a general call for readers to take on the challenge of finding a metaphysics “that provides a track from method to use,”¹⁴⁹ but she warns that this metaphysics must avoid the pitfalls of being “too abstract”¹⁵⁰ or “too thin.”¹⁵¹

5. Cartwright’s Contemporary Commentators

Nancy Cartwright’s Philosophy of Science (2008)

One year after this call for a metaphysics, however, in the collection of essays about Cartwright (and responses *by* Cartwright), we see that the unsettledness about

¹⁴⁸ Cartwright 2007, 1.

¹⁴⁹ Cartwright 2007, 6.

¹⁵⁰ Cartwright 2007, 6.

¹⁵¹ Cartwright 2007, 49.

metaphysics¹⁵² we discussed at the beginning of this sweep is still alive and well.

Metaphysics as Claims about Reality

In his introductory essay, Carl Hoefer seems (at first blush) to have a fairly positive view of metaphysics, and to be describing Cartwright's metaphysical project as claims about the shape of reality. Describing 1989's *Nature's Capacities and Their Measurement*, Hoefer writes:

Cartwright was ready to put forward her own alternative picture of how science functions, and the roles of causation in scientific practice. As we will see, that picture gives preeminent place not to causal laws but to *causal capacities* taken as genuine ingredients of reality.¹⁵³

His description of 1999's *The Dappled World* links her metaphysics with her (Stanford School) emphasis on the actual practice of scientists:

Stanford School philosophers are usually 'empiricists' in some broad use of the term but, unlike their teachers, do not shy away from metaphysics when it is built into, and hence justified by, successful scientific practice. . . . Cartwright has a metaphysical Big Picture that emerges with increasing clarity, becoming explicit in DW [Dappled World]. She does not make her chief objective that of defending this big-picture view overtly. Instead, she points out how it emerges from her studies of science as a natural and largely overlooked alternative to the more traditional Humean/empiricist and Rationalist big-pictures. The name of this alternative view is, of course, the 'Dappled World.'¹⁵⁴

Cartwright seems to confirm this metaphysics-as-reality-claims understanding of her own project when, in a reply to another essay, she writes:

¹⁵² By unsettledness, I mean disagreement over questions such as . . . Does "metaphysics" refer to presuppositions only or to genuine claims about the structure of reality? Is it something that should or should not be part of (the philosophy of) science? Is it a necessary but uncomfortable price to pay, or is it something to be embraced enthusiastically?

¹⁵³ Hoefer 2008a, 6.

¹⁵⁴ Hoefer 2008a, 2.

One of the central aims of *The Dappled World* is to offer a metaphysical account of the patchwork way in which successful science operates as opposed to an epistemological account that relies on our ignorance and cognitive limitations. The challenge then is to account for how there can be the kinds of regularity and precise predictability that we see in a world that is not ordered through and through by some fundamental and precise, regularity-type laws.¹⁵⁵

But this understanding of metaphysics is not the only one found in this book.

Metaphysics as List of Presuppositions

As we have seen elsewhere,¹⁵⁶ there is another understanding of metaphysics that need not make any claims about the structure of reality. Instead, it limits itself to the *assumptions* that are commonly made (in this case, by scientists and philosophers of science) about the structure of reality. Hofer—who we just saw looking like he is in the reality-claim camp—occasionally looks like he has retreated to a more limited understanding of metaphysics in his analysis of Cartwright’s work:

Her concerns are not with the problems of skepticism, induction, or demarcation; she is concerned with how actual science achieves the successes it does, and what sort of metaphysical and epistemological presuppositions are needed to understand that success.¹⁵⁷

Cartwright mounts an impressive argument for the reality of *natures* and of *causal capacities* as indispensable ingredients of the worldview presupposed by modern science and its methods.¹⁵⁸

And again, Cartwright seems to join Hofer on this metaphysical ‘retreat’:

I still believe that there is a proper wholistic story to be told without universal laws at all. But my own best efforts I think have instead been with nomological machines, which do presuppose capacity laws—as opposed to regularity laws—and that are in

¹⁵⁵ Hartmann, *et al.* 2008, 337.

¹⁵⁶ See page 37.

¹⁵⁷ Hofer 2008a, 1.

¹⁵⁸ Hofer 2008a, 7.

many cases very wide in scope, if not universal, e.g., the capacity law that masses attract other masses.¹⁵⁹

Here we see “capacity laws”—and, by implication, her metaphysical doctrine of the primacy of capacities—described as presuppositions (and universality described as something to try to avoid).

There appears to be a tension, then, between two models of metaphysics. That tension *can* be erased, of course, through realism: science works *because* the presuppositions it makes are accurate assumptions about how the world is *really* structured. (The level of success in a given scientific project can be a guide to the accuracy of the presuppositions it makes about the structure of reality.) And indeed, Stathis Psillos seems to take this very view when he describes Cartwright’s project:

One of the major contributions that Cartwright has made to philosophy of science is, I think, precisely this: there is a sense in which metaphysics can be respectable to empiricists. Hence, scientific realism cannot be dismissed on the grounds that it ventures into metaphysics. To be sure, the metaphysics that Cartwright is fond of is not of the standard a priori (or armchair) sort. It is tied to scientific practice and aims to recover basic elements of this practice (e.g., causal inference). But it is metaphysics, nonetheless. . . . What, I think, emerges quite clearly from her later writings is that Cartwright does not object to realism. Rather, she objects to Humeanism about laws, causation, and explanation. Insofar as Humeanism is a metaphysics independent of scientific realism, Cartwright is a more full-blown realist, without being Humean. And this is what she is.¹⁶⁰

One would think, given the realistic claims Cartwright herself makes, that this would settle the issue, but some other comments in this collection illuminate the strength of the current against which Cartwright is swimming.

¹⁵⁹ Hartmann, *et al.* 2008, 337.

¹⁶⁰ Psillos 2008, 167–168.

Anti-Metaphysical Leanings

We have already seen Cartwright use theological language to describe her position, and to describe the depth of the divide between her views and those of others.

We have also seen her make reference to Aristotle and Scotus. This seems to have disturbed some of her colleagues, and they express their discomfort both implicitly and explicitly.

Hofer, through deft use of the phrase “of course,” implies that theism is somewhat out of place in the philosophy of science:

Cartwright is no theist of course, but it is nevertheless correct to say that for her, God is an Englishman rather than a Frenchman. This means that the world is more than a bit untidy and poorly organized; it has superficial rules rather than deep, necessary principles.¹⁶¹

A fundamentalist believes in something rather ultimate and mysterious; not God, of course, but something that nevertheless ‘governs’ the whole universe, from top to bottom. What [the fundamentalist] believes in is the *fundamental* law(s) of nature.¹⁶²

Ronald Giere expands the sense of unwelcome to include metaphysics, and makes his dislike quite explicit:

In spite of my considerable sympathy with Cartwright’s program, I still find her invocation of capacities and natures to be anachronistic, even quixotic. I still feel there was something profoundly correct about the rejection of such notions that was part of the scientific revolution of the seventeenth century.¹⁶³

¹⁶¹ Hofer 2008a, 2.

¹⁶² Hofer 2008b, 308.

¹⁶³ Giere 2008, 129. A couple of observations: first, Giere appears to be confusing personal emotion with philosophical argument. At the very least, some *reasons* for his feelings would be appropriate. Second, even if Giere’s ‘feeling’ is correct—even if the rejection he describes *was* a part of the seventeenth century, it was only a *small* part. By Giere’s reasoning—especially as seen in the footnote that Giere himself adds at this point (see next quotation in main body)—it would seem that Kepler, Galileo, and Newton (Christians, all) were *themselves* anachronistic and quixotic. (For example, Kepler was motivated by the belief that correct science was the thinking of God’s thoughts after Him.) I have explored the *positive* relationship

And right at this point in his essay, there is a note that reads:

Cartwright was in part inspired to invoke these notions by Elizabeth Anscombe, to whom Chapter 5 of *The Dappled World* is dedicated. I fear that my basic sympathy with the Enlightenment makes me suspicious of Anscombe's Catholicism and its attendant metaphysics.¹⁶⁴

These comments make clear the extent to which Cartwright's philosophy is bold and (to some of her colleagues, at least) unexpected.

Cartwright Doubles Back?

And it would seem that Cartwright is not immune to the pressure such comments represent, as we can see in the following reply to an essay by Alfred Nordmann (although in her reply, she seems more concerned by the criticism of Stuart Hampshire):

[Hampshire] criticized me for indulging in questions of 'realism' and for supposing it to be worthwhile to ask whether and how theory really describes the world. This is just the kind of metaphysics that he thought he and his colleagues at Oxford—Ayer, Ryle, Austen, Berlin, and others—in league, but naturally not in total agreement, with those elsewhere had left behind. Anglophone philosophy, he had believed, could never turn to them again I have felt particularly shaken by Hampshire's criticisms. . . . I think that the hermeneutic reading that Nordmann proposes of my views show them in a light far more acceptable to the kind of in-the-world empiricism and particularism that we might ascribe to Hampshire, and that I would wish to emulate, than does the framing in terms of realism, universalism, unification, simplicity, and the like familiar in contemporary philosophy of science. . . . So I am happy to adopt the description of models as impersonal readers of both theory and the world, both for my own views and those of many others. And I especially embrace Nordmann's descriptions of science—really good science—that take us away from discussion of Truth, Unity, and Beauty, which I ought to have had no truck to begin with, to something far more modest: 'The success of science,'

between Christian theology and the rise of modern science elsewhere (see Teel 2006).

¹⁶⁴ Giere 2008, 132 n. 11. Perhaps we could name this the *ad religiosus* logical fallacy? Again, we find logical reasoning replaced with personal feeling—and not just any personal feeling, but an explicit anti-religious prejudice! In Peirce, by pleasant contrast, we will meet a post-Enlightenment thinker capable of both a general disgust with theology (for arriving at conclusions before departing upon investigations) *and* a great respect for the Catholic metaphysician Scotus (for his pioneering spirit and subtle logic).

Nordmann tells us, ‘consists in the establishment of a more or less local, more or less robust alignment of phenomena, models, and theories’ (Nordmann this volume: 371).¹⁶⁵

This would appear to be a rather rapid retreat from the realism others (and, indeed, Cartwright herself) have attributed to her. In this passage we see realism lumped in with “universalism, unification, [and] simplicity,” words we already know represent all that is repulsive to Cartwright about metaphysics. It would seem Cartwright has doubled back to Giere’s own assertion: “I would insist that science has no need of any metaphysics whatsoever. Sound methodology is enough.”¹⁶⁶

In the chapters that follow, I will develop an argument with the implication that Cartwright was correct to call for a metaphysics in 2007’s *Hunting Causes*, and that the apparent doubling back of 2008 is inconsistent with her own insistence that the philosophy of science pay attention to the actual practice of science. More specifically, I will argue that the triadic metaphysics of Charles Sanders Peirce is very helpful for Cartwright’s project. It will provide the expanded foundation she calls for in *Hunting Causes*, it is certainly neither too abstract nor too thin (weaknesses Cartwright says we must avoid), and it will help to illuminate and correct what I feel are weaknesses in Cartwright’s philosophy of science.

However, before making arguments to support any of those claims, I will present

¹⁶⁵ Hartmann, *et al.* 2008, 388–391.

¹⁶⁶ Giere 2008, 130. “Sound methodology” does not exist in an assumption-free vacuum. The data alone do not help us decide what science *is*, let alone what practices should count as better or worse scientific methodology. I have already argued that a presuppositionless science is impossible. In Chapter 5 we will explore Peirce’s broader argument that even the *possibility* of science requires a full-blooded metaphysics.

the basics of Peirce's triadic metaphysics (Chapter 2). After that, we will (following leads in both Cartwright and Peirce) take a brief and introductory look at Scotus's treatment of the problem of universals (Chapter 3) before returning to Peirce (Chapter 4) and Cartwright (Chapter 5).

Chapter 2

Introduction to Peirce's Triadic Metaphysics: A Look at the Categories

1. Introduction

Charles Sanders Peirce (1839 – 1914) was the son of Benjamin Peirce, the prominent Harvard mathematician,¹ and as a result Peirce's early education and interests were primarily mathematical and logical. Later, at age 24, he received a Bachelor of Science in chemistry from Harvard, and for most of his adult life he worked as a scientist for the U. S. Coast and Geodetic Survey where he was a geodesist (a geological scientist specializing in the shape and size of the earth), although he also studied variations in gravitational force, pioneered research into the shape of the Milky Way galaxy, and was the first to establish the official length of a metre in terms of light wavelength. All the while, he was a prolific writer. He is considered the founding father of pragmatism² and

¹ Charles Peirce seems to have been proud of this heritage: "It was Benjamin Peirce, whose son I boast myself, that in 1870 first defined mathematics as 'the science which draws necessary conclusions'" (CP 4.229).

² He coined the term (based on the Greek *pragma*, meaning "deed" or "action"), but later renamed his own position "pragmaticism" in order to distance himself from other pragmatists.

modern semiotics. He also wrote on logic, mathematics, phenomenology, metaphysics, science, philosophy of science, history of philosophy, epistemology, psychology,³ and more.

But while Peirce left us a lot to read, he left us only one very technical (and therefore, for our purposes, rather unhelpful) book.⁴ Instead, we have lectures, journal articles, book *plans*, essays meant only to be memos to himself in preparation for public work, rough drafts, and correspondence. Many (but by no means all) of these have been brought together in an eight volume set, *The Collected Papers of Charles Sanders Peirce*, published from the papers Peirce's widow sold to Harvard University—papers that were bought, lost, found, sorted, and finally published (volume one in 1931, volume eight in 1958).⁵

For better and for worse, *The Collected Papers* is organized thematically rather than chronologically. This editorial decision makes it possible to read Peirce's thoughts on various topics, but some commentators have complained that it is difficult to determine what Peirce thought *eventually*—that is, toward the end of his life when he was shaping his thinking into a kind of system. When one adds to this the further

We will explore his reasons in Chapter 4.

³ According to Peter Behrens, Peirce was the senior author of the “very first study from the [Johns] Hopkins laboratory” of experimental psychology, which was the first of its kind in North America (see Behrens 1993, 309).

⁴ *Photometric Researches*. Leipzig: Wilhelm Engelmann, 1878.

⁵ References to the *Collected Papers* will be in the format standard for Peirce studies: *CP x.y*, where *x* is the volume number and *y* is the paragraph number (although “paragraph” can be misleading: a “paragraph” may go on for several pages and be composed, itself, of several paragraphs).

complication that Peirce did not hesitate to change his mind—the scientific spirit of evidence, testing, and revision was at the core of Peirce’s “fallibilism,” a term he himself coined—it becomes clear that a chronological collection of his writings would be very helpful. There is such a collection being slowly produced,⁶ but thus far it has only published Peirce’s writings up to 1892, considered by at least one commentator to be only “the beginning of Peirce’s mature period,”⁷ so it is not yet fully helpful.

As a result, it is no easy task to investigate Peirce’s views on various important questions, let alone discover how those views interact with other elements of his philosophy, science, etc.⁸ However, one element of that task is universally accepted by Peircian scholars: coming to terms with what Peirce calls “the Categories”—and understanding the central role they play in Peirce’s philosophy. This chapter is just such an effort and has two main parts. In the first I will present an introductory explanation of the Categories⁹ and in the second I will begin to explore how these Categories make their way into many aspects of Peirce’s thought.

But first, to understand the Peircian Categories and their development, it is

⁶ *Writings of Charles S. Peirce: A Chronological Edition*. Indiana University Press. Volumes 1-6 and 8 have been published. Volume 7 (which will be limited to the entries Peirce wrote for the *Century Dictionary* between 1883 and 1909) has not yet been published.

⁷ Almeder, viii.

⁸ Indeed, when reading the *Collected Papers*, one becomes aware that one has not so much entered a world as a *universe comprised of many worlds* (logic, semiotics, pragmatism, pragmaticism, metaphysics, philosophy of science, philosophy of mathematics, etc.). And as with (the Newtonian conception of) gravity in our universe, the worlds in the Peircian universe are linked with an action-at-a-distance type of relatedness: it seems as if nothing Peirce writes in any discipline is without some effect on all other disciplines.

⁹ In this paper, “Category” (capitalised) will denote a Peircian Category (Firstness, Secondness, or Thirdness), while “category” (lowercase) will denote the normal use of the word. Passages from other authors, however, may not follow this convention.

relevant—and not merely interesting background information—to be aware of the general shape of Peirce’s life and work. I have already mentioned the mathematical/logical emphasis of his early education, his degree in chemistry from Harvard, and his lifetime of work as a scientist. Peirce’s Categories follow a similar path: they first occur to Peirce during his studies in logic, and his names for the Categories—Firstness, Secondness, and Thirdness—are accurate indications that he considers them the proper subjects of logical and mathematical analysis. Although he claims to have initially resisted the impulse,¹⁰ he eventually incorporates the Categories into his work on phenomenology, psychology, physiology, biological evolution, physics, and metaphysics.

2. The Categories and Phenomenology

Although the Categories first appear in Peirce’s logic studies, I will subvert chronology and begin with a phenomenological presentation of the Categories. I do this for two reasons: (1) Peirce himself almost always begins this way when introducing the Categories, and (2) the Categories are often referred to as Peirce’s “phenomenological Categories,” even though Peirce himself does not limit them in this way. But first, I begin with the observation that, although Peirce does not always use the word “phenomenology” (he uses “ideoscopy” in 8.328 and “phaneroscopy”¹¹ in 1.284), he was

¹⁰ “This sort of notion is as distasteful to me as to anybody; and for years, I endeavored to pooh-pooh and refute it; but it long ago conquered me completely. Disagreeable as it is to attribute such meaning to numbers, and to a triad above all, it is as true as it is disagreeable” (*CP* 8.328).

¹¹ “Phaneroscopy is the description of the *phaneron*; and by the *phaneron* I mean the collective total of all that is in any way or in any sense present to the mind, quite regardless of whether it corresponds to any real thing or not” (*CP* 1.284).

pursuing phenomenology long before Husserl published his *Logical Investigations* in 1900–1. Charles Hartshorne explains the connection between Peirce’s pre-Husserl phenomenology and the Categories:

Prior to Husserl, and I think always uninfluenced by him, Peirce maintained that the first thing a philosopher should do is to study the most general aspects of experience as such. For from these must come our most general conceptions, the philosophical categories.¹²

In fact, Peirce says:

Ideoscopy consists in describing and classifying the ideas that belong to ordinary experience or that naturally arise in connection with ordinary life, without regard to their being valid or invalid or to their psychology. In pursuing this study I was long ago (1867) led [this was written in 1904], after only three or four years’ study, to throw all ideas into the three classes of Firstness, of Secondness, and of Thirdness.¹³

I now turn to an explanation of these Categories.

3. The Categories: First Blush(es)

Concerning the interconnectedness of Peirce’s philosophy in general, Michael

Raposa writes:

In interpreting one aspect of his thought, it sometimes becomes necessary to invoke certain principles and notions articulated at various other points in his system. In fact, interpreters of Peirce must deal with their subject’s own willingness, even eagerness, to connect the most disparate of arguments and ideas.¹⁴

This is certainly true of Peirce’s treatment and presentation of the Categories—Firstness, Secondness, and Thirdness—which he describes and defines in many ways and from many perspectives; as a result, it is not possible to give an adequate description or

¹² Hartshorne 1964, 455.

¹³ *CP* 8.328.

¹⁴ Raposa 1989, 6.

definition that is at the same time *brief*. But concerning the Categories, this is not surprising, given that Peirce admits that his goal is

to make a philosophy like that of Aristotle, that is to say, to outline a theory so comprehensive that, for a long time to come, the entire work of human reason, in philosophy of every school and kind, in mathematics, in psychology, in physical science, in history, in sociology, and in whatever other department there may be, shall appear as the filling up of its details. The first step toward this is to find simple concepts applicable to every subject.¹⁵

Peirce's ambitious desire to "lay the foundations deep and massive"¹⁶ results in a philosophy that requires a fair amount of reading, re-reading, visiting, and re-visiting.

The Peircian Categories, therefore, require a kind of 'cumulative iteration' in order to be made clear. What follows is an introductory set of iterations.

I start with one of the most succinct descriptions of the Categories I have yet found in Peirce's writings:

My view is that there are three modes of being. I hold that we can directly observe them in elements of whatever is at any time before the mind in any way. They are the being of positive qualitative possibility, the being of actual fact, and the being of law that will govern facts in the future.¹⁷

My temptation is to rush into explanations of what Peirce means, but I beg the reader to be patient. I *will* return to these definitions in detail; however, I think it will be beneficial to hold off and present some more descriptions. My hope is that the general shape of the Categories will begin to emerge before we dive in to a more detailed analysis.¹⁸

¹⁵ *CP* 1.1.

¹⁶ *CP* 1.1.

¹⁷ *CP* 1.23.

¹⁸ By analogy, a geography lesson on Canada will most likely start with a national map rather than a discussion of the North Saskatchewan River's role in the development of downtown Edmonton.

Peirce gives another phenomenological account of the Categories:

Instead of the familiar division of Tetens or Kant which makes pleasure-pain, cognition, and volition the three categories of mental phenomena, we have feeling or quality [Firstness], the action of opposition [Secondness], and synthetic thought [Thirdness].¹⁹

We now turn to a general definition that explains Peirce's names for the Categories:

Firstness is the mode of being of that which is such as it is, positively and without reference to anything else. Secondness is the mode of being of that which is such as it is, with respect to a second but regardless of any third. Thirdness is the mode of being of that which is such as it is, in bringing a second and third into relation to each other.²⁰

Firstness, then, is monadic: the possibility of quality or feeling that needs nothing else in its explanation. Secondness is dyadic: the actuality of fact involves the opposition of two things. Thirdness is triadic: synthetic thought and law are mediating 'thirds' that bring two other things into relation. Peirce has reasons for stopping at Thirdness, and we will be turning to those reasons later in the chapter.

Before our last introductory iteration, I think it will be helpful to have a few specific examples that Peirce himself uses to explain each Category—examples drawn from common experience. We begin with an approximation of Firstness:

Imagine me to wake and in a slumbrous condition to have a vague, unobjectified, still less unsubjectified, sense of redness, or of salt taste, or of an ache, or of grief or joy, or of a prolonged musical note. That would be, as nearly as possible, a purely monadic state of feeling [Firstness].²¹

Next, Secondness:

A court may issue injunctions and judgments against me and I not care a snap of my finger for them. I may think them idle vapor. But when I feel the sheriff's hand on

¹⁹ *CP* 1.350.

²⁰ *CP* 8.328.

²¹ *CP* 1.303.

my shoulder, I shall begin to have a sense of actuality. Actuality is something brute. There is no reason in it. I instance putting your shoulder against a door and trying to force it open against an unseen, silent, and unknown resistance. We have a two-sided consciousness of effort and resistance, which seems to me to come tolerably near to a pure sense of actuality. On the whole, I think we have here a mode of being of one thing which consists in how a second object is. I call that Secondness.²²

And last, Thirdness:

By the third, I mean the medium or connecting bond between the absolute first and last. The beginning is first, the end second, the middle third. The end is second, the means third. The thread of life is a third; the fate that snips it, its second. A fork in a road is a third, it supposes three ways; a straight road, considered merely as a connection between two places is second, but so far as it implies passing through intermediate places it is third. Position is first, velocity or the relation of two successive positions second, acceleration or the relation of three successive positions third. But velocity in so far as it is continuous also involves a third. Continuity represents Thirdness almost to perfection. Every process comes under that head. Moderation is a kind of Thirdness. The positive degree of an adjective is first, the superlative second, the comparative third. All exaggerated language, 'supreme,' 'utter,' 'matchless,' 'root and branch,' is the furniture of minds which think of seconds and forget thirds. Action is second, but conduct is third.²³

These give us a fuller (or at least, a more descriptive and evocative) sense of what Peirce means by Firstness, Secondness, and Thirdness. Again, I ask the reader to be patient: analysis *is* coming.

For the last of our introductory iterations, we turn to a slightly more detailed account; the following are excerpted from fairly lengthy descriptions of the Categories.

Note that there are two quotations concerning Thirdness.

The immediate present, could we seize it, would have no character but its Firstness. Not that I mean to say that immediate consciousness (a pure fiction, by the way), would be Firstness, but that the quality of what we are immediately conscious of, which is no fiction, is Firstness.²⁴

²² *CP* 1.24.

²³ *CP* 1.337.

²⁴ *CP* 1.343.

The waking state is a consciousness of reaction; and as the consciousness itself is two-sided, so it has also two varieties; namely, action, where our modification of other things is more prominent than their reaction on us, and perception, where their effect on us is overwhelmingly greater than our effect on them. And this notion, of being such as other things make us, is such a prominent part of our life that we conceive other things also to exist by virtue of their reactions against each other. The idea of other, of not, becomes a very pivot of thought. To this element I give the name of Secondness.²⁵

The third category of elements of phenomena consists of what we call laws when we contemplate them from the outside only, but which when we see both sides of the shield we call thoughts. Thoughts are neither qualities [first category] nor facts [second category]. They are not qualities because they can be produced and grow, while a quality is eternal, independent of time and of any realization. . . . No more is [a thought] a fact. For a thought is general. I had it. I imparted it to you. It is general on that side. It is also general in referring to all possible things, and not merely to those which happen to exist. No collection of facts can constitute a law; for the law goes beyond any accomplished facts and determines how facts that may be, but all of which never can have happened, shall be characterized.²⁶

Not only will meaning always, more or less, in the long run, mould reactions to itself, but it is only in doing so that its own being consists. For this reason I call this element of the phenomenon or object of thought the element of Thirdness. It is that which is what it is by virtue of imparting a quality to reactions in the future.²⁷

These last two pages have been significantly quotation heavy, but I think it is best to hear from Peirce himself on these matters. We turn now to each Category in some detail, followed by a look at how Peirce saw the Categories at work in various disciplines of thought.

4. Firstness

Firstness, as we have seen, is the mode of being of something that is what it is with no reference to anything else. It is, Peirce often says, a quality of feeling. But his

²⁵ *CP* 1.324.

²⁶ *CP* 1.420.

²⁷ *CP* 1.343.

phenomenological examples of Firstness—i.e., the examples referring to our experiences—are always approximations or analogies at best, because (as we shall see) the moment a quality of feeling is actually experienced, Secondness is involved, and the moment that the actual experience is *thought* about, Thirdness is involved. That would imply that Firstness is logically prior to actuality. And, indeed, Peirce says just that when he says that Firstness “can only be a possibility.”²⁸ He uses the colour red as an example:

The mode of being a redness, before anything in the universe was yet red, was nevertheless a positive qualitative possibility. And redness in itself, even if it be embodied, is something positive and *sui generis*. That I call Firstness.²⁹

In the same manner, Peirce argues that Being logically precedes Existence, and he links Firstness to Being because “Being is monadic.”³⁰ To sum up, Firstness is an absolutely monadic *possibility* of a positive³¹ quality of feeling.³² We come as close as we can to Firstness when we are overwhelmed by

a consciousness in which there is . . . nothing but a simple positive character. Such a consciousness might be just an odour, say a smell of attar; or it might be one infinite dead ache; it might be the hearing of a piercing eternal whistle. In short, any simple and positive quality of feeling would be something which our description fits that it is such as it is quite regardless of anything else. The quality of feeling is the true psychological representative of the first category of the immediate as it is in its immediacy, of the present in its direct positive presentness. . . . The first category, then, is Quality of Feeling, or whatever is such as it is positively and regardless of

²⁸ *CP* 1.25.

²⁹ *CP* 1.25.

³⁰ *CP* 1.329.

³¹ By “positive” Peirce means something *capable* of being experienced but not something that *must* eventually be experienced: “We naturally attribute Firstness to outward objects, that is we suppose they have capacities in themselves which may or may not be already actualized, *which may or may not ever be actualized*, although we can know nothing of such possibilities [except] so far as they are actualized” (1.25, emphasis mine). In Peirce’s view, then, eventual actuality does not seem to be necessary for an object’s capacity to have Firstness.

³² Note: Peirce is saying that Firstness is a *quality* of feeling, not just a feeling.

ought else.³³

Notice that this is the “true psychical *representative*” of Firstness: it is as near an approximation as we get to psychically experiencing Firstness.³⁴

5. Secondness

Secondness is connected with actuality and existence: “The being of a monadic quality is a mere potentiality, without existence. Existence is purely dyadic.”³⁵ Consider, for example, “the being of an individual thing or fact, the being which consists in the object’s crowding out a place for itself in the universe, so to speak, and reacting by brute force of fact, against all other things. I call that existence.”³⁶ Very soon we will see the dyadic character described in terms of the *effort* and *resistance* evident in this passage.

Secondness is also the mode of being of will and sense. In fact, Peirce often argues that will and sense—considered by many to be separate mental phenomena—are in fact two sides of the same coin:

In sense and will, there are reactions of Secondness between the ego and the non-ego (which non-ego may be an object of direct consciousness). In will, the events leading up to the act are internal, and we say that we are agents more than patients. In sense, the antecedent events are not within us Consequently, we say that we are patients, not agents.³⁷

³³ *CP* 5.44.

³⁴ Robert Almeder puts it this way: “[Firstness] is what the world was to Adam on the day he opened his eyes to it, before he had drawn any distinctions or had become conscious of his own existence” (Almeder, 174).

³⁵ *CP* 1.328.

³⁶ *CP* 1.21.

³⁷ *CP* 1.325.

And again:

The evidence, however, seems to be pretty strong that the consciousness of willing does not differ, at least not very much, from a sensation. The sense of hitting and of getting hit are nearly the same, and should be classed together. The common element is the sense of an actual occurrence, of actual action and reaction. There is an intense reality about this kind of experience, a sharp sundering of subject and object. . . . A consciousness of polarity would be a tolerably good phrase to describe what occurs. For will, then, as one of the great types of consciousness, we ought to substitute the polar sense.³⁸

A related comment by Peirce concerns resistance and effort, and serves to explain the otherness, polarity, and duality in our experience of Secondness: “There can be no resistance without effort; there can be no effort without resistance. They are only two ways of describing the same experience. It is a double consciousness.”³⁹ Through will and sense alike, we come up against the “brute force of fact” that makes up the Secondness of actuality and existence. As a bridge into our discussion of Thirdness, we note that, for Peirce, there is no generality involved in the particular, brute facts that make up actuality and existence: “The dyad is an individual fact, as it existentially is; and it has no generality in it.”⁴⁰

6. Thirdness

Thirdness, then, is the realm of generality. In fact,

Some of the ideas of prominent Thirdness which, owing to their great importance in philosophy and in science, require attentive study are generality, infinity, continuity, diffusion, growth, and intelligence.⁴¹

³⁸ *CP* 1.380.

³⁹ *CP* 1.324.

⁴⁰ *CP* 1.328.

⁴¹ *CP* 1.340.

Elsewhere Peirce adds to this list thought, meaning, and law.⁴² In all of these, we see that Thirdness is the mode of being of what Peirce often calls *mediation*—the *relationships* among actual, existing, brute facts.

We will return to a more thorough discussion of Thirdness, especially in Chapter 4's exploration of Peirce's self-described "extreme scholastic realism."⁴³ In the meantime, the following chart may be helpful as a summary of what has been discussed thus far:

Firstness	Secondness	Thirdness
Monadic	Dyadic	Triadic
Being	Existence	Law
Possibility	Actuality/'Brute' Facts	Regularity/Generality/Intelligibility
Quality of Feeling	Will/Sense	Thought/Meaning
Beginning	End	Middle/Mediation/Growth

7. Why Peirce Stops at Thirdness

Before moving on to a survey of how Peirce applies these Categories to (or sees these Categories in) various disciplines, we must deal with an obvious question: Why stop at three Categories? Why not fourthness, etc.? Peirce's response to this question is succinct and nearly always the same, and his answer tells us a lot about Peirce's own

⁴² *CP* 1.346.

⁴³ *CP* 8.208.

assumptions about reality, particularly about how reality is related to mathematics and logic. But first, a clarification: Peirce is not *denying* the existence of fourthness, fifthness, and so on. While acknowledging that these properties may be real and even helpful, he asserts that they are not Categories—they “cannot rise to the height of philosophical categories so fundamental as those [Firstness, Secondness, and Thirdness] that have been considered.”⁴⁴ Using the convention of capitalization I introduced in a footnote on page 62, we might say that, for Peirce, fourthness is a category but not a Category. As we will see, this is because fourthness is not fundamental; it can be conceived as a sub-category of Thirdness. (We will see that the same can be said for any category higher than fourthness, as well.)

Peirce’s reasons are logical and mathematical in nature and often involve diagrams. Diagrams, for Peirce, are not just visual aids for a deficient mind; rather, they are the essence of a certain kind of logical thinking:

[M]athematical reasoning consists in constructing a diagram according to a general precept, in observing certain relations between parts of that diagram not explicitly required by the precept, showing that these relations will hold for all such diagrams, and in formulating this conclusion in general terms. All valid necessary reasoning is in fact thus diagrammatic.⁴⁵

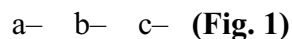
Peirce certainly puts this belief in action, as he fills page after page with diagrams in his explorations of mathematics and logic, explorations that go quite a bit deeper than what we need at the moment.

Instead, in order to introduce ourselves to Peirce’s diagrammatic argument for limiting the Categories to the three we have listed, we will make use of an analogy with

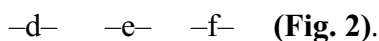
⁴⁴ *CP* 1.363.

⁴⁵ *CP* 1.54.

chemistry that Peirce himself (a chemist) uses. Imagine a univalent atom: an atom with only one ‘available’ bond. Such an atom can be represented by diagrams such as:



where a letter represents the atom and the line coming off of it represents the available bond. In like manner, bivalent atoms (those with two available bonds) are represented this way:



When we start to diagram the possible combinations of these atoms, we begin to see what is and is not possible. For instance, univalent atoms can combine only in pairs:

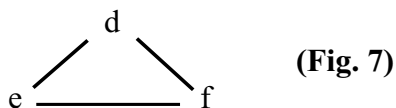


Any attempt to widen beyond pairs requires bivalency: $a-d-e-f-c$ (Fig. 4)

Notice in Figure 4 that the atoms a and c have only one bond, while d , e , and f each have two (a and c are univalent; d , e , and f are bivalent). Here are some other possibilities when combining univalent and bivalent atoms:



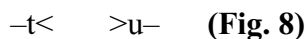
Bivalency also introduces combinatory possibilities that need not be simply linear:



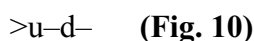
Also notice—this is especially important for Peirce—that *molecules* made up of only univalent and bivalent atoms cannot have a valency any higher than 2. You can see this in Figures 4–7, where the valencies of the resulting molecules are 0, 1, 2, and 0, respectively. To repeat: working with univalent and bivalent atoms alone, it is

impossible to reach trivalency.

Trivalent atoms are represented this way, with *three* lines coming off of each letter:



These trivalent atoms may, of course, be combined with univalent and bivalent atoms:



However, unlike univalent and bivalent atoms, trivalent atoms can be combined to create molecules with a *higher* valency than themselves. For instance, two trivalent atoms may be combined to create a molecule with valency 4:



It takes very little exploration with a pencil and paper to discover that one can arrange trivalent atoms to create molecules of valency 5, 6, 7, and so on. The general mathematical proof of this, Peirce admits, is “confusing,”⁴⁶ but these introductory diagrams are enough for our purposes. They are analogous examples of what Peirce maintains: fourthness, fifthness, etc., exist, but they are not fundamental Categories because they can be constructed from Thirdness.⁴⁷ Elsewhere, Peirce gives what may be the most succinct formulation of this argument:

But it will be asked, why stop at three? Why not go on to find a new conception in

⁴⁶ *CP* 1.292.

⁴⁷ As might be expected, there is disagreement on whether or not Peirce has adequately proven this. In duelling articles from the journal *Transactions of the Charles S. Peirce Society*, Vaught (1986) argues from the standpoint of phenomenology and semiotics for the existence of Fourthness (an additional Category required for an adequate account of analogy), while Hausman (1988) argues that Peirce’s triadic approach is sufficient to make analogy intelligible and that in fact Vaught’s own tetradic proposal may imply triadicity. Entering this debate is outside our scope, but it is nevertheless worth noting that the Vaught/Hausman debate over the adequacy of Peirce’s three Categories takes place in the realm of phenomenology and semiotics rather than in the realm Peirce himself most often chose for this debate: logic and mathematics.

four, five, and so on indefinitely? The reason is that while it is impossible to form a genuine three by any modification of the pair, without introducing something of a different nature from the unit and the pair, four, five, and every higher number can be formed by mere complications of threes.⁴⁸

As Peirce realizes, this argument is most easily understood through diagrams.

To conclude this brief treatment of Peirce's defence of Thirdness as the highest order Category—and as preparation for Chapter 4's exploration of what Peirce calls the logic of relatives—we will explore how Peirce connects the chemistry analogy with his analysis of logical arguments. First, Peirce himself claims that concepts themselves can be thought to have valency:

[M]y researches into the logic of relatives have shown beyond all sane doubt that in one respect combinations of concepts exhibit a remarkable analogy with chemical combinations; every concept having a strict valency. . . . Thus, the predicate "is blue" is univalent, the predicate "kills" is bivalent (for the direct and indirect objects are, grammar aside, as much subjects as is the subject nominative); the predicate "gives" is trivalent, since A gives B to C, etc.⁴⁹

To make this more clear, Peirce introduces yet another type of diagram: the rhema.

Propositions with some or all of their nouns 'erased' are what Peirce calls rhemas or rhemata.⁵⁰ Some examples:

—— is red.
 —— is larger than ——.
 —— gave —— to ——.

The first example above is analogous to the univalent atom; Peirce calls this type of rhema "non-relative." The second example, analogous to the bivalent atom, Peirce calls a

⁴⁸ CP 1.363. Keep in mind that Peirce is not speaking here of *numbers* but of *valencies* (continuing our analogy).

⁴⁹ CP 4.469.

⁵⁰ CP 4.438.

“dual rhema.” And those like the third example, analogous to the trivalent atom, Peirce calls “triple rhemata.”⁵¹ As in the chemistry analogy, Peirce maintains that with rhemata, the “triple” is all that is necessary in order to build all higher ‘valencies’:

Non-relative and dual rhemata only produce rhemata of the same kind . . . but junctions of triple rhemata . . . will produce all higher orders. Thus, “— gives — to —” and “— takes — from —,” give “— gives — to somebody who takes — from —,” a quadruple rhema. . . . Accordingly, all rhemata higher than the dual may be considered as belonging to one and the same order; and we may say that all rhemata are either singular, dual, or plural.⁵²

In another treatment of the importance of the triadic relation’s ability to build relations of higher order—this in the midst of a lengthy analysis of the logic of mathematics—Peirce becomes quite enthusiastic:

It would scarcely be an exaggeration to say that the whole of mathematics is enwrapped in these trichotomic graphs; and they will be found extremely pertinent to logic. So prolific is the triad in forms that one may easily conceive that all the variety and multiplicity of the universe springs from it All that springs from the

|
∧ [the triad symbol]

— an emblem of fertility in comparison with which the holy phallus of religion’s youth is a poor stick indeed.⁵³

With those memorable words we conclude the first part of this chapter, an introduction to Peirce’s Categories. We turn now to part two: how Peirce sees his Categories at work in various disciplines of human thought and endeavour.⁵⁴

⁵¹ All from *CP* 3.421.

⁵² Such is the importance of this observation, that Peirce goes on in the very next paragraph to say, “Such, at least, is the doctrine I have been teaching for twenty-five years, and which, if deeply pondered, will be found to enwrap an entire philosophy” (3.422).

⁵³ *CP* 4.310.

⁵⁴ This will also help prepare us to see how the Categories might be of use as we analyse Cartwright’s philosophical project.

8. A Guess at the Riddle

As I already mentioned in introducing Peirce's Categories, his goal was to set up an intellectual structure so all-encompassing that

for a long time to come, the entire work of human reason, in philosophy of every school and kind, in mathematics, in psychology, in physical science, in history, in sociology, and in whatever other department there may be, shall appear as the filling up of its details.⁵⁵

Peirce himself began that infilling, and what follows is from a series of notes (ca. 1890)

Peirce made in preparation for a book he was planning to call *A Guess at the Riddle*.⁵⁶ So important was this project to Peirce that he said, “[T]his book, if ever written, as it soon will be if I am in a situation to do it, will be one of the births of time.”⁵⁷

In his notes—covered in 1.354–416—Peirce finds the “triad” in Reasoning, Metaphysics, Psychology, Physiology, Biological Development, and Physics. We will touch on each of these briefly.

The Triad in Reasoning

It is not surprising that Peirce begins with the category of Reasoning, since it was his study of logic that initially led him to formulate the Categories. In this section, Peirce begins by agreeing with Kant that there is a “frequency in logical analytics of

⁵⁵ *CP* 1.1.

⁵⁶ A reference to the famous riddle in the myth of Oedipus: What is the animal that goes on four legs in the morning, two at noon, and three in the evening? Man (crawling at the beginning of life, walking at the height of life, and using a cane at the end of life). Perhaps the triadic nature of the answer is what drew Peirce's attention—it is unclear. I have yet to find a commentator who explains it.

⁵⁷ *CP* 1.354, in a note on the title. That “situation” never materialized, thanks in part to the Carnegie Foundation's refusal to award Peirce a grant.

trichotomics or threefold distinctions.”⁵⁸ In the same paragraph, Peirce lists many. In an ordinary syllogism, for example, there are three propositions (two premises and a conclusion), three terms (*man*, *mortal*, and *Socrates* in the classic example), and three ways for that ordinary syllogism to be formulated:

$$\begin{pmatrix} A & \sim C & A \\ B & B & \sim C \\ \bar{C} & \sim \bar{A} & \sim \bar{B} \end{pmatrix}$$

Inferences in science are “Deductions, Inductions, or Hypotheses.”⁵⁹ Peirce goes on:

Other examples of threes in logic are statements of what is actual, what is possible, and what is necessary; the three kinds of forms, Names [or Terms—see 1.372], Propositions, and Inferences [or Arguments]; affirmative, negative, and uncertain answers to a question.⁶⁰

Finally, Peirce identifies in logic “three kinds of characters, three kinds of facts.”⁶¹

“[T]he three fundamental categories of fact are, fact about an object, fact about two objects (relation), fact about several objects (synthetic fact).”⁶² It is not difficult to see how these three categories of fact are directly related to the three Categories.

The Triad in Metaphysics

This topic is too vast for our introductory purposes. Volume Six of the *Collected*

⁵⁸ *CP* 1.369.

⁵⁹ By “Hypotheses” here, Peirce means acts of what he elsewhere calls “retroduction” or “abduction” (sometimes called inference to the best explanation). As we will see, Peirce feels that all three types of inference are involved in the growth of human knowledge.

⁶⁰ *CP* 1.369.

⁶¹ *CP* 1.370.

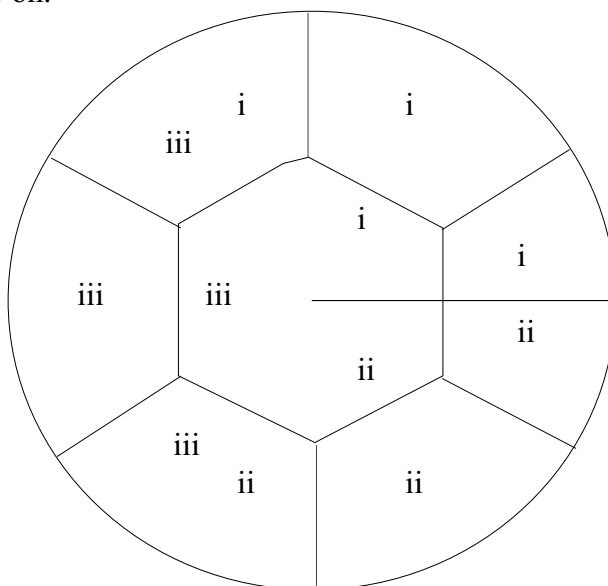
⁶² *CP* 1.371.

Papers is entitled “Scientific Metaphysics,” and no justice to it can be done here. I will limit myself to two points: (1) Peirce saw his Categories as a helpful way of understanding the range of metaphysics encountered throughout philosophy, and (2) Peirce’s “scholastic realism”⁶³ meant that, for Peirce, the Categories—while perhaps understood initially through phenomenology—were in fact ‘deeper’ than phenomenology.

In understanding my first point, the diagram on the following page will help. (This is another example of Peirce’s use of diagrams, in this case to illustrate various metaphysical possibilities.)

⁶³ *CP* 5.77, n. 1.

What you see in Figure 12 is a seven-fold division of philosophy based on the three Categories. Some philosophies, according to Peirce, acknowledge all three Categories (represented by Roman numerals in the diagram); these would be in the middle of this diagram. Others would recognize only Firstness and Secondness, so would be at ‘three o’clock.’ And so on.



(Fig. 12)

Peirce himself generates a list of various philosophies and where they might fit in this diagram:

- i. Nihilism, so-called, and idealistic sensualism.
- ii. The doctrine of [Wincenty] Lutoslawski and his unpronounceable master [Mickiewicz].
- iii. Hegelianism of all shades.
- ii iii. Cartesianism of all kinds, Leibnizianism, Spinozism, and the metaphysics of the physicists of today.
- i iii. Berkeleyanism.
- i ii. Ordinary Nominalism.
- i ii iii. The metaphysics that recognizes all the categories. It ought to be subdivided, but I shall not stop to consider its subdivisions. It embraces Kantism, Reid’s Philosophy, and the Platonic philosophy of which Aristotelianism is a special development.

A great variety of thinkers call themselves Aristotelians, even the Hegelians, on the strength of special agreements. No modern philosophy, or very little, has any real right to the title. I should call myself an Aristotelian of the scholastic wing,

approaching Scotism, but going much further in the direction of scholastic realism.⁶⁴

This proclamation for realism leads to my second point, which is that Peirce thinks we experience these Categories in our phenomenology, reasoning, science, etc., because these Categories *are the way things really are*. Peirce says that “the real is that which insists upon forcing its way to recognition as something *other* than the mind’s creation.”⁶⁵ This is how he treats the Categories; they are something *other* than the mind’s creation. Put another way, Peirce believes in the *reality* of the Categories: they are what they are, *regardless* of how or what (or if) we think about them. In Chapter 4, and in some significant detail, we will look at Peirce’s views on realism, nominalism, and the problem of universals. For now, I will simply show that Peirce (a) calls himself a realist, (b) decries nominalism as deficient, and (c) finds support for the reality of the Categories in the fact that he is not the first to notice the triadic shape of all reality.

First, Peirce calls himself a realist:

In [1871] I declared for realism. I have since very carefully and thoroughly revised my philosophical opinions more than half a dozen times, and have modified them more or less on most topics; but I have never been able to think differently on that question of nominalism and realism.⁶⁶

This alone is not helpful until we know what Peirce means by “realism.” In the following passage, he describes a litmus test:

[If a man] thinks that, whether the word ‘hard’ itself be real or not, the property, the

⁶⁴ CP 5.77, n. 1. This final sentence of self-description requires more attention. We will return to it in Chapter 4.

⁶⁵ CP 1.325. In Chapter 3, we will see Scotus using much the same definition of “real” and “reality.”

⁶⁶ CP 1.20. This was written in 1903, thirty-two years after his original declaration for realism. As we will see, if anything his realism grew stronger (and more influential in his thinking) over time.

character, the predicate, hardness, is not invented by men, as the word is, but is really and truly in the hard things and is one in them all, as a description of habit, disposition, or behavior, then he is a realist.⁶⁷

Next, Peirce describes nominalism as deficient:

Many philosophers call their variety of nominalism, “conceptualism”; but it is essentially the same thing; and their not seeing that it is so is but another example of that loose and slapdash style of thinking that has made it possible for them to remain nominalists.⁶⁸

And finally, Peirce is sometimes frustrated by the description of his Categories as new or revolutionary; since he believes in the *reality* of these Categories, he also believes that others should have noticed them before. In a letter to William James, he writes:

It rather annoys me to be told that there is anything novel in my three Categories; for if they have not, however confusedly, been recognized by men since men began to think, that condemns them at once.⁶⁹

And, in fact, Peirce believes people *have* thought this way for as long as they have been thinking carefully:

Originality is the last of recommendations for fundamental conceptions. On the contrary, the fact that the minds of men have ever been inclined to threefold divisions is one of the considerations in favor of them.⁷⁰

In the next section, we see that Peirce criticizes (and replaces) one of these “threefold divisions.”

⁶⁷ *CP* 1.27, n. 1.

⁶⁸ *CP* 1.27. Again, this is by way of introduction only. In Chapters 4 and 5 we will explore the *reasons* for his claim.

⁶⁹ *CP* 8.264.

⁷⁰ *CP* 1.368. Elsewhere, Peirce writes that “the fact that these different attempts were independent of one another . . . only goes to show that there really are three such elements” (*CP* 8.329). James Bradley’s unpublished paper—“Triads, Trinities, and Rationality”—also makes this case quite compellingly, with Peirce listed among Plato, Plotinus, Augustine, Marius Victorinus, John Scotus Eriugena, Bonaventure, Aquinas, Spinoza, Kant, Schelling, Hegel, and Whitehead.

The Triad in Psychology

While we have been introduced to some of Peirce's views on psychology in the phenomenological introduction to the Categories, we now (in *A Guess at the Riddle*) find a more detailed treatment. Peirce begins by naming the standard triad in psychology, which he says has been widely accepted since Kant (although the triad is not original to Kant): feeling (pleasure/pain), knowing (cognition), and willing (volition). After offering many arguments against these, Peirce proposes a different triad:

It seems, then, that the true categories of consciousness are: first, feeling, the consciousness which can be included with an instant of time, passive consciousness of quality, without recognition or analysis; second, consciousness of an interruption into the field of consciousness, sense of resistance, of an external fact, of another something; third, synthetic consciousness, binding time together, sense of learning, thought.⁷¹

These “three radically different elements of consciousness”⁷² provide “a psychological explanation of the three logical conceptions of quality, relation, and synthesis or mediation.”⁷³

At this point, one might wonder if Peirce is developing a bit of a chicken-or-egg scenario. We have seen that the ideas of the Categories first came to him through his study of logic. Now he sees these Categories at work in psychology, and says that the psychological triad may explain the logical triad. Logic helps explain psychology, which helps explain logic. One way out of this circularity, of course, is through Peirce's belief in the *reality* of the Categories. Psychology and logic *do* help explain and illuminate each

⁷¹ CP 1.377.

⁷² CP 1.382.

⁷³ CP 1.378.

other, he could say, but neither is the *basis* of the other. Rather, the triadic nature of *reality* is the basis of them both, so their feedback loop should be unproblematic and unsurprising.

And, in fact, this realism seems to be presupposed in his exploration of the triad in psychology, when Peirce celebrates the human mind's ability—through the third category of consciousness that deals with synthesis, mediation, thought, and learning—to make intelligible what would otherwise be an almost infinite list of disconnected, brute facts:

[I]t 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. Intuition is the regarding of the abstract in a concrete form, by the realistic hypostatization of relations; that is the one sole method of valuable thought.⁷⁴

Peirce then rails against those nominalists who discourage or mistrust abstraction:

Very shallow is the prevalent notion that [abstraction] is something to be avoided. You might as well say at once that reasoning is to be avoided because it has led to so much error; quite in the same philistine line of thought would that be; and so well in accord with the spirit of nominalism that I wonder some one does not put it forward. The true precept is not to abstain from hypostatization, but to do it intelligently.⁷⁵

In later chapters we will see that this idea of intelligent hypostatization is connected with two other Peircian principles we have already encountered: his fallibilism, and his desire for positive speculation (speculation with testable implications).

The Triad in Physiology

While clearly not limited to materialism, Peirce feels that there must be a triadic

⁷⁴ *CP* 1.383. We will return to the important Peircian idea of “realistic hypostatization of relations” in Chapter 4.

⁷⁵ *CP* 1.383.

nature to the nervous system that corresponds to the triadic nature of consciousness.⁷⁶ This he explores in a protracted discussion of the “protoplasmic content of every nerve-cell.”⁷⁷ We will not be analysing this discussion in depth, for two major reasons: (1) we would require a knowledge of what “protoplasm” meant to a scientist one hundred years ago, and (2) we would need to make almost constant distinctions between what Peirce meant by a biological term *then* and what we mean by that same term *today*. However, there are two points that we *can* explore. First, Peirce finds three fundamental categories of *function* in protoplasm:

The properties of protoplasm are enumerated as follows: contractility, irritability, automatism, nutrition, metabolism, respiration, and reproduction; but these can all be summed up under the heads of sensibility, motion, and growth. These three properties are respectively first, second, and third.⁷⁸

Notice that the last sentence connects these biological categories with Peirce’s Categories. This is the important point for our purposes, and it remains intact regardless of the differences in meaning between Peirce’s use and contemporary use of the biological term “protoplasm.”⁷⁹

Second, and perhaps more profound and relevant today, Peirce spends considerable time analysing “the most characteristic property of the nervous system, the

⁷⁶ This does not mean that Peirce believes in the *reduction* of mind to brain. Far from it, as he calls the relationship between mind and matter “an enigma” (1.119).

⁷⁷ *CP* 1.386.

⁷⁸ *CP* 1.393.

⁷⁹ A preliminary look indicates that many of those same protoplasmic functions are listed today in biology textbooks. It may be that Peirce’s analysis still stands—or at least partially stands.

power of taking habits.”⁸⁰ For Peirce, nerve cells have five characteristics that, together, lead to habit taking:

- (1) When an irritation continues for a certain amount of time, not only the nerve cells directly affected but also neighbouring cells are aroused and excited in a temporary crescendo.
- (2) After a time, the cells get tired and the excitation slowly subsides.
- (3) If the irritation is removed, the excitation disappears quickly but not instantly.
- (4) Assume an excitation in the nerve cells has previously travelled along a certain path. If so, then a similar irritation is now more likely to produce an excitation that travels along that same path than if the previous excitation had not occurred.
- (5) After a significant period of time without a particular excitation, nerve cells can ‘forget’ how to react to a particular stimulus. Peirce calls this forgetfulness “negative habit.”⁸¹

Peirce then makes a distinction between habit taking and the laws of physics:

This [fourth characteristic] is the central principle of habit; and the striking contrast of its modality to that of any mechanical law is most significant. The laws of physics know nothing of tendencies or probabilities; whatever they require at all they require absolutely and without fail, and they are never disobeyed.⁸² Were the tendency to

⁸⁰ *CP* 1.390.

⁸¹ *CP* 1.390.

⁸² Cartwright would (and does) strongly disagree with this characterization of the laws of nature. In fact, what we see here is an anomalous statement for Peirce, whose views on the laws of nature are (as we will see) strikingly similar to Cartwright’s. Perhaps this statement is best taken as a reference to the *popular* understanding of law (and not his own) in an attempt to

take habits replaced by an absolute requirement that the cell should discharge itself always in the same way, or according to any rigidly fixed condition whatever, all possibility of habit developing into intelligence would be cut off at the outset; the virtue of Thirdness would be absent. It is essential that there should be an element of chance in some sense as to how the cell shall discharge itself; and then that this chance or uncertainty shall not be entirely obliterated by the principle of habit, but only somewhat affected.⁸³

In this we can see the importance—indeed, the necessity—of Thirdness in this process of habit taking, and subsequently in the process of developing intelligence. But Thirdness, while a necessary condition, is not sufficient. There must also be an element of chance, which in other places Peirce associates with Firstness. And finally, there must be an element of Secondness: the irritation is caused through the brute fact of an irritant coming up against the nerve cell. Sensation, remember, is in the realm of Secondness. Therefore, all three Categories are involved.

The Triad in Biological Development

By “biological development,” Peirce primarily means the evolutionary principle of natural selection as outlined by Darwin. (Peirce was twenty years old when *Origin of Species* was published, and the ideas in the book had a profound effect on Peirce’s thinking and, as we shall see, in his speculative cosmology.) Peirce describes the three processes at work in natural selection as “individual variation,” “hereditary

describe vividly the character of Secondness (and, subsequently, its inadequacy to account for the development of intelligence).

⁸³ CP 1.390.

transmission,”⁸⁴ and “elimination of unfavorable characters.”⁸⁵ Again, Peirce sees his

Categories at work:

The principle of sporting [variation] is the principle of irregularity, indeterminacy, chance. . . . It is the bringing in of something fresh and first. The principle of heredity is the principle of the determination of something by what went before, the principle of compulsion, corresponding to will and sense. The principle of the elimination of unfavorable characters is the principle of generalization by casting out of sporadic cases, corresponding particularly to the principle of forgetfulness in the action of the nervous system.⁸⁶

In that last sentence we see an attempt to make a connection between his triadic analysis of natural selection and his previous triadic analysis of physiology.

The Triad in Physics

Peirce begins this section by distinguishing between a fact that is “ultimate” and a fact that “calls for an explanation.”⁸⁷ Firstness and Secondness are ultimate:

Indeterminacy, then, or pure firstness, and haecceity,⁸⁸ or pure secondness, are facts not calling for and not capable of explanation. Indeterminacy affords us nothing to ask a question about; haecceity is the *ultima ratio*, the brutal fact that will not be questioned.⁸⁹

Thirdness, however, we *must* attempt to explain:

⁸⁴ At the time of Peirce’s writing, Mendel’s work on genetic inheritance was known but not yet universally affirmed as the primary method of transmission and therefore not yet synthesized with Darwin’s natural selection. Nevertheless, Peirce’s analysis still holds.

⁸⁵ *CP* 1.398. These same three processes are generally acknowledged today, often with similar names like “variation,” “continuation,” and “selection.”

⁸⁶ *CP* 1.399.

⁸⁷ *CP* 1.405.

⁸⁸ “What Scotus calls the haecceities of things, the hereness and nowness of them” (1.405)

⁸⁹ *CP* 1.405.

But every fact of a general or orderly nature calls for an explanation; and logic forbids us to assume in regard to any given fact of that sort that it is of its own nature absolutely inexplicable. This is what Kant [in a footnote, Peirce adds, “after the scholastics”] calls a regulative principle, that is to say, an intellectual hope. . . . Despair is insanity.⁹⁰

The rest of the section is devoted to just such an explanation in the realm of physics and the laws of nature. Peirce sets out to show “how law is developed out of pure chance, irregularity, and indeterminacy.”⁹¹ In other writings, Peirce-the-logician spends a lot of time and energy considering what rules ought to apply to this sort of speculative project; therefore, before we continue with his project in the laws of physics, I will present Peirce’s speculative methodology.

Brief Detour: Peirce’s Speculative Methodology

In his 1908 essay, “A Neglected Argument for the Reality of God” (6.452–493), Peirce describes what we might call the logic of speculation as a three-fold procedure.⁹² First comes retrodution (sometimes called abduction)⁹³ to formulate a hypothesis. Second comes deduction to explore what the implications are if the hypothesis is true. Third comes induction through the form of scientific experiment to explore the extent of the actual existence of those implications and subsequently to establish the probability⁹⁴

⁹⁰ *CP* 1.405.

⁹¹ *CP* 1.407.

⁹² This is not the only place Peirce does so, but it is one of the more succinct formulations.

⁹³ If A then B. B. Therefore, *probably* A. Again, this is often called inference to the best explanation.

⁹⁴ In many places, Peirce is clear that induction gives us an approximation only, although through time and with cooperation the scientific effort can give us an approximation that is

of the truth of the hypothesis. It is necessary, says Peirce, that all three forms of inference be present in our exploration of the world.⁹⁵

This, then, will be the shape of the Peircian cosmological speculation that follows. First, Peirce will present a speculative hypothesis about the evolution of the universe. Second, he will deduce from that hypothesis some implications that should be observable to us. Third, he will use induction to evaluate the likelihood of the speculative hypothesis.

Before we begin, however, a brief observation. It would seem (in 6.144–145, although the idea is only germinal there) that Peirce sees faint echoes of the Categories in these three steps, in these three types of inference. Retroduction is a leap to something *new*; there is an echo of Firstness. Deduction is an inevitable chain of reasoning in which each new thought, idea, or proposition is *determined* by the previous one; there is an echo of Secondness. Induction is the art of *generalization* from particular experiences, and it is the *mediator* between the hypothesis of the Retroduction and the implications of the Deduction; there is an echo of Thirdness.

From our detour into Peirce's speculative methodology, we now return to Peirce's evolutionary and cosmological treatment of the laws of physics.

Peirce's speculative hypothesis rests on a concept we have already met in Peirce's treatments of Physiology and Biological Development: habit taking. Here Peirce

increasingly accurate.

⁹⁵ We will return to this at the end of this chapter.

expands the habit taking tendency beyond the biological to the cosmological:

Uniformities in the modes of action of things have come about by their taking habits. At present, the course of events is approximately determined by law. In the past that approximation was less perfect; in the future it will be more perfect. The tendency to obey laws has always been and always will be growing. We look back toward a point in the infinitely distant past when there was no law but mere indeterminacy;⁹⁶ we look forward to a point in the infinitely distant future when there will be no indeterminacy or chance but a complete reign of law. But at any assignable date in the past, however early, there was already some tendency toward uniformity; and at any assignable date in the future there will be some slight aberrancy from law. Moreover, all things have a tendency to take habits. . . . This tendency itself constitutes a regularity, and is continually on the increase. . . . It is a generalizing tendency; it causes actions in the future to follow some generalization of past actions; and this tendency is itself something capable of similar generalizations; and thus, it is self-generative. We have therefore only to suppose the smallest spoor of it in the past,⁹⁷ and that germ would have been bound to develop into a mighty and over-ruling principle, until it supersedes itself by strengthening habits into absolute laws regulating the action of all things in every respect in the indefinite future.

According to this, three elements are active in the world: first, chance; second, law; and third, habit-taking.⁹⁸

With this hypothesis in mind, Peirce proceeds to use deduction and induction:

We must show that there is some method of deducing the characters of the laws which could result in this way by the action of habit-taking on purely fortuitous occurrences, and a method of ascertaining whether such characters belong to the actual laws of nature.⁹⁹

Peirce begins with an analysis of the beginning of this cosmological evolution:

“The original chaos, therefore, where there was no regularity, was in effect a state of mere

⁹⁶ As we will see, in 1.412 Peirce mentions that the Beginning was so chaotic and indeterminate that there really could not be time yet. Therefore, the “infinitely distant past” does not necessarily mean an infinite amount of regularly flowing time.

⁹⁷ In fact, since (as we have seen) Peirce believes that Thirdness *cannot* be constructed out of Firstness and Secondness alone, he concludes “there must be an elementary triad” (1.292). This, it seems to me, is a powerful metaphysical statement—bordering on the theological!—but there seems to be very little commentary on it in the literature.

⁹⁸ *CP* 1.409.

⁹⁹ *CP* 1.410.

indeterminacy, in which nothing existed or really happened.”¹⁰⁰ Assumed in the statement that “nothing existed” is the principle that “the existence of things consists in their regular behaviour,”¹⁰¹ for otherwise . . .

If an atom had no regular attractions and repulsions, if its mass was at one instant nothing, at another a ton, at another a negative quantity, if its motion instead of being continuous, consisted in a series of leaps from one place to another without passing through any intervening places, and if there were no definite relations between its different positions, velocities and directions of displacement, if it were at one time in one place and at another time in a dozen, such a disjointed plurality of phenomena would not make up any existing thing.¹⁰²

Given this original condition, Peirce proposes a kind of story that appears to be a deduction of sorts from his principles of Firstness, Secondness, and habit-taking (which is related to Thirdness):

Out of the womb of indeterminacy we must say that there would have come something, by the principle of Firstness, which we may call a flash. Then by the principle of habit there would have been a second flash. Though time would not yet have been, this second flash was in some sense after the first, because resulting from it.¹⁰³

Peirce then allows for the development of different “streams” or types of time, of succession, of habit-taking. These different “streams” would result in completely different worlds:

¹⁰⁰ *CP* 1.411. An obvious question is this: Why presume original chaos? Perhaps we see here the subtle influence of Christian theology, because the very next sentence (in 1.412) mentions the first chapter of Genesis: “Our conceptions of the first stages of the development, before time yet existed, must be as vague and figurative as the expressions of the first chapter of Genesis.” Speculative leaps, inherent in the very process of retroduction, may be especially open to religious and theological influence.

¹⁰¹ *CP* 1.411.

¹⁰² *CP* 1.411.

¹⁰³ *CP* 1.412. Peirce calls this an atemporal state primarily because of the lack of regularity. “Not only substances, but events, too, are constituted by regularities. The flow of time, for example, in itself is a regularity” (*CP* 1.411). Since the original chaos had no regularity, it could have no time.

So one stream might branch into two, or two might coalesce. But the further result of habit would inevitably be to separate utterly those that were long separated, and to make those which presented frequent common points coalesce into perfect union. Those that were completely separated would be so many different worlds which would know nothing of one another; so that the effect would be just what we actually observe.¹⁰⁴

Within each world, habit taking would mean “flashes” eventually become what Peirce calls “states,”¹⁰⁵ giving rise to

bundles of habits, which will be substances. Some of these states will chance to take habits of persistency, and will get to be less and less liable to disappear; while those that fail to take such habits will fall out of existence. Thus, substances will get to be permanent.¹⁰⁶

This permanence would become the basis of the physical laws of nature:

In fact, habits, from the mode of their formation, necessarily consist in the permanence of some relation, and therefore, on this theory, each law of nature would consist in some permanence, such as the permanence of mass, momentum, and energy.¹⁰⁷

An inductive look around shows that “In this respect, the theory suits the facts admirably.”¹⁰⁸

Peirce should have expected an obvious objection at this point: ‘Wait a minute! Are we supposed to be surprised here? You knew what the current facts were before you ever started this enterprise. The game was rigged from the beginning.’ In the section under discussion, Peirce does not deal with this. However, it is clear from Peirce’s other writings that he would say, ‘The *real* test of my theory will be how well it holds up over

¹⁰⁴ CP 1.412.

¹⁰⁵ CP 1.413.

¹⁰⁶ CP 1.414. In a footnote to this paragraph, Peirce says, “I use substance, here, in the old sense of a thing, not in the modern chemical sense.”

¹⁰⁷ CP 1.415.

¹⁰⁸ CP 1.415.

the next 100 years of scientific investigation.’ Using that criterion, he may have done rather well. There was no Big Bang Theory until at least a decade after Peirce’s death. Also, Peirce’s deduction that there would be, after the initial “flash,” a period of great instability during which possible worlds could separate off from each other resonates quite strikingly with a contemporary cosmological speculation that spontaneous symmetry breaking may have occurred in the smallest fraction of a second after the Big Bang, causing different worlds to break off from one another (with the result that we cannot know of or travel to any of these other worlds).¹⁰⁹

This ends Peirce’s own survey in “A Guess at the Riddle,” a survey which Peirce saw as part of the much greater project (found throughout his writings) of filling in the details of his Categories.¹¹⁰ I will finish with one more example: Peirce’s high-level, triadic categorization of philosophy. The three “grand divisions”¹¹¹ of philosophy are (1) phenomenology, (2) normative science, and (3) metaphysics. Phenomenology “simply contemplates the Universal Phenomenon and discerns its ubiquitous elements, Firstness,

¹⁰⁹ See Wilkinson 1991, 165–166. This is tentative, of course. Whether or not physicists will be able to *explain* the Big Bang remains an open question. Whatever the result, the resonance of Peirce’s speculation with spontaneous symmetry breaking may still remain.

¹¹⁰ However, his Categories do not seem to have been as obvious to his interlocutors and peers as to himself. Consider this passage, from a letter written by Peirce to William James: “It is . . . entirely inscrutable to me why my three categories have been made so luminous to me without my being given the power to make them understood by those who alone are in a condition to see their meaning, — i.e. my fellow-pragmatists. It seems to me that you all must have a strange blind spot on your mental retina not to see what others see and what pragmatism ought to make so much plainer; . . .” (*CP* 8.263). As mentioned at the beginning of this chapter, Peirce eventually changed the name of his own position from “pragmatism” to “pragmaticism,” in order to distance himself from these “blind” pragmatists. In Chapters 4 and 5 we will explore the reason why, for Peirce, pragmaticism is inseparably linked with the reality of Thirdness.

¹¹¹ *CP* 5.121.

Secondness, and Thirdness, together perhaps with other series of categories,”¹¹² but it deals with phenomena “in their immediate phenomenal character, in themselves as phenomena. It, thus, treats of Phenomena in their Firstness.”¹¹³ Normative science “investigates the universal and necessary laws of the relation of Phenomena to *Ends*, that is, perhaps, to Truth, Right, and Beauty”;¹¹⁴ because it deals with “the relation of phenomena to ends . . . it treats of Phenomena in their Secondness.”¹¹⁵ Metaphysics “endeavors to comprehend the Reality of Phenomena. Now Reality is an affair of Thirdness as Thirdness, that is, in its mediation between Secondness and Firstness.”¹¹⁶

So then the division of Philosophy into these three grand departments, whose distinctness can be established without stopping to consider the contents of Phenomenology (that is, without asking what the true categories may be), turns out to be a division according to Firstness, Secondness, and Thirdness, and is thus one of the very numerous phenomena I have met with which confirm this list of categories.¹¹⁷

Thus we complete our introduction to Peirce’s Categories, and to how Peirce saw the Categories at work in a large number of disciplines. There are many more avenues yet unexplored. We have not considered the huge field of semiotics (in which triads are prominent). I have just barely introduced Peirce’s take on the nominalism/realism debate, to which we will return in Chapter 4. We have not analysed Peirce’s essay, “The Logic of Mathematics: An Attempt to Develop My Categories from Within.” We have not

¹¹² *CP* 5.121.

¹¹³ *CP* 5.122.

¹¹⁴ *CP* 5.121.

¹¹⁵ *CP* 5.123.

¹¹⁶ *CP* 5.121.

¹¹⁷ *CP* 5.121.

discussed Peirce's analysis of the two grades of Secondness (one genuine, one degenerate) and the three grades of Thirdness (one genuine, two degenerate). We have not looked at Peirce's detailed categorization of the various fields of human knowledge (and how those correspond to the Categories and to sub-categories within them). Peirce's philosophy is *indeed* "deep and massive" (1.1); my aim here has been to equip the reader to *begin* to understand just what is involved in that claim.

9. Brief Concluding Summary

We have now been introduced to our two major players: Nancy Cartwright and Charles Peirce. In Chapter 5, I will argue that Peirce's triadic metaphysics may very well be the metaphysics Cartwright is calling for. For now, I want to pause briefly to consider some striking similarities in the thoughts of Cartwright and Peirce about science and about the philosophy of science. Perhaps these similarities will help to make the case that a connection between Peirce and Cartwright—even though Peirce pre-dates her by a century—is a plausible and reasonable connection to assert.

I have divided the similarities into the following major categories:

- (a) Against the universal coverage of natural laws,
- (b) Capacities and nomological machines,
- (c) Inadequacy of induction in the building of scientific knowledge,
- (d) Realism, and
- (e) Aristotle and Scotus.

Against the Universal Coverage of Natural Laws

Like Cartwright, Peirce questions the universal coverage of law in two ways: (1) epistemologically and (2) ontologically. That is, (1) he asserts that empirical investigation has *not*—if considered honestly—confirmed universal coverage (*nor ever could*, due to the errors always present in our measurements), and (2) he suggests that, even if we were able to eliminate all error in our measurements, we might find that universal coverage does not exist.

As is his wont, Peirce approaches the problem with mathematics as his starting point. Observing that traditional metaphysics—from the ancient Greeks up to and including Kant—has based its hope of certainty upon the exactitude of geometric axioms and theorems, Peirce wonders what will happen to metaphysics now that mathematicians have given up their own hope in such an exactitude. What metaphysical propositions will have to be discarded?

The first to go must be the proposition that every event in the universe is precisely determined by causes according to inviolable law. We have no reason to think that this is absolutely exact. Experience shows that it is so to a wonderful degree of approximation, and that is all.¹¹⁸

This is the epistemological argument: we have no empirical knowledge of such a law.

However, this may be only because all our measurements involve error. In other words, even if such a universal law *did* exist, we would never be able to confirm it empirically.

Peirce realizes this, but points out that we will also never be able to rule out what

Cartwright would call, a century later, the dappledness of things:

We know that when we try to verify any law of nature by experiment, we always find discrepancies between the observations and the theory. These we rightly refer to

¹¹⁸ CP 1.402.

errors of observation; but why may there not be similar aberrations due to the imperfect obedience of the facts to law?¹¹⁹

Here we see a transition from the epistemological to the ontological. Like Cartwright, Peirce says only, ‘This *may* be the way things really are. There *may* not be universal coverage of law.’ But like Cartwright, once he has established this possibility, Peirce argues that it is now only *belief* that grounds universal coverage—and such a belief is not required by the evidence.

Grant that this [lack of universal coverage] is conceivable and there can be nothing in experience to [negate] it. . . . So we are under no inward necessity of believing in perfect causality if we do not find any facts to bear it out.¹²⁰

Cartwright, as we have seen, calls such a belief “fundamentalism.” In a very real sense, so does Peirce, especially when he expresses frustration with the pseudo-religious “infallibilism” rampant in science: dramatically, he says that if the Church ever gives up *its* infallibilism, the only infallibilists (might we say, fundamentalists?) left will be

the infallible scientists, under which head I include, not merely the kind of characters that manufacture scientific catechisms and homilies, churches and creeds, and who are indeed ‘born missionaries,’ but all those respectable and cultivated persons who, having acquired their notions of science from reading, and not from research, have the idea that ‘science’ means knowledge¹²¹

Peirce, like Cartwright, calls for what he names fallibilism in the scientific approach to the world. This fallibilism hints at a different way of understanding science. According to C. F. Delaney, Peirce had

a concrete, as opposed to an abstract, conception of science. In contrast to the focal conception of science being that of a static set of propositions (Euclidean geometry or Newtonian mechanics), he conceived of it as a sociohistorical process of inquiry

¹¹⁹ CP 1.402.

¹²⁰ CP 1.403.

¹²¹ CP 1.8. We will explore these competing conceptions of science in Chapter 5.

with a specific structure. . . . He argued that the focal meaning of the word ‘science’ should be to designate the concrete life of a social group of inquirers, informed by a particular methodological strategy and animated by the desire to discover the truth.¹²²

In this, too, we see that Peirce and Cartwright share a desire to embrace the scientific project as we find it, not as we idealize it. In other words, Peirce agrees with the Stanford School that philosophy of science should be concerned with the *actual practice* of science, and should always temper metaphysical speculation with the realities of that actual practice.

Capacities and Nomological Machines

As we have seen, once Cartwright does away with this fundamentalist belief in the universal coverage of natural law, she argues that we must pay closer attention to the experiences we actually have in science—and to the presuppositions that ground those experiences. For Cartwright, this kind of attention leads her to assert the reality and primacy of what she calls the capacities of natural objects; she describes our use of those capacities through the fabrication of—and, rarely, the discovery in nature of—nomological machines. Recall that she describes capacities as widely varied, open ended tendencies that may or may not be actualized.

Peirce, too, in describing natural objects, says that

we suppose they have capacities in themselves which may or may not be already actualized, which may or may not ever be actualized, although we can know nothing of such possibilities [except] so far as they are actualized.¹²³

Both Cartwright and Peirce seem to recognize the reality of capacities as including both

¹²² Delaney 1993, 18.

¹²³ *CP* 1.25.

potentialities and actualities, which will eventually bring us to their comments on Aristotelianism in general, and Scotus in particular. But first, although Peirce never uses the term nomological machine (nor, to my knowledge, does he ever describe nomological machines as clearly as does Cartwright), he *can* be read as thinking along the same lines. Peirce scholar Edward C. Moore offers just such a reading when he says, “[T]hat there are generalized structures of energy forces that apply to all of a common set of instances was what Peirce meant by a law.”¹²⁴ If “generalized structures of energy forces” is taken to refer to capacities, and if “apply to all of a common set of instances” is taken to mean that these capacities are relatively enduring and portable from situation to situation, then capacities can be harnessed to produce regularities under carefully controlled circumstances (with proper shielding, etc.), and Moore’s reading serves my purpose. Given Peirce’s earlier comments on fallibilism and on the possibility that law is *not* universal in its coverage, I think these are reasonable assumptions to make.

Inadequacy of Induction in the Building of Scientific Knowledge

In a chapter of *The Dappled World* titled “Aristotelian Natures and Modern Experimental Method,” Cartwright opens the section “How Do We Know What We Are Testing?” with these words:

For anyone who believes that induction provides the primary building tool for empirical knowledge, the methods of modern experimental physics must seem unfathomable.¹²⁵

This is the part of the book in which Cartwright argues that the Aristotelian concept of

¹²⁴ Moore 1993, 7.

¹²⁵ Cartwright 1999, 85.

natures is crucial when describing the modern scientific method, and this is where the historical case study of Newton and Goethe comes into her argument (recall the discussion of one-case-is-enough versus the regularity theorist's call for many repetitions). For now, though, let us focus on the idea that induction and deduction alone are not enough to build our scientific knowledge. This is a thought also found in Peirce's writing:

Observe that neither Deduction nor Induction contributes the smallest positive item to the final conclusion of the inquiry. They render the indefinite definite; Deduction explicates; Induction evaluates: that is all.¹²⁶

Then what *does* build our scientific knowledge? Cartwright and Peirce offer similar answers. Here is Cartwright:

I have been impressed at the ways we can put together what we know from quantum theory with much else we know to draw conclusions that are no part of the theory in the deductive sense. . . . [K]nowledge must be collected from where we can find it, well outside the boundaries of what any single theory says, no matter how fundamental—and universal—we take that theory to be. And not just knowledge but guesses too. When we look at how fundamental theories get applied, it is clear that the *Ansatz* plays a central role.¹²⁷

According to Cartwright, then, we build our scientific knowledge with speculative leaps, with creative guesses that amount to provisional abduction.¹²⁸ Peirce agrees, although his formulation is more picturesque (note, also, that in this passage his word for abduction is retrodution):

¹²⁶ CP 6.475.

¹²⁷ Cartwright 1999, 181. An *Ansatz* is an initial guess that is borne out (or not) by subsequent investigation.

¹²⁸ Sometimes Cartwright demonstrates an aversion to, or lack of trust in, abduction. (Especially in 1983's *How the Laws of Physics Lie*.) I think, though, that a provisional, fallibilist abduction would be acceptable to her. I assume that this is what she means by the central role of the *Ansatz*.

Over the chasm that yawns between the ultimate goal of science and such ideas of Man's environment as [he has] . . . we are building a cantilever bridge of induction, held together by scientific struts and ties. Yet every plank of its advance is first laid by Retroduction alone, that is to say, by the spontaneous conjecture of instinctive reason; and neither Deduction nor Induction contributes a single new concept to the structure.¹²⁹

This brings us back to Menzies' accusation that Cartwright has drawn strong metaphysical conclusions from limited evidence. This is *exactly* what both Peirce and Cartwright say we *must* do: we are *always* dealing with limited evidence, and yet from limited evidence we *are* able to gain knowledge of generals. Cartwright's Newton/Goethe case study is an example of this very point. Peirce makes a similar point about Kepler's three laws of planetary motion:

Mill denies that there was any reasoning in Kepler's procedure. He says it is merely a description of the facts. . . . But so to characterize Kepler's work is to betray total ignorance of it.¹³⁰

In fact, Peirce calls Kepler's work "the greatest piece of Retroductive reasoning ever performed."¹³¹

Realism

We have seen that Cartwright has come down on the side of realism.¹³² We have also seen that Peirce agrees. Here again is his declaration:

[Thirty-two years ago] I declared for realism. I have since very carefully and thoroughly revised my philosophical opinions more than half a dozen times, and have modified them more or less on most topics; but I have never been able to think

¹²⁹ CP 6.475.

¹³⁰ CP 1.71.

¹³¹ CP 1.74.

¹³² Albeit a modified form she calls "local realism."

differently on that question of nominalism and realism.¹³³

Peirce is referring here (“that question of nominalism and realism”) to the medieval debate on the problem of universals, and he sees that debate as relevant to a discussion of modern science, agreeing with Francis Ellingwood Abbot “that science has always been at heart realistic, and always must be so”¹³⁴ Moore explains further:

What Peirce is advocating is Aristotelianism, which says that there are generals, but they are in the real physical world and are open to observation and study. This is the path by which Peirce got to the Aristotelian views of Duns Scotus and is why he called himself a Scotistic realist and held that science was a form of what is known as moderate realism.¹³⁵

I will argue in Chapter 4 that Moore is incorrect to connect Peirce with “moderate realism,” or even to say that Peirce thought science was a form of moderate realism.

Peirce called himself an *extreme* scholastic realist, and criticized Scotus for not being extreme enough. Nevertheless, Moore correctly identifies Peirce as a realist, and Moore rightly makes connections among Aristotle, Scotus, realism, and modern science—which leads to our final category of similarity between Cartwright and Peirce.

Aristotle and Scotus

Cartwright says that Aristotelian-like ‘natures’ are just what we need when explaining our scientific process; she also says that she is a follower of Scotus, affirming the particular over the universal, the world as we have it over the world as we wish it.¹³⁶

¹³³ CP 1.20.

¹³⁴ CP 1.20.

¹³⁵ Moore 1993, 7–8.

¹³⁶ As we saw in Chapter 1, Cartwright’s metaphysical reluctance stems (in part, at least) from the suspicion that these two phrases are synonymous.

Again, in Peirce we find similar statements. Concerning Aristotle:

A great variety of thinkers call themselves Aristotelians, even the Hegelians, on the strength of special agreements. No modern philosophy, or very little, has any real right to the title. I should call myself an Aristotelian of the scholastic wing, approaching Scotism, but going much further in the direction of scholastic realism.¹³⁷

Here Peirce makes a reference to Scotus. Elsewhere he expands what he feels is his great debt to Scotus:

The works of Duns Scotus have strongly influenced me. If his logic and metaphysics, not slavishly worshipped, but torn away from its medievalism, be adapted to modern culture, under continual wholesome reminders of nominalistic criticisms, *I am convinced that it will go far toward supplying the philosophy which is best to harmonize with physical science.*¹³⁸

As with Cartwright, we see a statement that Aristotelianism—with important modifications, and without the excess philosophical baggage of the medieval era—particularly as modified by Scotus, may provide the best help as we formulate a philosophy of science.

This concludes our brief, preliminary look at the similarities between Cartwright and Peirce. We have seen that they both argue against the pseudo-religious belief in the universal coverage of natural laws, emphasize the importance of the capacities of natural objects, call attention to the inadequacy of induction and the importance of the human ‘guessing instinct’ in the building up of scientific knowledge, advocate a kind of realism, and are explicitly indebted to Aristotle and Scotus.

¹³⁷ CP 5.77, n. 1.

¹³⁸ CP 1.6. Emphasis mine.

This attention to Scotus will help to frame the connection I want to make between Peirce and Cartwright. It is one thing, of course, to find out what Cartwright thinks of Peirce. She lives a century later and has access to his writing. (Although, interestingly enough, to my knowledge Cartwright has made *no* mention of Peirce in her various works.)

But it is quite another thing to find out what Peirce thinks of Cartwright! This is where Scotus comes in. Peirce *does* interact with the philosophy of Scotus. My contention is that Peirce's criticism of Scotus would also have been Peirce's criticism of Cartwright. That is a contention I will need to support, of course, but for now I simply assert it. Having done so, here is how the rest of the dissertation will unfold. In the next chapter (Chapter 3) I will present *just enough* of the philosophy of Scotus to make intelligible Peirce's critique of it (which is the subject of Chapter 4). Finally, in Chapter 5, I will present what I think Peirce's criticism of Cartwright would be, and I will also argue that Peirce's triadic metaphysics is what she needs to support her overall project.

Chapter 3

Duns Scotus and the Problem of Universals

1. Introduction

Our Context and Motivations

Once more, recall Cartwright's words in *The Dappled World*:

This book takes its title from a poem by Gerard Manley Hopkins. Hopkins was a follower of Duns Scotus; so too am I. I stress the particular over the universal¹

With these words, Cartwright explicitly calls to mind Duns Scotus and the problem of universals. She appears to view Scotus as having taken the side of the particular over the universal, and—as we shall see—there is a sense in which she is correct. But it is more complicated than that: we will also see that there is a sense in which Scotus affirmed the reality of the universal more strongly than many of his contemporaries.

The primary aim of this chapter is to explore Scotus's treatment of what is commonly called the "problem of universals." Ultimately, of course, we are doing this in order to further our agenda: the philosophical relationship between Nancy Cartwright and

¹ Cartwright 1999, 104.

Charles Peirce, both of whom have signalled a philosophical indebtedness to Scotus. However, our exploration of the problem of universals is more than a brief detour into what might appear to be an irrelevant medieval debate. Rather, as John Boler says, the topic *is* a relevant one, not only for our agenda but for philosophy of science in general:

To some extent, the parochial and peculiar aura of medieval controversies about universals can be dispelled if they are taken to be part of a general inquiry into the issue of the intelligibility of things (or of “the world”). Medieval realists—especially Aquinas and Scotus—recognize two vices which, so to speak, bracket epistemic virtue. On the one hand there is the foolishly cluttered ontology that results from insisting on a one-for-one correspondence between things in the world and the elements of a representational system (thought or language). And on the other, there is the scandal—anachronistically put—of the unknowable thing-in-itself.²

According to Boler, then, the problem of universals is linked to the general intelligibility of the world. That intelligibility, in turn—its existence or non-existence, its knowability or unknowability—is quite obviously linked with the practice and the status of science. Philosophers of science, then, are (or *ought* to be) thoroughly invested in the problem of universals; we are not as far off the track as it might seem.

Scotus’s Context and Motivations

In a way, Scotus shared many of these science-centred themes. In his approach to the problem of universals he, too, was concerned with its implications for the objectivity of our scientific conceptions of the world. In fact, Scotus’s concern was to *preserve* the objectivity of science. We will explore the details soon, but let us now say simply that, regarding the debate between nominalism and realism, Scotus was a realist. However, his was no naive or simple realism. His approach to the problem of universals was aimed to

² Boler 1980, 294.

avoid Platonic extreme realism on the one hand and strict nominalism on the other, all the while exploring what the metaphysical features of the world must be if—within an Aristotelian epistemology—we can acquire objective knowledge about the universals *and* particulars that are found in that world.

These were not his only concerns, of course. As a theologian, he was also interested in the possibility of human knowledge of God, exploring the rationality of the doctrine of the Trinity, and defending God’s knowledge of particulars (and, thus, individual persons). We will not focus on these theological questions, but neither will we avoid them if they become relevant to our discussion.³

We now turn to a fairly brief but nevertheless detailed account of Scotus’s treatment of the problem of universals, and his argument for a kind of realism. Before we begin, however, I want to remind the reader that this dissertation focusses on Cartwright and Peirce, not Scotus; our treatment of Scotus is primarily to help us understand Peirce (and how Peirce might have responded to Cartwright). As a result, this analysis will not be at the same level of detail as our treatment of Cartwright and Peirce, and there will be comparatively more use made of secondary materials— particularly, work by Robert Almeder, John Boler, Maurice Grajewski, Eike-Henner Kluge, Paul Vincent Spade, and Allan Wolter.⁴

³ And relevant they often are. Frequently, Scotus first developed a philosophical tool (such as the formal distinction) while working on a *theological* problem (such as those stemming from the Doctrine of the Trinity)—only to find, later on, that the philosophical tool in question had applications in other areas (such as what we would call the philosophy of science).

⁴ Almeder and Boler each have a significant interest in the connections between Scotus and Peirce, so their secondary materials are quite relevant. Wolter, also, occasionally mentions a

2. Scotistic Realism

The problem of universals can be described as the examination of “two extreme positions, one holding that the universal as such is to be found in things, and the other that the universal is found only in the mind.”⁵ Or, to use a simple example, it revolves around the status of the statement, ‘Socrates and Plato are both human.’ Does that statement reflect something Socrates and Plato *really* have in common (with the human understanding simply reflecting what is indeed already, really true)? In other words, does the similarity of Socrates and Plato exist *outside* the human mind? Or does the statement, ‘Socrates and Plato are both human,’ reflect a similarity that exists only inside the human mind? Speaking quite generally, *realism* is the view that the similarity is ultimately outside the human mind (and therefore *real*), while *nominalism* is the view that the similarity is inside the human mind (and is therefore a *name*—Latin, “*nomen*”—only). The word “human” in our example is a universal—a term predicable of many (in this case, of Socrates and Plato). The problem of universals is so named, because it explores the *ontological status* of universals. In our sentence, is “human” (*qua* universal) *real* or simply a *name*? Does it have an ontological status (and, subsequently, a linguistic status reflecting that reality) or does it have mental or linguistic status only?

Let us begin with a distinction, observing that the term “universal” is used in two

link between the two.

⁵ Boler 1963, 41.

senses:⁶

- (1) to refer to the external ground of universality in the world, and
- (2) to refer to the internal concept that is predicable of many.

For example, returning to Socrates and Plato, “universal” in sense (1) refers to the *real* similarity—to the shared or common nature—that exists between Socrates and Plato, a similarity that exists *prior* to any act of the human mind. “Universal” in sense (2) refers to the concept inside the human mind that is predicated of both Socrates and Plato.

“Universal” in sense (2), we might say, is a *logical* universal, while “universal” in sense (1) is a *real* universal—and, for the realist, is the ground for the logical universal.

The problem of universals also has implications for particulars (or individuals). For the nominalist, one implication is that—if individuals are *all* that really exist—one not only has to account for the phenomenon of similarity, one also has to account for the human ability to reliably *predict* the behaviour of similar natural objects. Call these, taken together, the problem of causality.⁷ For the realist, one implication is that—if universals are *real*—one has to figure out what it is that actually distinguishes Socrates from Plato (or whether they are distinct at all). Call this the problem of individuation.

In our treatment of Scotus’s approach to these problems, we need to explore the

⁶ Scotus makes this distinction in *Questions on the Metaphysics of Aristotle*, VII., q. 18, n. 6.

⁷ They are, of course, separable. The problem of similarity has priority, here: if only *individuals* exist (with nothing *really* in common), then how is it that we group them into—and sensibly talk about—*kinds*? The problem of prediction follows: again, if only individuals exist, and *kinds* are a convenient fiction, how is it that we come to learn enough about the behaviour of *kinds* to make accurate predictions about how (for example) one kind always (or nearly always) affects other kinds? Since these predictions can also be framed as foreknowledge about causes and effects, I have grouped all this under “the problem of causality.”

I should also point out that the problem of causality, as I have described it here, was not raised by the medievals. For reasons that will become clear in Chapters 4 and 5, I have expanded the problem of similarity to include the problem of prediction.

following six topics:

- (a) Individuation and Haecceity,
- (b) Universality and the Common Nature,
- (c) The Epistemological ‘Story’ of Scotistic Realism,
- (d) The Formal Distinction,
- (e) Scotus’s Moderate Realism, and
- (f) One Important Implication of Scotus’s Moderate Realism.

Perhaps the easiest way to do this is to allow Scotus’s own treatment of the problem of individuation to structure our investigation. In his *Ordinatio*, section II, distinction 3, part 1, questions 1–6,⁸ Scotus surveys (and criticizes) five theories of individuation before ultimately presenting his own. Working our way through his survey will help us to begin exploring topics (a) – (f) above.

Remembering that Scotus approached all of this within the context of a medieval, Aristotelian epistemology, we should very briefly remind ourselves of the basics of that epistemology. For the medieval Aristotelian, nothing is in the mind that is not first in the senses. The journey to human knowledge, then, begins with the *external senses* (sight, hearing, etc.), which collect what we might call raw data from the outside world. The raw data are collected by the *common sense* into a unified image called a *phantasm*. From this unified image is abstracted a universal, form, definition, essence. The

⁸ While the regularly used abbreviated reference for this is *Ord.*, II, d. 3, p. 1, qq. 1–6 (and, where appropriate, followed by a marginal number), in this chapter I simply refer to the question and marginal number, since all references are to book II, distinction 3, part 1. I use the translation by Paul Vincent Spade in his 1994 *Five Texts on the Mediaeval Problem of Universals*, pp. 57–113.

abstracting itself is done by the *active intellect*, which then impresses the universal/form/definition/essence upon the *passive intellect*.

In this context, consider Allan Wolter's description of the human epistemic condition:

[T]he human intellect with its gift of generalization always grasps some common or potentially universal characteristic of the objects it perceives through the senses In this sense, what is known about a thing is not what is uniquely individual, but some property or feature it has in common with other things. . . . [But] there still seems to be something in the nature of each thing that is isomorphic with the sort of thing we think it to be. Scotus called this its sortal aspect its "*natura communis*" and he felt that unless one admitted its reality prior to any actual intellection, the whole objectivity of our intellectual enterprise was threatened.⁹

Thus Wolter describes Scotus's motivation to fashion an Aristotelian realism, and now we turn to make our way through Scotus's survey of the previously mentioned five theories of individuation with an eye for what Scotus finds inadequate in each, and for the hints he gives about his own theory.

3. Scotus's Survey of Theories of Individuation

First Theory: No Special Cause Is Needed to Individuate What Is Real¹⁰

Scotus begins his exposition of this theory by showing how its proponents make reference to Aristotle:

In *Metaphysics* VII [13, 1038^b10–11], the Philosopher argues against Plato that "the substance of anything whatever is proper to what it belongs to, and is not in anything else"; therefore, etc. Therefore, a material substance from its nature, disregarding

⁹ Wolter 1994, 272.

¹⁰ This title is from Wolter 1994, 273, in his very helpful treatment of Scotus's approach to the problem of individuation. The remaining theory titles also come from (and much of the analysis of those theories has been influenced by, and in some cases closely follows) Wolter 1994.

everything else, is proper to what it is in, so that from its nature it is unable to be in anything else; therefore, from its nature it is individual.¹¹

According to this theory, Aristotle's four causes are enough to individuate particular things: "the same causes that are the causes of the unity of a thing are also the causes of its singularity."¹² On this view, individuation is not a problem to be solved; rather, it is the very shape of reality. Real things *are* singular in their being; universality is a mental add-on. Since universals come only from human thought and speech, the mistake lies in thinking that they are real: only then does individuation become a 'problem.'

Scotus has two responses to this theory. The first is that if this theory is true, then we can have no knowledge, for (within an Aristotelian epistemology) we only *know* through the process of abstraction, which generates a *universal* as the intellectual object that is impressed upon the passive intellect. Human knowing involves logical universals. But if reality is made up only of *singular, particular* things, then our so-called knowledge is nothing of the sort:

Therefore, the intellect, understanding that object under the aspect of a universal, understands it under an aspect *opposite* to the object's very notion [formal essence].¹³

This first response, then, can be viewed as being in the form of a *reductio ad absurdum*, since (in Scotus's view), we *do* have objective knowledge about the world.¹⁴

¹¹ Q. 1, n. 2 (Spade, 57).

¹² Q. 1, n. 6 (Spade, 58).

¹³ Q. 1, n. 7 (Spade, 59).

¹⁴ To make the *reductio* explicit:

- (1) We have knowledge of reality as it really is.
- (2) Reality is made up of singular, particular, individual things only (no universals).
- (3) Human knowledge is the product of the abstraction of the active intellect.

His second response follows quite logically from the first and is more ‘Kantian’ in character: What must be true if we *do* have knowledge of individual things? Once again, Aristotelian epistemology says that knowing involves abstraction only, in which a universal (essence, form) is extracted from sense data. But extracted forms cannot give us knowledge of unique individuals. Therefore, according to Aristotle (says Scotus), something *more* than form is needed in order to know individuals as individuals.¹⁵

There are two directions to take the enquiry at this point. The first is the most obvious: if something *more* is required, then investigate what that something more might be. However, in perhaps another indication of why he is called the Subtle Doctor, Scotus does not pursue that direction just yet.¹⁶ Instead, rather than moving on to that something *more*, Scotus considers what Aristotle’s statement means for the nature itself. If something *more* is required for individuation, then the nature itself must be something *less*. Less than what? Less than the numerical unity of an individual. The *nature* of a particular thing, says Scotus, has a less-than-numerical unity. Considering a stone for example, he says that “the proper, real or sufficient unity of the nature existing in this stone is less than numerical unity.”¹⁷

This requires explanation, which Scotus provides in abundance. He begins with

(4) This abstraction always and only produces universals from particulars.
 (5) Our knowledge, then, is of universals only.
 (6) Therefore, contradicting premise (1), we have *no* knowledge of reality as it really is.

¹⁵ See Wolter 1994, 273.

¹⁶ And, in fact, he does not until he has completed his survey of the five theories.

¹⁷ Q. 1, n. 8 (Spade, 59).

seven arguments¹⁸ that establish the *possibility* of a real¹⁹ unity that is less-than-numerical. This is an important point for Scotus. Therefore, in order to acquaint ourselves with the character of his reasoning, we will rehearse three of those seven arguments.

The first²⁰ appeals to Aristotle—remember, Scotus is operating within the context of Aristotelianism—and can be paraphrased this way:

‘Aristotle says, “In every genus there is something one and primary that is the metric and measure of all that are in that genus.”²¹ First I will show that the unity to which Aristotle is referring is *real*, and then I will show that this unity is *not* numerical unity.

‘That the unity is real: Aristotle clearly says that the “one” (or “unity”) measures everything in the genus. We may add that these measured items are *real* and are *really* measured. This measuring “unity” can be thought of in two ways: either it is a mere being of reason or it is *real*. If it were a mere being of reason, however, it would not be able to *really* measure a collection of *real* objects. Therefore, the “unity” cannot be merely a being of reason. Therefore, this “unity” must be *real*.

‘That the unity is *not* numerical unity: Let us assume that this “unity” *is* a

¹⁸ Q. 1, nn. 11–28 (Spade, 59–63).

¹⁹ For Scotus, as for Peirce, the word “real” is used to describe those things that are what they are *regardless* of human thought. They are, then, *extramental*.

²⁰ Q. 1, nn. 11–15 (Spade, 59–60).

²¹ This is a reference to *Metaphysics* 10.1, 1052^b18.

numerical unity. Then it would simply be one of the items in the genus. Granted, it would be a special item, an item with priority. In a sense, it would have to be the First Item. But Aristotle and Plato both agree that when it comes to items in a genus—that is, to individuals of the same species—there can be no essential order. Our assumption that this “unity” is a numerical unity, then, has led us to a contradiction. Therefore, this “unity,” while *real*, is not a numerical unity.’

In this paraphrase, one gets a taste of the *thoroughness* with which Scotus makes his arguments. He is very carefully establishing the possibility of a unity that is both real and non-numerical (or less-than-numerical) in character. Note that for Scotus, a non-numerical unity is *automatically* a less-than-numerical unity, because numerical unity (the unity of the individual) is the greatest possible unity. We will return to this priority-of-the-individual when we discuss the nature of Scotus’s *moderate* realism, but as we continue keep in mind that the phrases “non-numerical unity” and “less-than-numerical unity” are synonymous.²²

Here is a paraphrase of Scotus’s fourth argument²³ for the possibility of a real and less-than-numerical unity:

‘Whenever there is a *real* opposition, there must be two primary and *real*

²² The idea that there can be different kinds of unity may seem strange to the contemporary reader, but it was certainly nothing new for Scotus as an Aristotelian. Aristotle himself appears to be the source of the idea: “If, now, being and unity are the same and are one thing in the sense that they are implied in one another as principle and cause are . . . [and if] unity is nothing apart from being; and if, further, the essence of each thing is one in no merely accidental way, and similarly is from its very nature something that *is*:—all this being so, there must be exactly as many species of being as of unity. . . . For being falls immediately into genera . . .” (*Metaphysics* 4.2, 1003^b23–1004^a5). The idea, then, is this: if there can be different kinds of being (and Aristotle says there can), then there are just as many different kinds of unity.

²³ Q. 1, n. 19 (Spade, 61).

extremes. As a special case of this, consider contrariety. In the case of contrariety, the primary extremes try to destroy each other (for example, consider lightness and darkness). This is true no matter what we think about it. This is true *prior to* any operation of the intellect. Therefore, contrariety is a *real* opposition. Therefore, the primary extremes of contrariety are *real*.

‘But in addition, these primary extremes each have a kind of unity. What if this unity were a numerical unity? Then we would not say that lightness is contrary to darkness. Rather, our statements of contrariety would be limited to statements of ‘this’ and ‘that.’ We would have to say that “precisely this white thing or precisely that white thing would be the primary contrary of this black thing, which is nonsense.”²⁴ Therefore, the unity is not numerical in nature.

‘All of this shows that there is a unity that is both real and non-numerical in nature.’

Notice that Scotus has moved from the *possibility* of a real and less-than-numerical unity to the *actuality* of such a unity, once one has granted the reality of contrariety. That is, to deny such a unity requires denying the reality of contrariety.

Scotus’s sixth argument²⁵ is an outright *reductio ad absurdum*, exploring the implications of the assertion that all real unities are numerical unities. Here, again, is a paraphrase:

‘If every real unity is a numerical unity, then likewise every real diversity

²⁴ Q. 1, n. 19 (Spade, 61).

²⁵ Q. 1, nn. 23–27 (Spade, 62–63).

is a numerical diversity.

‘This if-then statement forms the first premise of (and is therefore crucial for) this sixth argument, but before completing the syllogism let us establish the truth of this if-then statement.²⁶

‘Aristotle lists pairs of opposites, including one/many and same/diverse.²⁷ Therefore, unity and diversity are opposites. But Aristotle also says that one item in a pair of opposites is “said” in as many ways as the other item in that pair.²⁸ Therefore, applied to the unity/diversity opposite-pair: if unity is numerical, then diversity is numerical.

‘Having established the statement that “If every real unity is a numerical unity, then likewise every real diversity is a numerical diversity,” I now assert that the consequent is false.

‘The consequent is false because it leads to an absurd conclusion. If every diversity were a numerical diversity, then all diversities would be, in that sense, equal. All things would be equally distinct. Socrates and Plato would be just as distinct as Socrates and a line! This would mean that the intellect would be unable to abstract *anything* common from any two objects, even two allegedly similar objects like Plato and Socrates.

‘Since the consequent is false, then the antecedent must also be false.

²⁶ Scotus actually offers two arguments—and then two further confirmations!—for the if-then statement, but I will only paraphrase the first argument here.

²⁷ In *Metaphysics* 10.3, 1054^a20–21.

²⁸ In *Topics* 1.15, 106^b14–15.

Therefore, it is *not* the case that “every real unity is a numerical unity.” Therefore, there is a real unity that is a less-than-numerical unity.’

Although Scotus does not say so explicitly, notice that the implication of numerical-unity-only is not just absurd for realists, but also for nominalists. Even universals *as understood by nominalists* could not exist unless a less-than-numerical unity is allowed.

After these seven arguments for the existence (or possibility) of a less-than-numerical unity, Scotus then appeals to Avicenna’s comment that “Equinity is only equinity; of itself it is neither one nor several, neither universal nor particular.”²⁹ Scotus takes all this to mean that the *nature* of a particular thing—that which tells us what *kind* of thing it is—is actually a Common Nature³⁰ (shared by all particular things of that *kind*). In itself, the Common Nature is neither universal nor singular; that is to say, there is nothing in the Common Nature that necessitates its being a singular or a universal. Scotus’s position, then, is that the Common Nature is naturally *prior* to both universality and singularity. It also has extramental reality in addition to its less-than-numerical unity.³¹

²⁹ Q. 1, n. 31 (Spade, 63). The Avicenna reference is to *Metaphysics* 5.1, 86^{va}.

³⁰ I choose to capitalize the term in order to maintain parallel usage with John Boler, to whom we will be referring fairly frequently in this chapter and the next.

³¹ According to Joseph Owens, in “Common Nature: A Point of Comparison Between Thomistic and Scotistic Metaphysics,” *Mediaeval Studies*, 19 (1957): 1–14, when Scotus grants the Common Nature *unity* he also grants it *being*, which is an interesting point of contrast with Aquinas. However, it is within our scope neither to explore the debate between Scotists and Thomists on this matter nor to pronounce a victor. For our purposes, it is sufficient to note what Scotus asserts on the matter: universals in metaphysical mode (not physical, but also not yet concepts in the mind) have a kind of *being*. This assertion is, as we shall see, closely (and causally) related to Peirce’s assertion in favour of what he calls the reality of Thirdness—and as

We have now, as it were, ‘half’ the story of Scotistic realism: the Common Nature. What we are missing is the principle of individuation, what Scotus will call haecceity (‘thisness’). As I have said, Scotus does not officially propose his theory until all the competing theories have been surveyed (and rejected); although, as we will see, there is some foreshadowing along the way. As does Scotus himself, we will move through the next four theories rather quickly.

Second Theory: Individuation as a Double Negation

According to this theory, a particular thing qualifies as an individual if it meets two negative criteria: (1) it must not be further divisible into what Scotus calls subjective parts,³² and (2) it must not be the same as anything else.

Scotus’s two criticisms of this theory³³ largely rest on what he sees as the inadequacy of negative reasons as opposed to positive reasons. First, he says that this account is adequate as an a posteriori *description* of the facts of individuation, but it cannot provide an a priori *reason* why there should not be anything else exactly like whatever particular thing is being considered. Only a positive reason can do this, Scotus says, because individuation is a kind of perfection, and perfections cannot spring from negations. Second, and related to the first, Scotus appeals to Aristotle’s statement that every negative presupposes a *naturally prior* positive. Rather than settling for the a

such, it helps to illuminate why Peirce calls himself a *Scotistic* realist.

³² I take “subjective parts” to mean parts capable of existing as substances. In this case, then, “subjective parts” refers to individuals of a species.

³³ Q. 2, nn. 48–56 (Spade, 69–71).

posteriori negative, we should seek out the *a priori* positive. Scotus surveys three more theories that do just that, proposing (in turn) existence, quantity, and matter as candidates for the positive principle of individuation.

Third Theory: Existence Individuates

This theory appeals to Aristotle's claim that *act* distinguishes.³⁴ If true, then the *ultimate act* (existence) must be responsible for the *ultimate distinction* (individuation).

Scotus's primary criticism of this theory is that existence is every bit as common³⁵ as the Common Nature being individuated. This does not move us any closer to a solution, says Scotus. The problem is *already* that we need a positive account for the way something common (the Common Nature) is individuated. Proposing something *else* common—indeed, even *more* common—does not help. Rather, a positive account of individuation must provide a *non*-common principle of individuation: each particular thing should have its *own* principle of individuation. This criticism foreshadows Scotus's own proposal of haecceity (still two theories away).

Fourth Theory: Quantity Individuates

This rather common theory (in Scotus's time) looks to Aristotle's definition of a quantity: "We call a quantity that which is divisible into two or more constituent parts of

³⁴ *Metaphysics* VII.13, 1039^a3–7.

³⁵ I am relying on Wolter here, who seems to equate "common" with Scotus's "not of itself distinct or determinate" (see Wolter 1994, 278).

which each is by nature a one and a ‘this.’”³⁶ Consider division: there can be division into individuals of *different* sorts (as when a genus is divided into species), or there can be division into individuals of the *same* sort (as when a species is divided into individuals). This theory addresses division into individuals of the *same* sort, claiming (based on Aristotle) that the division is performed by quantity.³⁷

Because this theory was common, Scotus produces *many* refutations of it.³⁸ In some, Scotus makes use of what Wolter calls “predicamental coordination.”³⁹ Scotus says⁴⁰ that according to Aristotle,⁴¹ substance is naturally *prior* to its accidents, like genus is prior to species and species prior to individuals. This hierarchy is what is meant by predicamental coordination. With this in mind, Scotus says that “it belongs to first substance, from its very notion, that it be a ‘this’ [an individual] prior to being determined in any way through something else.”⁴² Wolter interprets this to mean that quantity—which is an accident—“cannot account for the division of a species into individuals any more than an accidental difference can account for a division of a genus into its species.”⁴³

³⁶ Aristotle, *Metaphysics* V.13, 1020^a7–8.

³⁷ Again, this analysis relies on Wolter 1994, 279.

³⁸ Wolter helpfully organizes them into four general ‘types’ (Wolter 1994, 279–283).

³⁹ Wolter 1994, 281.

⁴⁰ Q. 4, n. 82 (Spade, 78).

⁴¹ *Metaphysics* VII.1, 1028^a10–^b2.

⁴² Q. 4, n. 82 (Spade, 78).

⁴³ Wolter 1994, 280.

Fifth Theory: Matter Individuates

Various Aristotelian texts seem to support this, especially perhaps *Metaphysics* V.6, 1016^b32–33: “For according to the Philosopher . . . , ‘Those of which the matter is one are one in number.’ Therefore, etc.”⁴⁴ Since every existing, particular, material object is made up of form and matter, there appears to be no choice: form is by definition universal, so matter is all that is left to distinguish one particular thing from another thing of the same kind. (Socrates and Plato share their form—humanity—so they can only be individuated by their matter.)

Scotus has two criticisms.⁴⁵ The first is similar to his criticism of the view that existence individuates: that which individuates should not be common. Yes, Scotus says, Aristotle *does* seem to use the term “matter” when he means “not-form,”⁴⁶ but there remains the problem of the commonness of matter. Wolter describes Scotus’s position this way:

[O]ne can abstract “matter” from this matter and that matter, and consequently, matter is indifferent to being in this or that. But what is indifferent with respect to several things of the same sort cannot be the reason they are unique, or individual, or several.⁴⁷

Put another way: surely something *indifferent* to individuation cannot be the *principle* of individuation.

Scotus’s second criticism is a short *reductio ad absurdum*. When one element

⁴⁴ Q. 5, n. 130 (Spade, 93). There are other Aristotelian texts that seem to support matter as the individuating principle, and Scotus lists them in Q. 5, nn. 132–135.

⁴⁵ Q. 5, nn. 136–141.

⁴⁶ See Wolter 1994, 284.

⁴⁷ Wolter 1994, 284.

(say, fire) turns into another element (water), the matter stays the same. Therefore, if matter individuates, those two elements are numerically the same.⁴⁸ But nobody says that; therefore, matter cannot individuate.

Before discussing Scotus's own proposal, I will summarize the preceding survey. First, Scotus considers the theory that *no* principle of individuation is required. He rejects this because it eliminates the possibility of objective human knowledge of particulars. He also asks, 'Since we *have* objective knowledge of particulars, what (moving backwards in Kantian fashion) must be true?' His answer: 'A particular thing should have a Common Nature and a principle of individuation.' Second, Scotus considers and rejects the possibility of a negative principle of individuation; rather, individuation—a perfection—must have a positive principle. The next three theories are attempts to find that positive principle in existence, quantity, and matter. All three are found to be inadequate for various reasons: notably, the principle of individuation cannot itself be something common (and therefore indifferent to individuation), and accidental difference is not sufficient (we need something substantial).

Now we know what Scotus wants: a substantial, positive, principle of individuation that is unique to each individual.

4. Haecceity

This, indeed, is what Scotus says: "a material substance is individual through

⁴⁸ Scotus: "Matter is the same in the generated and the corrupted. Therefore, it has the same singularity in the generated and the corrupted" (Q. 5, n. 140 — Spade, 95).

some positive entity that by itself determines the nature to singularity.”⁴⁹ Concerning the example of Socrates and Plato, Wolter says this:

[W]e can say that Socrates’ haecceity, together with what makes him human [the Common Nature], constitutes a *per se* or substantial union, as contrasted with ‘white man’ or ‘black man,’ each of which represents an ‘*ens per accidens*,’ not an ‘*ens per se*.’⁵⁰

Scotus is more thorough than this, of course. He has established that there must be a positive entity involved, but he also rules out the Common Nature (which *is* a positive entity, after all, and therefore a candidate) as the principle of individuation, arguing that something with less-than-numerical unity cannot be the principle responsible for the numerical unity of the individual. But, ultimately, Scotus acknowledges the limits of his discussion. He cannot say much *directly* about haecceity other than what its characteristics *must* be: substantial, positive, and unique to each individual. Otherwise, haecceity is, in a sense, just over the horizon of what we can know or say. Continuing the metaphor, one might say that the work of Scotus *qua* metaphysician is to sail as close to that horizon as possible—and to infer with great care what lies just out of sight.

5. The Epistemological ‘Story’ of Scotistic Realism

We are now ready to describe the basic epistemological account of the acquisition of scientific knowledge of particulars under Scotus’s realism. In each individual thing, according to Scotus, there is found both a Common Nature and haecceity.⁵¹ The

⁴⁹ Q. 6, n. 142 (Spade, 96).

⁵⁰ Wolter 1994, 282.

⁵¹ We will see shortly that these are *formally* (and not *really*) distinct.

Common Nature, considered just in itself prior to being in the individual, is neither universal nor singular. However, in the individual, it is “contracted”⁵² to a singularity by a positive something (the individual’s haecceity).

When we consider an individual thing, we can reflect upon it in two modes: the metaphysical mode (first intention), and the logical mode (second intention).

First intention: In metaphysical mode, we are aware of the Common Nature in itself, as neither universal nor singular. The extramental Common Nature is the ground of the *real* concept generated in our minds. (As such, although the Common Nature is related to our thinking, it is unaffected by our thinking.)⁵³

Second intention: Then, in logical mode, we realize that this *real concept* we have of the Common Nature is predicable of many (and is therefore a universal). This second kind of concept is

⁵² *Contraction* is Scotus’s term (see, for example, q. 6, n. 207), is clearly a metaphor, and is therefore potentially confusing. Boler attempts to explain it this way: “In the individual . . . something must happen to the nature in itself, for in Socrates the nature [humanity] becomes peculiarly his. To preserve the status of the individual, Scotus holds that there must be a principle whereby the Common Nature, as well as all the other ‘common’ attributes of a thing, becomes ultimately real in the one, unique, integral thing that is the supposit. This ‘principle of individuation’ Scotus calls ‘haecceity’ and its operation ‘contraction.’ Precisely how it operates is not easy to describe” (Boler 1963, 51). In a related note, Boler adds, “Copleston suggests that the *haecceity* ‘seals a being as this being’ (*History of Philosophy*, II, 517). My own effort is to describe ‘contraction’ as the operation whereby haecceity makes a being real and unique. One hesitates to simplify further since, however mysterious it may be, the doctrine is central to Scotus’s philosophy” (Boler 1963, 51, n. 60).

⁵³ In Chapter 4 (page 199), we will see Peirce make the distinction between *reality* and *existence*. At the risk of getting too far ahead of ourselves, it might be useful to use Peirce’s distinction to say that the Common Nature, in itself, has reality but not existence. It only has existence after contraction.

called a *logical* concept.

We could put the matter this way: In metaphysical mode, real concepts terminate on the world outside our mind. In logical mode, however, our reflections terminate not on external reality but on our own internal concepts. John Boler captures the difference nicely: “Universality is of course an element of our way of thinking, but the commonness upon which it is based is not.”⁵⁴

As I see it, Scotus’s realism arises from two concerns: (1) the concern that a *logical* universal concept alone is not enough to guarantee the *reality* of the universal in question, and (2) the concern that Aristotelian epistemology seems to preclude knowledge of individuals.

As an example, consider the phrase, “Socrates is human.” First, even if we were to assert that the predicate “human” is also predicable of Plato, all we have done is logically examine the inner world of our own concepts. We have *not*, however, determined whether or not Socrates and Plato share humanity *in reality*. There is nothing to guarantee that our inner world connects in an isomorphic way to the outer world. Scotus’s assertion that our first intention (in the metaphysical mode) terminates on the *real* Common Nature of Socrates and Plato is an attempt to make just such a guarantee: we really can know *kinds* of things; our universal concepts are grounded not just on convenience but also on *reality*. This addresses the first concern above.

⁵⁴ Boler 1963, 52. In this statement, “universality” refers to the logical (predicable of many) concept in second intention, while “commonness” refers to the *ground* of the real concept in first intention.

Second, under Aristotelianism before Scotus's modifications, we might be able to ascertain only the *humanity* in Socrates (through abstraction) without ever really knowing Socrates as an individual. This is a very serious concern, primarily because of the special status accorded to individual particulars by most scholastic thinkers. Boler describes the general outlook: "Broadly speaking, the scholastics held that only individual *things* (what they called 'supposits') exist."⁵⁵ Later in the same work, Boler says:

Scotus, for example, with all his discussion of the reality of the Common Nature, still insists that the individual is the *thing*: the supposit. Haecceity is the ultimate actualizing entity, and the individual thus contains the perfection of its attributes.⁵⁶

Robert Almeder, also, when describing Scotus's realism, remarks that, for Scotus, "it must be admitted that only individuals exist."⁵⁷ All of this leads to the paradox Scotus is trying to solve: under Aristotelianism, individual things (supposits) are the most fundamental existential things that there are, and yet we cannot know them *as individuals*. Scotus's assertion that haecceity is a positive, substantial principle of individuation is an attempt to provide an account within the Aristotelian tradition that allows us to have knowledge of individual things, and therefore addresses the second concern above.

Almeder gives a nice overview of the resulting epistemological story:

The universal as the common nature possessing less than numerical unity, as

⁵⁵ Boler 1963, 39.

⁵⁶ Boler 1963, 140–141. Boler does not clarify what he means by "perfection" here. I assume he means that an actualized attribute is more perfect than an attribute not yet actualized—and that the actualizing force of an individual's haecceity therefore brings out "the perfection of its attributes." Whatever the case, my use of the passage stands: Boler emphasizes the existential primacy of the supposit over the Common Nature.

⁵⁷ Almeder 1980, 163.

reduced⁵⁸ to the mode of individuality (but still maintaining its distinctive commonness) may be understood, as Charles McKeon has pointed out,⁵⁹ as the universal *ante rem* and *in re* respectively. It is neither actually universal nor individual but a habit, tendency, or disposition to be individually or universally actualized, universally actualizable as the immediate ground of predicability of many. The common nature as contracted to the mode of individuality is the immediate, though of itself the incomplete ground of the logical universal.⁶⁰

Having explored (a) individuation and haecceity, (b) universality and the Common Nature, and (c) the epistemological ‘story’ of Scotistic realism, we are now ready to move to a slightly deeper level of analysis, looking at (d) the formal distinction, (e) Scotus’s moderate realism, and (f) one important implication of Scotus’s moderate realism.⁶¹

6. The Formal Distinction

Once again: for Scotus (as for all the Scholastic Aristotelians), individual things are the most basic things there are. They are called primary substances and are given a kind of existential priority over what we might call their constituents (specifically in this case, the Common Nature and haecceity). This is why Scotus insists on the *contraction* of the Common Nature into an individual thing—and, as we shall see, this is also why Scotus is called a moderate realist: the individual is given priority over the (nevertheless real) Common Nature.

This leads to a question: What *kind* of distinction is the distinction between an

⁵⁸ “Contracted” would probably have been a better word choice.

⁵⁹ Although not perfectly clear in Almeder’s text, it turns out that the reference is to McKeon 1952, p. 242.

⁶⁰ Almeder 1980, 163.

⁶¹ These labels match the list found on page 112.

individual thing's Common Nature and its haecceity? Is it a *real simpliciter* distinction (one that exists between extramental, individual things or suppositis), or a *logical* distinction (one that only exists between concepts in our minds)? For Scotus, neither choice is adequate to preserve his realism. If the distinction is *real simpliciter*, then the Common Nature is a separable individual thing and has a numerical unity. (But Scotus needs to preserve the less-than-numerical unity of the Common Nature in order to ensure that, in metaphysical mode, our scientific knowledge of things comes to us unmediated and complete.) However, if the distinction is *logical* (existing only between concepts in our minds), then, as Wolter has already put it, "the whole objectivity of our intellectual enterprise [is] threatened."⁶²

So Scotus champions⁶³ a third kind of distinction: the *formal* distinction. Scotus himself does not provide a thorough description of the formal distinction, but after a long preparatory analysis of Thomistic and Scotistic distinctions, Maurice Grajewski offers what he calls "an inductively constructed definition of the formal distinction:"

A formal distinction is a distinction from the nature of the thing occurring between two or more really identical formalities, of which one, before the operation of the intellect, is conceivable without the others though inseparable from them even by divine power.⁶⁴

In Grajewski's definition, we can see three essential ingredients of the formal distinction:

- (g) It is a type of *real* distinction, based on the nature of an extramental, real thing. "The extremes which are the objects of this distinction proceed

⁶² Wolter 1994, 272.

⁶³ I use this word deliberately, based on Wolter 1946, 16: "Scotus was not the originator of the *distinctio formalis*, though he did become one of its greatest champions."

⁶⁴ Grajewski 1944, 93.

from the thing and are not the product of a cogitative intellect.”⁶⁵ Put another way, a formal distinction points to a difference that “exists already *ex natura rei* antecedently to the operation of the intellect. In no sense whatsoever is it the result of the mind’s activity.”⁶⁶

- (h) Formal distinctions are made between formalities⁶⁷ (not *things*) which really and only exist in the same thing and therefore are *never* said to actually exist separately from each other. “Formalities do not have separation for they *are* really the thing itself wherein the distinction takes place”⁶⁸
- (i) While really inseparable, formalities have definitions that do not include each other. Thus, they are each conceivable without the other. According to Grajewski, “This non-inclusive character of the formalities is the primary characteristic of the formal distinction.”⁶⁹

As we will see, the *formal* distinction will describe the distinction between the Common Nature and the haecceity of an individual.

In all likelihood, the formal distinction first arose as a solution to the essential problem of the Trinity: How can there be both plurality and unity in the Godhead? (If

⁶⁵ Grajewski 1944, 94.

⁶⁶ Grajewski 1944, 96.

⁶⁷ Alternatively, the term “realities” may be used. Boler asserts that “formalities” and “realities” are used interchangeably (Boler 1963, 54).

⁶⁸ Grajewski 1944, 95–96.

⁶⁹ Grajewski 1944, 96.

the distinctions among the divine Persons are *real simpliciter*, then there are three Gods; if the distinctions are only *logical*, then there need be no supporting reality. Both options are heretical. If the distinctions are *formal*, however, then the divine Persons are inseparable in reality—are numerically one—and yet are *real*.)⁷⁰ Scotus soon found more than a theological use for the formal distinction. It made possible his realism, but also

there is no doubt that for Scotus the *distinctio formalis a parte rei* seemed the only theory that could safeguard the objectivity of our transcendental notions and make of metaphysics a science of reality.⁷¹

Not only that, but Boler insists that, through the formal distinction, Scotus introduced a new mode of being:

The Thomist recognizes only two modes of being, the real and the logical. Scotus recognizes, in addition to the logical mode, two modes of the real: the physical and the metaphysical. The physical mode is that made up of real individuals (suppositis); the objects of the logical mode are the ways the mind uses to refer to the real world. The objects of the former [physical mode] are real and independent of the mind, while the objects of the latter [logical mode] are found only in the mind. The objects of the metaphysical mode are like those of logic, for they are not suppositis; but they are also like those of the physical mode, for they are real. The metaphysical mode consists, to use a barbarism, in the intelligibilities of real objects, which are objective, in the sense of being discovered rather than made.⁷²

We may seem to have strayed quite a distance from Scotistic realism, but we are discussing the formal distinction and the three modes of being precisely because they are *required* for Scotistic realism. According to Boler,

we are now approaching the central problem of Scotus' realism. If the Common

⁷⁰ See Wolter 1946, 16–17; Moore 1964, 404; and Grajewski 1944, 98.

⁷¹ Wolter 1946, 17.

⁷² Boler 1963, 57. Moore agrees that Scotus affirms three modes of being, but lists them differently: as “potential matter,” “haecceity,” and “potential form” (Moore 1964, 411). Moore’s attempt is to link these three with Peirce’s Firstness, Secondness, and Thirdness (respectively). Whether they also link with Boler’s three modes is beyond the scope of this project.

Nature is individuated in any existent thing, is there any sense in saying that the Common Nature is real? Scotus wants to protect both the primary status of the individual (as a supposit) and the real Common Nature as a ground for our conceptions. But can Socrates, for example, have at one and the same time an individuated nature and a common nature? To resolve this problem, Scotus introduces his famous ‘formal distinction’: the Common Nature and haecceity are not two separate things in an existent individual, but they are formally distinct.⁷³

In order to maintain his realism, Scotus must hold that the distinction of Common Nature and haecceity is more than a logical one. If the Common Nature and haecceity are distinct only in the mind, the less-than-numerical unity of the Common Nature could not be real. Consequently, although the formal distinction is not a distinction between supposits, it is also not a logical one.⁷⁴

It is now possible to understand why Boler also says, “From the point of view of Scotus’s realism, this insistence upon contraction is what creates the difficulty that the formal distinction is intended to solve.”⁷⁵

We are now ready to elaborate a bit more on the epistemological story that results from Scotus’s realism:

For Scotus, the Common Nature must come across whole—which is why the formality must be real before the operation of the intellect. . . . The full process of abstraction, then, contains two steps: (1) the nature, which is already (before the operation of the intellect) distinct⁷⁶ from the haecceity and therefore “common,” is considered in itself; and (2) the nature thus in the mind is given a numerical unity so that it can be predicated as one thing of many things. By insisting upon this first step, and maintaining that the nature is real before the operation of an intellect, Scotus feels that he can better account for the objectivity of our conceptions. Then, by holding that the Common Nature is contracted in the individual, he is able to conclude with a moderate realism similar to that of St. Thomas.⁷⁷

⁷³ Boler 1963, 53.

⁷⁴ Boler 1963, 54–55.

⁷⁵ Boler 1963, 59.

⁷⁶ That is, *formally* distinct.

⁷⁷ Boler 1963, 60–61. This reference to Aquinas assumes Boler’s earlier point that “it seems to be the position of St. Thomas (or an approximation thereto) which is usually presented

Here we see the role played by the formal distinction and the three modes described by Boler. The supposit being considered is in what Boler calls the physical mode (one of two real modes). Step (1) in the passage above—in which the formal distinction is prominent—refers to what Scotus calls the first intention and what Boler calls the metaphysical mode (the other real mode). Step (2) in the passage above refers to what Scotus calls second intention and what Boler calls logical mode. We also see, at the very end of this passage, a reference to moderate realism, which brings us directly to our next theme.

7. Scotus's Moderate Realism

Moderate realism can be seen as an attempt to avoid two extremes. The first extreme—whose avoidance is indicated by the word “moderate”—is what we might call a full blown Platonism, where a Universal is a UNIVERSAL, an individually distinct Form that functions as a special kind of supposit. Against this extreme we find Boler defining moderate realism this way: “It is the unwillingness of the scholastics generally to treat a

as ‘scholastic’ or ‘moderate’ realism. For St. Thomas, the individuating principle is matter, a potential and limiting principle. As a result, the nature in the individual is limited, or, to use a metaphor, scarred. . . . Scotus has many reasons for disagreeing with the Thomistic principle of individuation; but in the particular context of abstraction, Scotus seems to feel that the Thomistic account does not sufficiently safeguard the objectivity of our conceptions” (Boler 1963, 59–60). An important distinction between Scotus and Aquinas, Boler says, is that Scotus’s philosophy guarantees that the Common Nature comes to us (real concepts, in first intention) unsullied by the limitation of individuals—but at the same time, the Common Nature (existentially speaking) still ‘yields’ to the individual. While taking a crucially different path, Scotus arrives (like Aquinas) at a moderate realism.

nature as a separate thing or supposit that is indicated by the term ‘moderate realism.’”⁷⁸

The second extreme—whose avoidance is indicated by the word “realism”—is what we might call a full blown nominalism, where there are *only* individual particulars in nature and where a Universal is only a universal, a figment of the mind that functions as a convenient way for us to organize what we perceive (but which has no basis in reality). Against this extreme we find Boler defining moderate realism this way: “[T]he reason why Scotus’s realism is moderate is not because he holds that the *universal* is made by the mind, but because he insists that the *nature* is contracted in the existent individual.”⁷⁹

Almeder, also, sees Scotus’s moderate realism as a balance between these two extremes:

Scotus avoided extreme Platonic realism by insisting that the metaphysical universal, which is the foundation of logical universality, is not numerically one; while at the same time he apparently avoided nominalism by insisting that there is something really (though not numerically) common to many individuals of the same species. It is precisely the formal distinction between the common nature and the principal [*sic*] of individuation which allowed Scotus to insist that only individuals exist but also that each individual possesses a real commonness which is the foundation for the logical universal and the objective referent for universal terms.⁸⁰

We can summarize this way:

- (1) The less-than-numerical unity of the Common Nature is crucial for Scotus to avoid Platonism but preserve realism.
- (2) The formal distinction is crucial for Scotus to avoid nominalism (the

⁷⁸ Boler 1963, 49. On the same page Boler says, “Scotus is quite clear about this much: if Plato meant what Aristotle says he did, then Plato is wrong. For the nature cannot itself be a supposit, that is, be numerically one. If the numerically one nature were separate from Dobbin, then Dobbin would not be a horse; and if the nature were in Dobbin, then he would be the one and only horse—indeed, horseness itself.”

⁷⁹ Boler 1963, 63.

⁸⁰ Almeder 1980, 163.

formal distinction keeps the Common Nature *common*) but preserve the priority of individual supposits.

- (3) Haecceity—and contraction generally—is crucial for Scotus to preserve *both* the reality of universals *and* the objectivity of our knowledge of individual supposits.

We now turn to one significant result of all this.

8. One Important Implication of Scotus's Moderate Realism

There is another aspect of Scotus's realism that will be important in the following two chapters: the causal status of universals. Or, put another way, the question of whether or not universals, in themselves, have any causal power. For Scotus, the answer is no. Boler links this answer directly to Scotus's *moderate* realism when he says that:

the “moderateness” of medieval realists is reflected in their refusal to allow universals a causal status. Form may have a causal influence on matter, but that takes place, so to speak, “within” substance. Scotus may appear to be an exception for according to “common natures” a real but less-than-numerical unity and, therefore, a reality of sorts. But even he insists that in any actual individual, the common nature is “contracted” (by haecceity); it exists only as individualized and as common has no effect. As with all the scholastic Aristotelians, Scotus takes substance as the primary causal agent.⁸¹

In a later essay, while discussing the role contraction plays for Scotus, Boler has this to say:

First, contraction for Scotus preserves the ontological priority of first substance The second role of contraction for Scotus is that it grounds the activity of substances in their individual natures. . . . The scholastics, of course, relied heavily on potencies in their explanation of the activities of things, but they still saw the ground for that activity in certain actual conditions (e.g., forms or natures) of individual

⁸¹ Boler 1980, 293.

substances.⁸²

Here, again, we see that the Common Nature—the metaphysical ground for the logical universal—prior to contraction into “first substance” or individual supposit, does not have causal power. After contraction, however, the *individual* nature “grounds the activity of substances.” Notice that it is *substance*, then, that has causal power, although the shape of that power *is* determined (in large part, at least) by the individuated nature—that is to say, by the Common Nature after contraction by the supposit’s haecceity.

Eike-Henner Kluge confirms this view of causality when he discusses Scotus’s theory of causation (which Kluge says is the standard Aristotelian model):

According to this theory, every causal interaction is a species of change and, as such, requires the action of an efficient cause imposing a formal cause on a material cause for a final cause. The theory also maintains that every change involves the actualisation of a potential that is inherent in the material cause, where this actualisation can be brought about by the efficient cause only if the efficient cause contains within itself, either actually or eminently, the formal cause that it imposes.

One of the more important things about this analysis of causality is that it requires the acceptance of certain ontological propositions. In particular, it requires the assumption that an efficient cause is a substance that has a particular nature in virtue of its substantial form.⁸³

And again, in the conclusion to Kluge’s article:

To sum up and generalise: The substances that act as accidental efficient causes do impose form on matter—that is integral in the Aristotelian theory of efficient causation. Moreover, the manner in which they impose form on matter must be a function of their natures—which is to say, it must find its explanation in the natures of their substantial forms.⁸⁴

Once more, we see that *substances* are what have causal power (“act as accidental

⁸² Boler 2004, 72–73.

⁸³ Kluge 2008, 234.

⁸⁴ Kluge 2008, 245.

efficient causes”), not universals or forms or natures. To be sure, the natures play a role: their “function” is to affect the “manner” in which causality takes place. But, as Boler says, natures do this from “within” substance.

I have indicated that this is an important implication for our project, and that we will return to it in the following two chapters. Perhaps I owe the reader a bit of foreshadowing: without giving too much away prematurely, I suggest that Scotus’s prominent use of the idea that an object’s contracted *nature* determines the shape of its causal power calls us back to Cartwright’s use of the very same term, “nature”—*and* her acknowledgement that hers is an Aristotelian use of the term—when she discusses an object’s capacity. For her, remember, the statement “Planets have the capacity to attract each other” is equivalent to “Attracting each other is in the nature of planets.” Add to this her insistence that she is a follower of Scotus, and we have (I will argue) a fairly strong link of ideas.

With this in mind, in the next chapter (Chapter 4) I explore Peirce’s critical interaction with Scotus, understanding that this will be (perhaps) the best hint we can get about what Peirce’s criticism of Cartwright’s philosophy of science would be. In the following chapter (Chapter 5), I attempt to construct that criticism.

Chapter 4

Return to Peirce (Peirce on Duns Scotus)

We now return to Charles S. Peirce, and our treatment of his philosophy will cover the next two chapters. In the present chapter, I analyse his treatment of Scotus and the problem of universals; in Chapter 5, I shift to Peirce's own philosophy of science and its metaphysical implications. Put another way: in Chapter 4 we look (from Peirce) *backward* in time toward Scotus, while in Chapter 5 we look from Peirce's own time *forward* to our own, which will lead us quite naturally back to Nancy Cartwright and her philosophy of science.

1. Peirce and Scotus

Because Peirce has a great admiration for the work of Scotus, and because Peirce describes himself in various ways as "Scotistic," it is widely recognized by Peirce scholars that his philosophy cannot be properly understood without an understanding of his philosophical relationship to Scotus. A sentence from Robert Almeder is typical:

“Without some extended discussion of Peirce’s intellectual debt to the medieval philosopher Duns Scotus, it is unlikely that a thorough understanding of Peirce’s philosophy is possible.”¹

Before we delve into that “intellectual debt,” however, there are two preliminary matters that need attention: the understanding Peirce had of Scotus’s realism, and the texts he read that *shaped* his understanding of Scotus. We begin with the texts.

As is common with ancient and medieval texts, authorship is not always a settled question. Some texts which *had* been considered to be Scotus’s have turned out not to be. As an example, the *Grammatica Speculativa* was shown in 1922 to be the work of Thomas of Erfurt. While Peirce *does* refer to the *Grammatica Speculativa* as Scotus’s,² he also left us plenty of evidence about which of Scotus’s texts he was reading.³

Interestingly, we still have many of those Peirce-owned texts of Scotus, complete with Peirce’s notes and markings:

It is known that Peirce was acquainted with at least a considerable portion of the works of Scotus, which was included in the volumes he sold to Johns Hopkins University; the fact that the volumes are underscored and that errata were noted in the indexes suggests they were closely read by Peirce.⁴

And a closer look at those volumes leads Charles K. McKeon to conclude that, for the most part, Peirce’s understanding of Scotus was indeed based upon the actual writings of

¹ Almeder 1980, 160. This is the opening sentence from the chapter titled, “Peirce’s Pragmatism and Scotistic Realism.”

² See *CP* 2.206, for example.

³ See *CP* 1.444, 1.549 n.1, 1.659, 2.206, 2.361, 2.364, 2.398 n.1, 4.28, 5.213 n.1, 5.312 n.1, 5.606, 6.362, 6.367, 6.371, and 7.395.

⁴ Boler 1963, 37, n. 3.

Scotus:

It may here be remarked that Peirce took the whole *Opera omnia* as genuinely the work of Scotus, whereas more recent scholarship has established the *Speculative Grammar* as the work of Thomas of Erfurt, and narrowed the unquestionable works to the two commentaries on the sentences (*Opus Oxoniense* and *Reportata Parisiensia*), the questions on Aristotle's metaphysics (*Quaestiones subtilissimae*), *On the First Principle*, and some *Quodlibetal Questions*. The effect is here unimportant, since of Peirce's specific references to Scotus' works those to questionable or spurious works are few and scattered,⁵ and since Scotus' influence on Peirce may be substantially and consistently represented from the unquestionable works.⁶

McKeon wrote that passage in 1952, but even forty years later, Claudine Engel-Tiercelin says, "It must be noticed that almost all the texts referred to by Peirce belong to those that have been since authenticated."⁷ It is widely recognized, then, that Peirce used (primarily, at least) what are considered today to be authentic Scotus texts.

Having established the authenticity of the texts Peirce used, we turn to Peirce's understanding of Scotus's realism, and here we find that Peirce's formulation of Scotus's position is in very close agreement with my own in Chapter 3. I noted Scotus's motivation to preserve the objectivity of scientific knowledge; so, also, does Peirce:

[For Scotus,] the subject of science is universal; and if the existence of [the] universal were dependent upon what we happened to be thinking, science would not relate to anything real. . . . It is the very same nature which in the mind is universal and *in re* is singular; for if it were not, in knowing anything of a universal we should be knowing nothing of things, but only of our own thoughts, and our opinion would not be converted from true to false by a change in things.⁸

I pointed out that, for Scotus (as for Avicenna), the Common Nature is (considered just in

⁵ There is a note here: "As, for example, Peirce's reference to the *Commentary on the Physics*, 1.549, n. 1" (McKeon 1952, 352 n. 5).

⁶ McKeon 1952, 240–241.

⁷ Engel-Tiercelin 1992, 79 n. 13.

⁸ *CP* 8.18.

itself prior to contraction into a supposit) neither singular nor universal; so, also, does

Peirce:

[Scotus] holds, therefore, that such natures (i.e. sorts of things) as a *man* and a *horse*, which are real, and are not of themselves necessarily *this* man or *this* horse, though they cannot exist *in re* without being some particular man or horse, are in the *species intelligibilis* always represented positively indeterminate, it being the nature of the mind so to represent things. Accordingly, any such nature is to be regarded as something which is of itself neither universal nor singular, but is universal in the mind, singular in things out of the mind.⁹

I demonstrated some of Scotus's arguments for a non-numerical unity for the Common

Nature; so, also, does Peirce:

If there were nothing in the different men or horses which was not of itself singular, there would be no real unity except the numerical unity of the singulars; which would involve such absurd consequences as that the only real difference would be a numerical difference, and that there would be no real likenesses among things.¹⁰

When combined with the textual question above, this gives us a clearer picture of Peirce's *understanding of* and *access to* the philosophy of Scotus. This is a significant point, considering the direction of our research toward the connectedness of Scotus, Peirce, Cartwright, and the philosophy of science—especially considering that one of the primary connections between Peirce and Cartwright (I will argue) is through Scotus.

⁹ CP 8.18. To understand what Peirce means by “of itself,” I think it is helpful to remember Boler's identification of the three modes of being under Scotus's view: physical mode and metaphysical mode (the two modes of extramental reality), and logical mode (the realm of our mental concepts). When Peirce says that (for Scotus) a Common Nature is “of itself neither universal nor singular,” he is referring to what Boler calls the metaphysical mode: the Common Nature prior to contraction has not yet been contracted by haecceity into the physical mode (Peirce's “singular in things”), nor has it yet been extracted from that singular by the active intellect to form a *logically* universal (predicable of many) concept (Peirce's “universal in mind”).

¹⁰ CP 8.18.

2. Peirce's Admiration of Scotus

One indication of the influence Scotus has on Peirce can be seen in the degree to which Peirce holds Scotus in high regard. Peirce calls him “one of the greatest metaphysicians of all time” and says that he “added a great deal to the language of logic.”¹¹ As do many today, Peirce often mentions Scotus in connection with Ockham (although perhaps with more superlatives than most):

The most striking characteristic of British thinkers is their nominalistic tendency. This has always been and is now very marked. So much so that in England and in England alone are there many thinkers more distinguished at this day as being nominalistic than as holding any other doctrines. William Ockham or Oakum, an Englishman, was beyond question the greatest nominalist that ever lived; while Duns Scotus, another British name, it is equally certain is the subtlest advocate of the opposite opinion. These two men, Duns Scotus and William Ockham, are decidedly the greatest speculative minds of the middle ages, as well as two of the profoundest metaphysicians that ever lived.¹²

We see a variant on “subtle” in that previous passage, a hint at Scotus’s moniker, the Subtle Doctor. We see that again in another passage linking Scotus with the height of scholastic thinking:

Until about the end of the [thirteenth] century, scholasticism was somewhat vague, immature, and unconscious of its own power. Its greatest glory was in the first half of the fourteenth century. Then Duns Scotus, a Briton, first stated the realistic position consistently, and developed it with great fulness and applied it to all the different questions which depend upon it. His theory of “formalities” was the subtlest, except perhaps Hegel’s logic, ever broached¹³

¹¹ *CP* 4.28. From Peirce, himself one of the leading logicians of the modern era, this is a heartfelt and meaningful compliment.

¹² *CP* 1.29.

¹³ *CP* 8.11. In the same passage, Peirce adds Ockham to Scotus as representing the height of scholasticism, saying, “After him [Ockham] the scholastic philosophy showed a tendency to separate itself from the religious element which alone could dignify it, and sunk first into extreme formalism and fancifulness, and then into the merited contempt of all men; just as the Gothic architecture had a very similar fate, at about the same time, and for much the same reasons.”

Clearly Peirce has great respect for Scotus. It is no surprise, then, to hear Peirce describe himself as “an attentive and meditative student”¹⁴ of Scotus, but in a thinker of such independence as Peirce, it *may* be surprising to hear him describe himself this way: “The author of the present treatise is a Scotistic realist.”¹⁵ And elsewhere (but in the same year, 1893):

Yet be it known that never, during the thirty years in which I have been writing on philosophical questions, have I failed in my allegiance to realistic opinions and to certain Scotistic ideas¹⁶

Ten years later, he still describes himself as “an Aristotelian of the scholastic wing, approaching Scotism, but going much further in the direction of scholastic realism.”¹⁷

However—back to 1893—Peirce also says this:

In calling himself a Scotist, the writer does not mean that he is going back to the general views of 600 years back; he merely means that the point of metaphysics upon which Scotus chiefly insisted and which has since passed out of mind, is a very important point, inseparably bound up with the *most* important point to be insisted upon today.¹⁸

That “*most* important point” is, in fact, the focus of our previous chapter: the debate between nominalism and realism. In 1898, Peirce says that this debate is “as pressing today as ever it was.”¹⁹ Perhaps the best clue as to what Peirce means by this comes from an essay 27 years earlier, in 1871, when he writes this:

¹⁴ *CP* 6.328.

¹⁵ *CP* 4.50.

¹⁶ *CP* 6.605.

¹⁷ *CP* 5.77, n. 1.

¹⁸ *CP* 4.50.

¹⁹ *CP* 4.1.

So long as there is a dispute between nominalism and realism, so long as the position we hold on the question is not determined by any proof *indisputable*, but is more or less a matter of inclination, a man as he gradually comes to feel the profound hostility of the two tendencies will, if he is not less than man, become engaged with one or other and can no more obey both than he can serve God and Mammon. If the two impulses are neutralized within him, the result simply is that he is left without any great intellectual motive.²⁰

Intellectual motive is not the only thing at stake in this debate, as far as Peirce is concerned. In Chapter 5, we will see that the debate is linked with the philosophy of science—indeed, with the very *possibility* of science. But to get a fuller grasp of Peirce’s view of the debate’s implications, we return to the above passage. Just after it comes a section on how the “dry” disciplines of logic and philosophy may provide the best tools for solving the nominalism/realism puzzle, followed by this, in which Peirce links the debate to broader, social concerns:

But though the question of realism and nominalism has its roots in the technicalities of logic, its branches reach about our life. The question whether the *genus homo* has any existence except as individuals, is the question whether there is anything of any more dignity, worth, and importance than individual happiness, individual aspirations, and individual life. Whether men really have anything in common, so that the *community* is to be considered as an end in itself, and if so, what the relative value of the two factors is, is the most fundamental practical question in regard to every public institution the constitution of which we have it in our power to influence.²¹

Because of all this, Peirce believes that the problem of universals warrants serious study—and that Scotus’s realist approach to the problem is the place to start. We will now turn to Peirce’s own treatment of the problem, which will include his critical interaction with Scotus.

²⁰ *CP* 8.38. Engel-Tiercelin also makes a connection—albeit more limited—between *CP* 4.1 and 8.38. See Engel-Tiercelin 1992, 53.

²¹ *CP* 8.38.

3. How Peirce Frames the Problem of Universals

Naturally, we begin with Peirce's own formulation of the problem of universals, which—when dealing with the original *scholastic* setting of the problem—focuses on the meaning of the word “real”:

Are universals real? We have only to stop and consider a moment what was meant by the word *real*, when the whole issue soon becomes apparent. Objects are divided into figments, dreams, etc., on the one hand, and realities on the other. The former are those which exist only inasmuch as you or I or some man imagines them; the latter are those which have an existence independent of your mind or mine or that of any number of persons. *The real is that which is not whatever we happen to think it, but is unaffected by what we may think of it.*²²

We will return a bit later to Peirce's emphasis on the word “real” and its implications for *truth* in general and *science* in particular. For now, however, Peirce's definition of “real” sets up his framing of the scholastic problem of universals:

The question, therefore, is whether *man*, *horse*, and other names of natural classes, correspond with anything which all men, or all horses, really have in common, independent of our thought, or whether these classes are constituted simply by a likeness in the way in which our minds are affected by individual objects which have in themselves no resemblance or relationship whatsoever.²³

This formulation sounds familiar enough, but—in keeping with his conviction that the problem of universals is not just a scholastic issue—Peirce offers other formulations as well.²⁴ In the following example, he keeps the idea of *type* but expands the problem to

²² *CP* 8.12. Emphasis of final sentence mine. Note that this is the same working definition of “real” that we saw in Scotus.

²³ *CP* 8.12.

²⁴ Leading some scholars to argue that—in the end—Peirce and Scotus do *not* actually mean the same thing by the “problem of universals.” One could argue, however, that Peirce is simply translating the problem of universals into a version more recognizably relevant to science. After all, says Peirce, “it was always agreed that there were other sorts of universals besides *genera* and *species*, and in using the word law, or regularity, we bring into prominence the kind of universals to which modern science pays most attention” (*CP* 4.1).

include *law*:

In the days of which I am speaking, the age of Robert of Lincoln, Roger Bacon, St Thomas Aquinas, and Duns Scotus, the question of nominalism and realism was regarded as definitively and conclusively settled in favor of realism. You know what the question was. It was whether *laws* and general *types* are figments of the mind or are real.²⁵

This leads to another formulation, remarkable for its succinctness: “Now what was the question of realism and nominalism? I see no objection to defining it as the question of which is the best, the laws or the facts under those laws.”²⁶

General types—the standard understanding of “universal” when considering the problem of universals—have been joined by general laws in Peirce’s formulation,²⁷ which leads us to this passage from a review of Karl Pearson’s *Grammar of Science*:²⁸

Prof. Pearson has no difficulty in showing . . . that law is of an intellectual or rational nature; but he slides swiftly and lightly over the passage from that position to its having been introduced into the object by the scientist’s own mind. *But here is the whole question. Is law real or is it figment?* Psychological of course it is; for every thing we can cognize is purely psychological. Intellectual or rational it plainly is. But the question is whether it is among those intellectual objects that are destined ultimately to be exploded from the spectacle of the universe, or whether, as far as we can judge, it has the force to stand its ground indefinitely. It seems clear, to begin with, that to prove law a figment would be to prove all science to be a delusion and a Grammar of Science an idle pastime.²⁹

²⁵ CP 1.16.

²⁶ CP 4.1.

²⁷ Later in this chapter, we will see Peirce argue that, according to the logic of relatives, general types *are* general laws.

²⁸ Pearson, Karl. *The Grammar of Science*. London: Black, 1900. The first edition was published in 1892, but this 1900 second edition (with two new chapters) is what Peirce actually reviewed. Pearson was a British mathematician, scientist, and philosopher of science who argued for a Humean, anti-metaphysical understanding of science: laws of nature do not rule and are not active. Rather, they are simply *how humans describe* the regular sequences that have been observed in the past. As such, these laws do not exist in nature as commonly supposed; rather, they are the products of the human mind.

²⁹ CP 8.153. Emphasis mine.

Here we see why Peirce considers the problem of universals to be a relevant contemporary issue: it is critical for our understanding of the status of the natural sciences. We live in a scientific age (no less true now than it was during Peirce's lifetime). Peirce is asking, 'What does that mean? Is ours an age filled with—and guided by—the dreams, figments, and fictions of those who spend their time in laboratories? Or is it an age shaped by the discovery and profitable use of the general types and laws that constitute at least a portion of the reality in which we live and breathe and have our being?' This, in part, is what hangs in the balance when Peirce asks, "Is law real or is it figment?"

With the problem defined—and just before we explore Peirce's treatment of the problem—we should make ourselves aware that he, like Scotus, is interested in offering a solution that avoids extremes.³⁰ Like Scotus, he hopes to avoid nominalism on the one hand (and its implication that science is, at its core, fictitious) and Platonic realism on the other—although Peirce renames Platonic realism "nominalistic Platonism,"³¹ because (as Susan Haack writes) it involves "the thesis that universals like 'man' or 'horse' refer to abstract particulars, to existents."³² However, Peirce is also struggling against a third philosophical position: conceptualism.

The conceptualists seek to wedge in a third position conflicting with the principle of excluded middle. They say, "Those universals are real, indeed; but they are only real thoughts." . . . [T]hey say that the laws of nature and the properties of chemical

³⁰ Although this might not be obvious at first, considering that Peirce names his solution "extreme realism"!

³¹ *CP* 5.503.

³² Haack 1992, 22.

species are results of thinking.³³

According to Peirce, the conceptualists are mistaken in the belief that they are offering a genuinely distinct, third option (“a middle term between realism and nominalism”³⁴).

Instead, he says, they offer nothing genuinely new:

Many philosophers call their variety of nominalism, “conceptualism”; but it is essentially the same thing; and their not seeing that it is so is but another example of that loose and slapdash style of thinking that has made it possible for them to remain nominalists.³⁵

In fact, the so-called innovation of conceptualism (that universals are thoughts) was nothing new at all:

The great realists had brought out all the truth there is in that much more distinctly long before modern conceptualism appeared in the world. . . . But those realists did not fall into any confusion between the real fact of having a dream and the illusory object dreamed. The conceptualist doctrine is an undisputed truism about *thinking*, while the question between nominalists and realists relates to *thoughts*, that is, to the objects which thinking enables us to know.³⁶

Notice that Peirce concludes this passage on conceptualism with yet another formulation of the problem of universals, which reminds us of our current objective: to explore Peirce’s critical analysis of Scotus’s work on the problem.

4. Peirce’s Criticisms of Scotus

While Peirce has a deep appreciation for—and feels an indebtedness

³³ *CP* 1.27.

³⁴ *CP* 1.27.

³⁵ *CP* 1.27.

³⁶ *CP* 1.27.

toward—Scotus, by no means does he swallow Scotus’s philosophy whole.³⁷ One criticism—perhaps aimed at scholastics and/or Scotists generally rather than at Scotus himself—is that language *in the absence of experiment* was given too much of a leading role in formulating a metaphysics. Haack describes this difference between Peirce and the scholastics by saying that Peirce

did not hold that all common nouns represent real generals, only that some may. . . . The reality of a common nature, Peirce argued, does not follow merely from the availability of a general term; rather, it is a matter for empirical investigation which words classify together things which really are, independent of our classification, of a kind.³⁸

Peirce puts it this way:

Consequently, *some* generals are real. (Of course, nobody ever thought that *all* generals were real; but the scholastics used to assume that generals were real when they had hardly any, or quite no, experiential evidence to support their assumption; and their fault lay just there, and not in holding that generals could be real.)³⁹

[Their fault] was that they were utterly uncritical in accepting classes as natural, and seemed to think that ordinary language was a sufficient guarantee in the matter.⁴⁰

Haack sums it up nicely when she says, “Peirce’s position was that there are real generals, not that generals are real.”⁴¹

For our project, however, the most important criticism Peirce has for Scotus begins in the hint of an adjective, when Peirce says, “In the fourteenth century

³⁷ In addition to Scotus, Kant was another philosopher for whom Peirce had deep respect. But Peirce is clear that respect does not equal agreement when he says, “Nor . . . must it be supposed that I assent to everything either in Scotus or in Kant. We all commit our blunders” (6.95).

³⁸ Haack 1992, 23.

³⁹ *CP* 5.430.

⁴⁰ *CP* 6.361.

⁴¹ Haack 1992, 23.

Nominalism was rendered a respectable opinion by the *halting* realism of Scotus”⁴²

And again: “So far as a modern man of science can share the ideas of those medieval theologians, I ultimately came to approve the opinions of Duns, although I think he inclines too much toward nominalism.”⁴³ Scotus, it turns out, “was separated from nominalism only by the division of a hair.”⁴⁴ Eventually, the reason for these hints becomes clear, when Peirce says:

Duns Scotus is too nominalistic when he says that universals are contracted to the mode of individuality in singulars, meaning, as he does, by singulars, ordinary existing things. The pragmatist cannot admit that. I myself went too far in the direction of nominalism when I said that it was a mere question of the convenience of speech whether we say that a diamond is hard when it is not pressed upon, or whether we say that it is soft until it is pressed upon. I *now* say that experiment will prove that the diamond is hard, as a positive fact. That is, it is a real fact that it *would* resist pressure, which amounts to extreme scholastic realism.⁴⁵

It seems we have gone from famine to feast. Gone are mere hints of a “halting realism,” of being separated “by the division of a hair” from nominalism. Now we have before us a full menu of philosophical explication to explore:

- a) Peirce’s dramatic departure from Scotus on the matter of contraction,
- b) this strange word, “pragmatist” (and the implied distinction between pragmatism and pragmatism),
- c) Peirce’s own evolution from something “too far in the direction of nominalism” toward his more mature position involving *would-*

⁴² CP 6.175. Emphasis mine.

⁴³ CP 1.560.

⁴⁴ CP 8.11.

⁴⁵ CP 8.208.

be's, and

- d) Peirce's declaration for "extreme scholastic realism."

We will indeed attempt to digest the entire menu, but not directly. Rather, I want to structure our exploration around another (less explicitly critical) passage regarding Scotus:

The works of Duns Scotus have strongly influenced me. If his logic and metaphysics, not slavishly worshipped, but torn away from its medievalism, be adapted to modern culture, under continual wholesome reminders of nominalistic criticisms, I am convinced that it will go far toward supplying the philosophy which is best to harmonize with physical science. But other conceptions have to be drawn from the history of science and from mathematics.⁴⁶

In this passage we are reminded of the context within which Peirce criticizes Scotus. Out of deep respect, Peirce is taking what he feels is the very best of Scotus and harmonizing it with modern science. And although Peirce makes reference to the "wholesome reminders of nominalistic criticisms,"⁴⁷ we will see that the "other conceptions" required to bring Scotus's logic and metaphysics into harmony with science will lead us far away from nominalism.

Following Boler (mostly—see note), I think those "other conceptions" should be understood as the significant and interrelated contributions Peirce made in logic,

⁴⁶ *CP* 1.6.

⁴⁷ This may be a surprising phrase, considering all of Peirce's complaints about Scotus's borderline nominalism. I think the best way to understand this is as a reminder that speculative metaphysics should never be too far removed from empirical investigation. This will be a major tenet of Peirce's pragmatism: there *are* real generals, but they play out in events we can *measure*.

pragmaticism, and metaphysics.⁴⁸ We will explore them in that order, but I beg the reader to keep in mind that they cannot actually be considered separately. I have already stated that they are interrelated; Susan Haack describes very nicely why that is the case:

“Philosophy,” Peirce observed, ought “to trust to the multitude and variety of its arguments . . . Its reasoning should not form a chain . . . but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected” (5.265, 1868). His case for scholastic realism conformed rather strikingly to this pattern, marshalling together arguments both logical and phenomenological from his theory of categories, arguments from the history of philosophy, arguments from the philosophy of language, arguments from the philosophy of science.⁴⁹

She might also have made reference to Peirce’s essay, “A Neglected Argument for the Reality of God,”⁵⁰ in which he makes a distinction between argument and argumentation: “An ‘Argument’ is any process of thought reasonably tending to produce a definite belief. An ‘Argumentation’ is an Argument proceeding upon definitely formulated premisses.”⁵¹ Combining these insights, consider what follows—an exploration of Peirce’s (1) logic of relatives, (2) pragmaticism, and (3) Categories—to be in the shape of an Argument

⁴⁸ Boler 1963, 65–66. Actually, Boler lists the three developments as (1) “the logic of relatives,” (2) “pragmatism and scientific method,” and (3) “the reality of ideas” (66). I have altered Boler’s “reality of ideas” to “metaphysics,” by which I mean the Categories. I do this for two reasons: first, Boler spends much of the chapter titled “Realism and Idealism” describing and exploring the Categories. And second, I agree with Gresham Riley’s analysis and criticism of Boler’s treatment: in misunderstanding the Categories, Boler has under-emphasized Secondness and made Peirce out to be more Idealistic than Peirce’s writings allow (see Riley 1974).

⁴⁹ Haack 1992, 20.

⁵⁰ *CP* 6.452–493.

⁵¹ *CP* 6.456. Although not made explicit, it seems that “Argument” is associated with retroduction (and can thereby arrive at something *new*) while “Argumentation” is associated with deduction (and as a result *cannot* arrive at anything not already in the premises). Peirce’s explanation for the “neglected” status of his argument for the reality of God: theologians “probably share those current notions of logic which recognize no other Arguments than Argumentations” (6.457).

comprising a cable of many fibres (rather than the shape of an Argumentation comprising a linked chain of deductions).

5. The Logic of Relatives

When Peirce describes the problem of universals as the question of “whether *laws* and general *types* are figments of the mind or are real,” he immediately describes a method for attacking the problem:

If this be understood to mean whether there really are any laws and types, it is strictly speaking a question of metaphysics and not of logic. But as a first step toward its solution, it is proper to ask whether, granting that our common-sense beliefs are true, the analysis of the meaning of those beliefs shows that, according to those beliefs, laws and types are objective or subjective. This is a question of logic rather than of metaphysics — and as soon as this is answered the reply to the other question immediately follows after.⁵²

Elsewhere—and with his characteristic enthusiasm—regarding this question of logic (and its eventual implications for metaphysics), Peirce says:

My plan for defeating nominalism is not simple nor direct; but it seems to me sure to be decisive, and to afford no difficulties except the mathematical toil that it requires. For as soon as you have once mounted the vantage-ground of the logic of relatives, which is related to ordinary logic precisely as the geometry of three dimensions is to the geometry of points on a line, as soon as you have scaled this height, I say, you find that you command the whole citadel of nominalism, which must thereupon fall almost without another blow.⁵³

And so, to understand one aspect of Peirce’s “Argument” against nominalism (and for realism), we must come to grips with his logic of relatives. This is no small task, and a full treatment—complete with the “mathematical toil” to which Peirce refers—would

⁵² *CP* 1.16.

⁵³ *CP* 4.1.

probably require another dissertation, and is certainly beyond our scope.⁵⁴ However, in the interest of an understanding of the larger picture of Peirce's realism, we will attempt a brief introduction to the logic of relatives, focussing on those aspects relevant to our project.

We begin with Peirce's own comparison of his logic of relatives with what he calls "ordinary logic":

Ordinary logic has a great deal to say about *genera* and *species*, or in our nineteenth century dialect, about *classes*. Now, a *class* is a set of objects comprising all that stand to one another in a special relation of similarity. But where ordinary logic talks of classes the logic of relatives talks of *systems*. A *system* is a set of objects comprising all that stand to one another in a group of connected relations. Induction according to ordinary logic rises from the contemplation of a sample of a class to that of the whole class; but according to the logic of relatives it rises from the contemplation of a fragment of a system to the envisagement of the complete system.

The great difference between the logic of relatives and ordinary logic is that the former regards the form of relation in all its generality and in its different possible species while the latter is tied down to the matter of the single special relation of similarity. The result is that every doctrine and conception of logic is wonderfully generalized, enriched, beautified, and completed in the logic of relatives.⁵⁵

It is clear that, for Peirce, the logic of relatives is something much larger and grander than "ordinary logic." It includes ordinary logic, but goes beyond it the way a square goes beyond a line, or a cube beyond a square. Ordinary logic concerns itself with similarity (and this similarity is manifested in *classes*). The logic of relatives, however, concerns

⁵⁴ As a taste of what is being spared the reader: "But while in non-relative logic negation only divides the universe into two parts, in relative logic the same operation divides the universe into 2^n parts, where n is the number of objects in the system which the relative supposes; thus,
 $\infty = A + \bar{A}$
 $\infty = A:B + \bar{A}:B + A:\bar{B} + \bar{A}:\bar{B}$
 $\infty = (A:B:C) + (\bar{A}:B:C) + (A:\bar{B}:C) + (A:B:\bar{C}) + (\bar{A}:\bar{B}:\bar{C}) + (A:\bar{B}:\bar{C}) + (\bar{A}:B:\bar{C}) + (\bar{A}:\bar{B}:C)$
 (CP 3.221).

⁵⁵ Both paragraphs are from CP 4.5.

itself with generality of all kinds (manifested in *systems*).

At this point, let us pause to consider two examples that may help illuminate this difference between “ordinary logic” and the “logic of relatives.” In Chapter 2, I introduced Peirce’s “rhemata” (plural for rhema): propositions with some or all of their nouns removed and replaced by blanks. In Chapter 2, our agenda was to explore the analogy of valency in explaining why Peirce stops at Thirdness when listing foundational Categories. Now, to pursue our agenda of exploring the logic of relatives, we return to two of the rhemata discussed in Chapter 2: “_____ is red,” and “_____ gave _____ to _____.”

First, “_____ is red.” Under ordinary logic—the only logic available to Scotus—this rhema is considered using the ideas of *class* and *similarity*. The two major classes involved in exploring “_____ is red” are obvious and based upon the characteristic of redness: the class of things that are red, and the class of things that are not. We find ourselves thinking along these sorts of lines: ‘All healthy hearts are red. Socrates has a healthy heart. Therefore, Socrates’ heart is red.’ Or, ‘Some roses are red. I am holding a rose behind my back. Therefore, I may have something red behind my back.’ In other words, we explore “_____ is red” using universal and existential quantifiers, Venn diagrams, truth tables,⁵⁶ etc., at no point introducing anything into our conclusion that is not already present in the premises.

However, using the logic of relatives, “_____ is red” is explored in a dramatically different way. It is no longer a rhema that tells us which characteristic we

⁵⁶ The use of truth tables and the convention of the *inclusive* disjunction are developments in logic that were spearheaded by Peirce.

should use to build classes of similar or dissimilar objects. Rather, it is now seen as a *fragment* that gives us a clue about the larger *system* within which “——— is red” should be understood. From “——— is red,” for example, we can infer a larger context in which there are *seen objects* and *seeing beings*. We can then move to colour in general, seeing in general, radiation frequencies, and optical systems. We may also (if we wish) explore the affect of various colours on the emotions of human observers,⁵⁷ which may lead us to the use of the colour red in various works of art, and to the possible intentions of the artist in creating this particular red item.

There is another way in which Peirce views a predicate as a fragment of a much larger system (in this case, an *infinitely* larger system): the relationship between generality and continuity. Peirce uses the example of the word “sun” (*sōl*) to make his point:

None of the scholastic logics fails to explain that *sōl* is a general term; because although there happens to be but one sun yet the term *sōl aptum natum est dici de multis*. But that is most inadequately expressed. If *sōl* is apt to be predicated of *many*, it is apt to be predicated of any multitude however great, and since there is no maximum multitude, those objects, of which it is fit to be predicated, form an aggregate that exceeds all multitude. Take any two possible objects that might be called *suns* and, however much alike they may be, any multitude whatsoever of intermediate *suns* are alternatively possible, and therefore as before these intermediate possible *suns* transcend all multitude. In short, the idea of a general involves the idea of possible variations which no multitude of existent things could exhaust but would leave between any two not merely *many* possibilities, but possibilities absolutely beyond all multitude.⁵⁸

⁵⁷ After all, perhaps some kind of romantic intention is the reason I am holding a rose behind my back.

⁵⁸ *CP* 5.103. Notice that, to our way of thinking, Peirce seems to be avoiding the term “infinite,” although his point certainly includes the concept. This avoidance may, in fact, be deliberate. In a letter to Schiller, Peirce writes, “As for Cantor’s cardinal transfinities, though called numbers by him, they are not properly so called but are *multitudes*, or many-nesses of infinite collections” (*CP* 8.323).

This example helps to explain why Peirce claims that “continuity is shown by the logic of relations to be nothing but a higher type of that which we know as generality. It is relational generality.”⁵⁹ And elsewhere: “True generality is, in fact, nothing but a rudimentary form of true continuity. Continuity is nothing but perfect generality of a law of relationship.”⁶⁰

The second example is “——— gave —— to ——.” Because this is a triple rhema, its exploration through ordinary logic is more complicated. Rather than a single characteristic leading us to similarity, we find ourselves creating a set of ordered triples such as <Anthony, a ring, Cleopatra>, to use an example from Boler, who then follows through by describing the shift from ordinary logic to the logic of relatives:

The power of the new logic . . . is that it allows us to move not just from a sample to a collection, but from a fragment of a system to a whole system. In the case at hand, Peirce apparently means that we can move to things like the jeweler, the banker, and the attraction of women to shiny things⁶¹

In both of these examples, and as its name suggests, the logic of relatives assumes the *relatedness* of all things and understands the deductive and inductive exploration of *class* and *similarity* as taking place within a much larger context of relations that—because the

⁵⁹ CP 6.190. It is now possible to understand what Boler means when he writes, “The logic of relatives, [Peirce] says, changes the question of whether there are real generals into the question, Are there real continua?” (Boler 1963, 67).

⁶⁰ CP 6.172. We begin to see why and how *continuity* is a central feature of Peirce’s philosophy. And as was his wont, Peirce invented a name for his emphasis on continuity: “synechism,” which he defined as “that tendency of philosophical thought which insists upon the idea of continuity as of prime importance in philosophy and, in particular, upon the necessity of hypotheses involving true continuity” (6.169). This last phrase is explained further, in a passage infused with realism: “The general motive is to avoid the hypothesis that this or that is inexplicable. For the synechist maintains that the only possible justification for so much as entertaining a hypothesis is that it affords an explanation of the phenomena” (6.171).

⁶¹ Boler 1963, 77.

‘conclusion’ of the system has more in it than the ‘premise’ of the fragment—can be fully explored only retroductively.⁶²

Now for some implications. First, notice that while ordinary logic is limited to sets or classes based on similarity, the logic of relatives explores systems made up of things that are not necessarily similar at all. This has important implications for philosophy of science, as Boler points out:

Cause and effect, symptom and disease, the triadic relation of a sign to its object and interpreter, and, most important, a scientific law or mathematical formula—all constitute systems whose members are not necessarily similar to one another.⁶³

This new logic, in other words, is what we need in order to understand and explore laws of nature. This is not surprising, considering that *relatedness* is at the core of every law of nature.⁶⁴

Second, while in ordinary logic the most basic logical relation is that of identity, in the logic of relatives identity is replaced by illation (deductive conclusion):

I have maintained since 1867 that there is but one primary and fundamental logical relation, that of illation, expressed by *ergo*. A proposition, for me, is but an argumentation divested of the assertoriness of its premiss and conclusion. This

⁶² There is an implication here, mentioned briefly in the following paragraph, but to which we will return for a longer treatment in Chapter 5: if the reality we study scientifically is more like a *system* of unrelated objects than a *class* of similar objects, then retroduction—the tool for moving from fragment to system—must be considered a crucial and necessary component of the scientific process. This will lead to a discussion of the guesswork inherent in retroduction, and to an analysis of the relatively successful ‘guessing instinct’ humanity has demonstrated in the history and development of science.

⁶³ Boler 1963, 76.

⁶⁴ In fact, we will see that one way to understand Peirce’s view of natural laws is to consider them formulations of what we might call a higher order relatedness, or what Boler calls “relations of relations” (Boler 1963, 87).

makes every proposition a conditional proposition at bottom.⁶⁵

Elsewhere, Peirce gives an example of that last assertion, saying that the sentence, “Man is mortal,” when analysed, is equivalent to “For every individual it holds that if it is human, it is mortal; or, for all occasions it holds that what is human is mortal.”⁶⁶ He also describes the difference this can make in understanding the copula of a proposition:

In order to place this matter in a clearer light, I must remark, that I, in common with most logicians, take the copula in the sense of a sign of attribution, and not, like Hamilton, in the sense of a sign of equality in extension or comprehension. He exposes the proposition, “man is an animal,” thus:

The extension of man *Subject*
 equals *Copula*
 a part or all of the extension of animal *Predicate*

And thus he makes the predicate particular. Others interpret it thus:

Every man *Subject*
 has all the attributes common to . . . *Copula*
 every animal *Predicate*

It is in this latter sense that the copula is considered in this paper.⁶⁷

Combining this with Peirce’s treatment of the earlier sentence, “Man is mortal,” we might say that Peirce would understand “Man is an animal” this way: For every individual it holds that if it is human, it is an animal; or, for all occasions it holds that what is human is

⁶⁵ CP 3.440. Elsewhere, in similar fashion, Peirce says that “the relation between subject and predicate, or antecedent and consequent, is essentially the same as that between premiss and conclusion” (4.3).

⁶⁶ CP 2.354. In the same paragraph, Peirce helpfully provides the reader with the same sentence expressed “in my general algebra of logic, where, putting h for man and d for mortal, I write $\pi_i h_i - < d_i$.”

⁶⁷ CP 2.415. Peirce hints at one of the reasons for this difference with Hamilton, when he says that Hamilton “makes the predicate particular.” Peirce, by contrast, wants to keep the predicate general. Earlier in the same paragraph, he writes, “General terms denote several things. Each of these things has in itself no qualities, but only a certain concrete form which belongs to itself alone. This was one of the points brought out in the controversy in reference to the nature of universals.”

an animal. And thus we see the importance of the if-then: the copula does not represent identity, but rather an assumed antecedent-consequent *relationship* that Peirce calls “consequence”: “In the language of logic ‘consequence’ does not mean that which follows, which is called the *consequent*, but means the fact that a consequent follows from an antecedent.”⁶⁸

A third implication of the logic of relatives concerns abstraction:

One branch of deductive logic, of which from the nature of things ordinary logic could give no satisfactory account, relates to the vitally important matter of abstraction. Indeed, the student of ordinary logic naturally regards abstraction, or the passage from “the rose smells sweet” to “the rose has perfume,” to be a quasi-grammatical matter, calling for little or no notice from the logician. The fact is, however, that almost every great step in mathematical reasoning derives its importance from the fact that it involves an abstraction. For by means of abstraction the transitory elements of thought . . . are made substantive elements It thus becomes possible to study their relations and to apply to these relations discoveries already made respecting analogous relations. In this way, for example, operations become themselves the subjects of operations.⁶⁹

This advance is no small matter for Peirce, who considers abstraction one of the most powerful tools we have for advancing knowledge. We are now in a better position to understand a passage we first encountered in Chapter 2:

Intuition is the regarding of the abstract in a concrete form, by the *realistic hypostatization of relations; that is the one sole method of valuable thought*. Very shallow is the prevalent notion that this is something to be avoided. You might as well say at once that reasoning is to be avoided because it has led to so much error; quite in the same philistine line of thought would that be; and so well in accord with the spirit of nominalism that I wonder some one does not put it forward. *The true precept is not to abstain from hypostatization, but to do it intelligently.*⁷⁰

⁶⁸ CP 4.435, n. 1. In other words, there are three things here: (1) the antecedent, (2) the consequent, and (3) the mediating *relationship* between them. Consequence, then, is the paradigmatic example of Thirdness. Since it is also the “fundamental logical relation,” we begin to see yet another way Thirdness is so important for Peirce’s philosophy.

⁶⁹ CP 3.642. This last sentence demonstrates why abstraction is sometimes called “subjectification” (see Boler 1963, 80).

⁷⁰ CP 1.383. Emphases mine.

In this passage, we see references to hypostatization, implicitly defined as “the regarding of the abstract in a concrete form.” Elsewhere, Peirce calls this process “hypostatic abstraction,” and gives this example:

Thus, we transform the proposition, “honey is sweet,” into “honey possesses sweetness.” “Sweetness” might be called a fictitious thing, in one sense. But since the mode of being attributed to it *consists* in no more than the fact that some things are sweet, and it is not pretended, or imagined, that it has any other mode of being, there is, after all, no fiction. The only profession made is that we consider the fact of honey being sweet under the form of a relation; and so we really can. I have selected sweetness as an instance of one of the least useful of abstractions. Yet even this is convenient. It facilitates such thoughts as that the sweetness of honey is particularly cloying; that the sweetness of honey is something like the sweetness of a honeymoon; etc.⁷¹

Peirce concedes that—at first blush, anyway—hypostatic abstraction may very well appear to be nothing more than a semantic trick (and not a very clever one, at that).

Indeed:

Abstractions have been a favorite butt of ridicule in modern times. Now it is very easy to laugh at the old physician who is represented as answering the question, why opium puts people to sleep, by saying that it is because it has a dormative virtue. It is an answer that no doubt carries vagueness to its last extreme.⁷²

And yet, satiric laughter aside, Peirce asserts that, even in this extreme example, there is an important but too-often-overlooked truth:

The physician’s answer does contain a truth that modern philosophy has generally denied; it does assert that there really is in opium *something* which explains its always putting people to sleep. This has, I say, been denied by modern philosophers generally. Not, of course, explicitly; but when they say that the different events of going to sleep after taking opium have really nothing in common, but only that the

⁷¹ CP 4.235. Notice that Peirce finds hypostatic abstraction useful because it allows us to consider a property “under the form of a relation.” Once that relation has been subjectified (into the term “sweetness,” for instance), we are then equipped to consider higher level relatedness (*e.g.*, types of sweetness). All of this serves to remind us why Peirce calls his new logic the logic of relatives.

⁷² CP 4.234. Peirce is making reference to Molière’s 1673 comedic play, *The Imaginary Invalid*, in which doctors are portrayed rather unfavourably (to say the least).

mind classes them together—and this is what they virtually do say in denying the reality of generals—they do implicitly deny that there is any true explanation of opium’s generally putting people to sleep.⁷³

Although he does not say so explicitly, the position of modern philosophers (“denying the reality of generals”) being described by Peirce is the position of nominalism. By contrast, according to Peirce, what Molière’s doctor gets *right* (whether he means to or not, and despite everything else that he gets wrong) is that generals are real. In fact, says Peirce, hypostatic abstraction is the most powerful intellectual tool for exploring the continuous reality of generals.

This concludes our treatment of the logic of relatives. We can, perhaps, begin to see the interconnectedness of the various branches of Peirce’s philosophy and why

Randall Dipert writes:

To the extent that we have not explored the metaphysics and phenomenology of relations, we cannot understand Peirce’s unique variety of realism. And we can’t understand much else about his philosophy *really well*, either.⁷⁴

Recall that the logic of relatives is only the first of three “other conceptions” Peirce adds to Scotus’s realistic logic and metaphysics—the other two being pragmatism and metaphysics, to which we now turn, in that order.

⁷³ CP 4.234. After our treatment of Peirce’s additions to Scotistic realism, we will return to his portrayal of nominalism’s implications for science and prediction. But here we see a hint of what he will say: nominalism simply cannot offer any explanation as to *why* similar causal events take place.

⁷⁴ Dipert 2004, 318–319. Dipert does not refer here to the *logic* of relations, but I have included this quotation for two reasons: (1) it points to the profound importance of relations and relatedness in Peirce’s philosophy, and (2) from Peirce’s point of view, the “metaphysics and phenomenology of relations” are themselves *founded* upon the logic of relations, so Dipert’s comments—implicitly—*really are* about the topic at hand (the logic of relatives).

6. Pragmaticism

Without question, *if* one has heard of Charles Sanders Peirce at all, it is most likely in connection with the philosophical position known as pragmatism. Peirce first described this view in his 1878 essay, “How to Make Our Ideas Clear”:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.⁷⁵

This short passage has become quite widely known as the Pragmatic Maxim,⁷⁶ and—as we will see shortly—it has become what many people think of when they hear Peirce’s name. To see how pragmatism is generally understood, let us turn to the paragraph following the Pragmatic Maxim, where Peirce gives an example of its application:

Let us illustrate this rule by some examples; and, to begin with the simplest one possible, let us ask what we mean by calling a thing *hard*. Evidently that it will not be scratched by many other substances. The whole conception of this quality, as of every other, lies in its conceived effects. *There is absolutely no difference between a hard thing and a soft thing so long as they are not brought to the test.*⁷⁷

That last sentence, clearly, is rather startling. But to press home the point and remove any ambiguity, Peirce follows it with another example:

Suppose, then, that a diamond could be crystallized in the midst of a cushion of soft cotton, and should remain there until it was finally burned up. Would it be false to say that that diamond was soft? This seems a foolish question, and would be so, in fact, except in the realm of logic. . . . We may, in the present case, modify our question, and ask what prevents us from saying that all hard bodies remain perfectly soft until they are touched, when their hardness increases with the pressure until they are scratched. Reflection will show that the reply is this: there would be no *falsity*

⁷⁵ CP 5.402.

⁷⁶ Forrest Baird says that “one writer has called this famous quotation . . . ‘the least clear recommendation of how to make our ideas clear in the history of philosophy’” (Baird and Kaufmann 2000, 370), but unfortunately he does not give any reference for the reader to follow up.

⁷⁷ CP 5.403. Emphasis mine.

in such modes of speech. They would involve a modification of our present usage of speech with regard to the words hard and soft, but not of their meanings.⁷⁸

This, then, is the pragmatism Peirce first formulated, and it is the philosophy with which he is most often associated.

What is interesting about all this is that, as far as Peirce's mature view is concerned, it is completely wrong. In later life, Peirce stated clearly and repeatedly that he had been mistaken in his early formulation of pragmatism, and he lamented the nominalistic slant that resulted as others took it on—so much so that, as we will see, he changed the name of his position from “pragmatism” to “pragmaticism.” We will soon see the reasons for the modification of Peirce's views, but first—to demonstrate the pervasiveness of the erroneous association of Peirce with this early pragmatism—we turn to three typical textbooks on the history of philosophy,⁷⁹ surveying their presentation of Peirce and his philosophy.

In the first, *Socrates to Sartre: A History of Philosophy*, Samuel Enoch Stumpf introduces Peirce in his chapter on “Pragmatism,” in which he presents the work of Peirce, William James, and John Dewey. He writes that pragmatism

was given its initial theoretical formulation by Charles S. Peirce; it was given wide and popular circulation through the brilliant and lucid essays of William James; and it was methodically implemented into the daily affairs of American institutions by John Dewey.⁸⁰

⁷⁸ CP 5.403.

⁷⁹ Selected at random from a nearby bookshelf.

⁸⁰ Stumpf 1988, 410. Later, Stumpf writes, “If William James was the most brilliant of the pragmatists, John Dewey was in the final analysis the most influential” (422). Given the breadth and depth of Peirce's philosophy—even in the necessarily short treatment we have given it in this paper—and given the overwhelming and increasingly fruitful scholarly attention being paid to Peirce's writings, it is doubtful that Stumpf's characterisation of the pragmatists is still defensible.

Stumpf correctly describes the importance of the social and academic relationship between Peirce and James:

In his declining years, Peirce was in financial difficulties, failing health, and virtual social rejection. His loyal friend throughout these difficulties was William James, who not only assisted him, but became the channel through which Peirce's original thoughts about pragmatism found their way into the language and thought of a whole generation throughout the world.⁸¹

But Peirce's thoughts on pragmatism are characterised this way:

[W]ords derive their meanings from actions of some sort. Our ideas are clear and distinct only when we are able to translate them into some mode of operation. . . . To underscore the decisive role of *effects* in the meanings of words, Peirce argued that there would be absolutely no difference between a hard thing and a soft thing as long as they did not test differently.⁸²

While accurate from the point of view of 1878, this portrayal is significantly *inaccurate* from the point of view of 1988 (the publication date of this fourth edition of Stumpf's book). As we will see, Peirce has (since 1878) recanted the "absolutely no difference" position.

Our second example of this faulty association comes from the *Philosophic Classics* series, Volume IV—*Nineteenth-Century Philosophy (Second Edition)*, edited by Forrest E. Baird and the late Walter Kaufmann. This book is primarily a typical collection of philosophical essays, with each philosopher given a short introduction. Here is an excerpt from their introduction to Peirce:

Peirce has been called a "philosopher's philosopher." His writings are often difficult for beginning students, partly because of the technical way in which he expresses his ideas. In addition, he developed four more-or-less complete systems, abandoning

⁸¹ Stumpf, 1988 412.

⁸² Stumpf 1988, 412.

each in favor of the next.⁸³ Despite his esoteric and variegated writing, in 1877 and 1878 Peirce published a pair of essays for a general audience in *Popular Science Monthly*. These became his most important works.

These essays, “The Fixation of Belief” and “How to Make Our Ideas Clear,” are given here (complete). Together they develop Peirce’s famous theory of pragmatism.⁸⁴

It is remarkable to me that these two early essays could, with a straight face, be called Peirce’s “most important works,” unless of course importance is measured by the numbers of reprints in philosophy textbooks. Although the authors acknowledge that “Since the publication of his collected essays in the middle of the century, there has been renewed interest in Peirce’s thought,”⁸⁵ they give no information—either through their introduction or through their Peircian selections—that would help their readers understand that the *substantive* results of that “interest” would, in fact, undermine the claim that these two essays are “most important.”⁸⁶

The third and final example is the entry for Charles Sanders Peirce in a similar collection of essays: *Classics of Western Philosophy (Sixth Edition)*, edited by Steven M. Cahn. The introduction to Peirce is easily the best of the three, expanding his importance far beyond pragmatism:

⁸³ I have not seen this view expressed in any of the more complete and scholarly treatments of Peirce’s philosophy, although it *is* the view expressed in the “Peirce” entry of the well known *Encyclopedia of Philosophy*. I suspect that most scholars would find the Encyclopedia’s portrayal too neat and tidy. Baird and Kaufmann do not cite any sources, however, so it is unclear how they formed the ‘four-system’ view.

⁸⁴ Baird and Kaufmann 2000, 370.

⁸⁵ Baird and Kaufmann 2000, 371.

⁸⁶ Although, to be fair, it would be difficult indeed to select Peircian essays for inclusion in this sort of book. As we have seen, Peirce aimed for a philosophy that was deep and massive. Perhaps he succeeded enough to be his own victim; perhaps only his earlier, ‘shallower and smaller’ philosophy can be effectively excerpted into textbooks.

Despite his brilliance and his pioneering contribution to metaphysics, the history and philosophy of science, the theory of signs, and the development of symbolic logic, Peirce never succeeded in gaining a permanent university position Nevertheless, his fame and influence have continued to grow with the years, stimulated by the continuing study of the huge collection of manuscripts left at his death. The study of Peirce has indeed by now become a worldwide scholarly industry, ramifying into virtually every academic discipline.⁸⁷

But despite this much larger view of Peirce’s significance, the book includes only the same two essays as the previous textbook: “The Fixation of Belief” and “How to Make Our Ideas Clear.”

I have already indicated that such presentations of Peirce are incomplete at best and just plain wrong at worst, since his views on pragmatism changed substantially after their first formulation. Let me begin with the general shape of Peirce’s evolution, and only then turn to the reasons for that change.

In 1905, twenty-seven years after “How to Make Our Ideas Clear,” Peirce wrote an essay in *The Monist* titled, “Issues of Pragmaticism,”⁸⁸ in which he revisits the diamond example of that original essay:

Let us now take up the case of that diamond which, having been crystallized upon a cushion of jeweler’s cotton, was accidentally consumed by fire before the crystal of corundum that had been sent for had had time to arrive,⁸⁹ and indeed without being subjected to any other pressure than that of the atmosphere and its own weight. The question is, was that diamond *really* hard? It is certain that no discernible *actual* fact determined it to be so. But is its hardness not, nevertheless, a *real* fact? To say, as the article of January 1878 seems to intend, that it is just as an arbitrary “usage of speech” chooses to arrange its thoughts, is as much as to decide against the reality of the property, since the real is that which is such as it is regardless of how it is, at any time, thought to be. . . . Is it not a monstrous perversion of the word and concept *real* to say that the accident of the non-arrival of the corundum prevented the

⁸⁷ Cahn 2002, 1095.

⁸⁸ Here we see the semantic change from pragmatism to pragmaticism.

⁸⁹ The “crystal of corundum” was the instrument that was to attempt to scratch the diamond.

hardness of the diamond from having the *reality* which it otherwise, with little doubt, would have had?⁹⁰

And later in that same year, while the above essay was being prepared for publication,⁹¹

Peirce reaffirms his distance from the original Pragmatic Maxim's first and most famous example, this time relating his change in position to the debate between nominalism and realism:

I myself went too far in the direction of nominalism when I said that it was a mere question of the convenience of speech whether we say that a diamond is hard when it is not pressed upon, or whether we say that it is soft until it is pressed upon. I *now* say that experiment will prove that the diamond is hard, as a positive fact. That is, it is a real fact that it *would* resist pressure, which amounts to extreme scholastic realism.⁹²

In fact, it seems to be the very question of nominalism and realism that eventually led Peirce to change the name of his position from pragmatism to pragmaticism. We can see the story unfold quite clearly in a series of passages. In 1902, Peirce contributed an entry ("Pragmatic and Pragmatism") to the *Dictionary of Philosophy and Psychology*, edited by J. M. Baldwin. In the entry we find this:

This [pragmatic] maxim was first proposed by C. S. Peirce in the *Popular Science Monthly* for January, 1878 (xii. 287); and he explained how it was to be applied to the doctrine of reality. . . . The writer subsequently saw that the principle might easily be misapplied In 1896 William James published his *Will to Believe*, and later his *Philosophical Conceptions and Practical Results*, which pushed this method

⁹⁰ CP 5.457. Notice again that Peirce's use of the "word and concept *real*" is identical to Scotus's: the *real* is that which is unaffected by whether or how we think about it. Notice also that, in this passage, reality includes more than just the set of actual facts; reality also includes what we will see Peirce call "would-be's." In Chapter 5, I will argue that this is an important element in the relationship between the philosophies of Peirce and Cartwright.

⁹¹ Peirce complained in a letter that it was delayed, saying that it "seems to have been crowded out by matters of superior importance, magic squares and the like" (CP 8.208).

⁹² CP 8.208. We have seen this passage before, and (owing to its importance for our project) we will come across it at least once again. In fact, this chapter—taken together with the previous chapter—could very well be viewed as a detailed exegetical treatment of this very passage.

to such extremes as must tend to give us pause.⁹³

Indeed, Peirce's distance from James (and, as we will see, F. C. S. Schiller)⁹⁴ is made explicit in a 1904 letter from Peirce to James:

You and Schiller carry pragmatism too far for me. I don't want to exaggerate it but keep it within the bounds to which the evidences of it are limited. The most important consequent of it, by far, on which I have always insisted, as for example in my notice of Fraser's Berkeley in the *North American Review* of October, 1871, is that under that conception of reality we must abandon nominalism. That in my opinion is the great need of philosophy.⁹⁵

And so, one year after that letter to James, Peirce published an article ("What Pragmatism Is") in *The Monist*, in which he announces his name change with a significant dose of humour. Referring to himself in the third person as "the writer," Peirce first documents the rise of the word "pragmatism" from obscurity:

His word "pragmatism" has gained general recognition in a generalized sense that seems to argue power of growth and vitality. The famed psychologist, James, first took it up, seeing that his "radical empiricism" substantially answered to the writer's definition of pragmatism, albeit with a certain difference in the point of view. Next, the admirably clear and brilliant thinker, Mr. Ferdinand C. S. Schiller, . . . lit, in that most remarkable paper of his on *Axioms as Postulates*, upon the same designation "pragmatism," which in its original sense was in generic agreement with his own doctrine So far all went happily.⁹⁶

But, as one might expect, this was a mixed success:

⁹³ *CP* 5.3. Peirce's criticism is not limited to James; he also criticizes himself. Later in the same paragraph, he writes, "The doctrine appears to assume that the end of man is action — a stoical axiom which, to the present writer at the age of sixty, does not recommend itself so forcibly as it did at thirty. . . . Indeed, in the article of 1878, above referred to, the writer practised better than he preached; for he applied the stoical maxim most unstoically, in such a sense as to insist upon the reality of the objects of general ideas in their generality."

⁹⁴ Schiller, a British philosopher who settled in southern California at the end of his life (he died in 1937), is often listed with Peirce, James, and Dewey as the significant thinkers in shaping pragmatism's rise to prominence.

⁹⁵ *CP* 8.258. The Berkeley review he refers to can be found in *CP* 8.7–38.

⁹⁶ *CP* 5.414.

But at present, the word begins to be met with occasionally in the literary journals, where it gets abused in the merciless way that words have to expect when they fall into literary clutches. . . . So then, the writer, finding his bantling “pragmatism” so promoted, feels that it is time to kiss his child good-by and relinquish it to its higher destiny; while to serve the precise purpose of expressing the original definition, he begs to announce the birth of the word “pragmaticism,” which is ugly enough to be safe from kidnapers.⁹⁷

We have seen that Peirce feels his pragmatism has always implied a kind of realism, and that his new term pragmaticism is merely intended to return the reader to that original view. We now turn to the reasons Peirce gives for the connection between pragmaticism and realism.

7. Pragmaticism and Realism

We begin with an observation Peirce makes about a common feature in everyday life: “Five minutes of our waking life will hardly pass without our making some kind of prediction; and in the majority of cases these predictions are fulfilled in the event.”⁹⁸

Having been introduced to Peirce’s logic of relatives and its focus on generality, we are now moderately equipped to understand how Peirce continues: “Yet a prediction is essentially of a general nature, and cannot ever be completely fulfilled. To say that a prediction has a decided tendency to be fulfilled, is to say that the future events are in a measure really governed by a law.”⁹⁹ Here we see one of Peirce’s strongest and most repeated arguments for the connection between pragmaticism and realism: we

⁹⁷ *CP* 5.414. Thus far, even over a century later, the ‘ugliness’ seems to have had its intended effect.

⁹⁸ *CP* 1.26.

⁹⁹ *CP* 1.26.

successfully predict.

Perhaps the most famous version of this argument comes from what are commonly called the Lowell Lectures,¹⁰⁰ a series of seven lectures given at Harvard in the spring of 1903. In the fourth lecture, “The Reality of Thirdness,” Peirce begins with a memorable illustration:

I proceed to argue that *Thirdness* is operative in Nature. Suppose we attack the question experimentally. Here is a stone. Now I place that stone where there will be no obstacle between it and the floor, and I will predict with confidence that as soon as I let go my hold upon the stone it will fall to the floor. I will prove that I can make a correct prediction by actual trial if you like. But I see by your faces that you all think it will be a very silly experiment. Why so? Because you all know very well that I can predict what will happen, and that the fact will verify my prediction.¹⁰¹

As before, Peirce is not content to accept the assertion that our successful ability to predict is simply an “ultimate fact,” an unexplainable given. Instead, Peirce pushes further:

But *how can* I know what is going to happen? You certainly do not think that it is by clairvoyance, as if the future event by its existential reactivity could affect me directly, as in an *experience* of it, as an event scarcely past might affect me. You know very well that there is nothing of the sort in this case. Still, it remains true that I *do know* that that stone will drop, as a *fact*, as soon as I let go my hold. If I *truly know* anything, that which I know must be *real*. It would be quite absurd to say that I could be enabled to know how events are going to be determined over which I can exercise no more control than I shall be able to exercise over this stone after it shall have left my hand, that I can so peer in the future merely on the strength of any acquaintance with any pure fiction.¹⁰²

And so, Peirce sets up the choice between realism and nominalism, between law-as-real-general and law-as-convenient-fiction. To guide his audience through the choice—and in

¹⁰⁰ There seems to be some confusion as to whether they *should* be called the Lowell Lectures. The editors of the *Collected Papers* write, “[Peirce] states that they were delivered at the Lowell Institute; the available records, however, show that they were given in Sever Hall, Harvard, under the auspices of the Harvard department of philosophy” (Volume V, p. 11).

¹⁰¹ *CP* 5.93.

¹⁰² *CP* 5.94.

a typically pragmatic approach (getting at their beliefs through their actions)—he playfully but seriously appeals to their self-interest, and to observable results:

I know that this stone will fall if it is let go, because experience has convinced me that objects of this kind always do fall; and if anyone present has any doubt on the subject, I should be happy to try the experiment, and I will bet him a hundred to one on the result. . . . If I were to predict that on my letting go of the stone it would fly up in the air, that would be mere fiction; and the proof that it was so would be obtained by simply trying the experiment. That is clear.¹⁰³ On the other hand, and by the same token, the fact that I *know* that this stone will fall to the floor when I let it go, as you all must confess, if you are not blinded by theory, that I *do* know—and you none of you care to take up my bet, I notice—is the proof that the formula, or uniformity, as furnishing a safe basis for prediction, is, or if you like it better, *corresponds to*, a reality.¹⁰⁴

For Peirce, what is important in all of this is the *present fact* of prediction, which—as Boler nicely describes—leads to a question of metaphysics:

If I know *now* that the stone will fall—and it is essential that Peirce pick a case where I am willing to say that I do know what will happen—then what is the object of my knowledge? The fact “that the stone will fall” is not a future fact but a fact about the future; and to know at present a fact about the future is just the oddity that Peirce is interested in pointing out.¹⁰⁵

Ultimately, prediction shows there is something real now that accounts for a future actuality; and since the only actuality involved is the future event, the present reality must be a possibility.¹⁰⁶

¹⁰³ We will see this theme again later, under the heading “fallibilism,” which is Peirce’s term for the admission that *some* generals are *indeed* fictions: sometimes we just get it wrong. However, not *all* generals are fictions, and the only way to sort out the real from the fictitious is through experimentation or some other empirical exploration of the world. Peirce has given us one example of a fictitious general: ‘All stones, when released, fly up in the air.’ We could, of course, think of many others. On page 103, for instance, we saw Peirce call Kepler’s work on the laws of planetary motion some of the best retrodution done in the history of science. That work, however, included many proposed general statements about the orbits of the planets that turned out, after the painstaking work of checking the statements against Tycho Brahe’s astronomical data, to be fictions. Eventually Kepler hit upon general statements that were real, but the way he sorted out the real from the fictitious was through empirical data.

¹⁰⁴ CP 5.95–96.

¹⁰⁵ Boler 1963, 110.

¹⁰⁶ Boler 1963, 147.

Possibilities like these are called would-be's by Peirce, and it is in *would-ness* that Peirce ultimately finds the true meaning of predicates like "hard." In fact, as we have already seen, Peirce revises his original formulation of pragmatism with just this kind of thinking: "I *now* say that experiment will prove that the diamond is hard, as a positive fact. That is, it is a real fact that it *would* resist pressure" ¹⁰⁷

Three years after his Lowell Lectures, in 1906, Peirce says that his pragmatism means that predicates like "hard"

carry some implication concerning the general behaviour either of some conscious being or of some inanimate object, and so convey more, not merely than any feeling, but more, too, than any existential fact, namely, the "would-acts," "would-dos" of habitual behaviour; and no agglomeration of actual happenings can ever completely fill up the meaning of a "would-be." ¹⁰⁸

This is because

the *total* meaning of the predication of an intellectual concept is contained in an affirmation that, under all conceivable circumstances of a given kind (or under this or that more or less indefinite part of the cases of their fulfillment, should the predication be modal) the subject of the predication would behave in a certain general way — that is, it would be true under given experiential circumstances (or under a more or less definitely stated proportion of them, *taken as they would occur*, that is in the same order of succession, *in experience*). ¹⁰⁹

And so, returning once again to that troublesome diamond and taking on the question of

¹⁰⁷ *CP* 8.208.

¹⁰⁸ *CP* 5.467.

¹⁰⁹ *CP* 5.467. Notice, here, that unlike the Humean insistence that a law must describe a perfect regularity, Peirce suggests that a law may be real without being 'perfect.' We will return to this when we return to Cartwright in Chapter 5, but for now I would like to point out that Peirce's metaphysics supports this through the category of Firstness: chance, leading to genuine novelty, is a real mode of being, a real constituent of reality. As such, even should Thirdness (and the 'reign of law') advance for eternity—as Peirce's speculative, evolutionary cosmology suggests—it will never be the case that laws of nature are always and everywhere obeyed. This view that chance/randomness/spontaneity is a *genuine* feature of reality (and not merely the result of epistemological inadequacy) was named, by Peirce himself, "tychism," from the Greek word for chance (see *CP* 6.102).

its hardness from the perspective of his new and improved pragmatism, Peirce writes that

we must dismiss the idea that the occult state of things (be it a relation among atoms or something else), which constitutes the reality of a diamond's hardness can possibly consist in anything but in the truth of a general conditional proposition.¹¹⁰ For to what else does the entire teaching of chemistry relate except to the "behavior" of different possible kinds of material substance? And in what does that behavior consist except that if a substance of a certain kind should be exposed to an agency of a certain kind, a certain kind of sensible result *would* ensue, according to our experiences hitherto. As for the pragmatist, it is precisely his position that nothing else than this can be so much as *meant* by saying that an object possesses a character. He is therefore obliged to subscribe to the doctrine of a real Modality, including real Necessity and real Possibility.¹¹¹

Which brings us back to the question of realism versus nominalism, and to the previously mentioned argument for the link between Peirce's realism and his pragmatism: the *fact* that we successfully predict.

[M]y argument to show that law is reality and not figment, — is in nature independently of any connivance of ours, — is that predictions are verified. Nobody will maintain that these verifications are chance coincidences. Nor can [the highly nominalistic] Prof. Pearson explain how Newton and Laplace have been influential in producing eclipses at the moments they were called for by theory. He does not attempt it.¹¹²

Pragmatism requires would-be's in order to make sense of even simple predicates (like hardness); would-be's are understood as laws; and laws are used to make predictions that can be empirically verified. None of this is intelligible to the pragmatist if the laws are

¹¹⁰ Recall Peirce's insistence that illation is the fundamental logical principle, and that therefore *every* proposition is at heart a conditional proposition.

¹¹¹ CP 5.457. This grounding of an object's character in the mode of would-be, based upon predictable 'measurables' is what leads Peirce, in Boler's view, to add *law* to the medieval list of the types of universals (genus, species, accident, property, and specific difference), increasing the list from five to six (see Boler 1963, 44 & 81, keeping in mind that in this discussion Boler sometimes uses "universal" and "predicable" interchangeably). Whether or not Boler is correct about that, what *is* certain is that Peirce sometimes frames the medieval problem of universals in terms of *law*.

¹¹² CP 8.153.

fiction, for then the *fact* of our many, many successful predictions (including the behaviour of the dropped stone at Harvard) would be nothing more than remarkable coincidences. The nominalist cannot *explain* our successful predictions; he can only accept them as intrinsically unexplainable givens, as ultimate facts. The pragmatist *can* explain our successful predictions, but to do so he must presuppose realism. Hence, “pragmatism could hardly have entered a head that was not already convinced that there are real generals.”¹¹³

8. The Categories

We have now covered two of the three “other conceptions” that Peirce added to the philosophy of Scotus, and which he said took Scotistic realism back away from the brink of nominalism and rendered it harmonious with physical science. Actually, one might say that we have covered all three conceptions, given that we have already introduced ourselves to Peirce’s Categories in Chapter 2. Therefore, rather than reiterate the basics of Firstness, Secondness, and Thirdness, I will build on Chapter 2 and discuss the relationship of the Categories to the logic of relatives, pragmatism, and Scotistic realism.

The Categories and the Logic of Relatives

Randall Dipert argues not only for the importance but also for the *priority* of the logic of relatives, as connected to the Categories:

¹¹³ CP 5.503.

[Peirce] himself said on numerous occasions — when he wasn't emphasizing his role as a working scientist with the Coast Survey, that is — that he was mainly a logician. . . . Logic, especially the logic of relations, played a central role in the development of his philosophy. His three Categories were based on, and shown to be fundamental by, the logic of relations.¹¹⁴

While the link between logic and the Categories is unarguable, and while a very good case can be made for the chronological priority of Peirce's work in logic to his more mature understanding of the Categories, it is (in my view) not the case that Peirce's final opinion involved the view that logic was ontologically prior to the Categories. Rather, a much more likely account—and one that is consistent with his all-pervading realism—is that Peirce first formulated the Categories as a *result* of his logic studies, but that the Categories then took on a metaphysical life of their own as Peirce saw them 'at work' in all areas of human knowledge and experience (as we saw in Chapter 2). Although one might accuse of Peirce of speaking his Categories into existence in all these fields, or of seeing just what he wanted to see, an excerpt from a 1904 letter seems to undermine that view and support the account I favour (contra Dipert):

This sort of notion is as distasteful to me as to anybody; and for years, I endeavored to pooh-pooh and refute it; but it long ago conquered me completely. Disagreeable as it is to attribute such meaning to numbers, and to a triad above all, it is as true as it is disagreeable.¹¹⁵

Although Dipert and I may disagree about the exact ontological relationship between the Categories and the logic of relatives, it is certainly the case that logic assisted Peirce in

¹¹⁴ Dipert, 287.

¹¹⁵ *CP* 8.328. We have already seen this passage in Chapter 2, page 63, while exploring Peirce's phenomenology. Whether Peirce is actually as averse to triads as he makes himself out to be could certainly be a matter for debate: he often seems to go out of his way to create triadic divisions. On the other hand, if he came to be convinced that triads best reflect the *structure* of reality—and the next passage does seem to suggest that—then his frequent use of triads in the *study* of reality would be understandable and, indeed, inevitable.

naming the Categories. Writing in 1898, Peirce says that

the recurrence of triads in logic was quite marked, and must be the croppings out of some fundamental conceptions. I now undertook to ascertain what the conceptions were. This search resulted in what I call my categories. I then [in 1867] named them Quality, Relation, and Representation. But I was not then aware that undecomposable relations may necessarily require more subjects than two; for this reason *Reaction* is a better term. Moreover, I did not then know enough about language to see that to attempt to make the word *representation* serve for an idea so much more general than any it habitually carried, was injudicious. The word *mediation* would be better. Quality, reaction, and mediation will do. But for scientific terms, Firstness, Secondness, and Thirdness, are to be preferred as being entirely new words without any false associations whatever.¹¹⁶

The names make very good logical sense: after all, we have already learned that Firstness refers to the mode of being of that which refers to nothing else, Secondness to the mode of being of that which involves opposition with one other thing, and Thirdness to the mode of being of that which mediates between *two* other things.

The Categories and Pragmaticism

The relationship between the Categories and pragmaticism is so deep and interconnected that one should write either a paragraph or a dissertation. Because I already have a dissertation underway, I will limit myself to a paragraph. Perhaps the most obvious connection to be made is between pragmaticism and Thirdness. In fact, one could argue that pragmaticism is simply thought that takes the *reality* of Thirdness seriously. The emphasis on would-be's—alternatively called laws, habits, or capacities—is precisely an emphasis on Thirdness. We are brought back to the first iteration of Category definitions we saw in Chapter 2:

¹¹⁶ CP 4.3. Yet again we see Peirce's tendency to coin new terms, but this time we are given a reason: to avoid false associations.

My view is that there are three modes of being. I hold that we can directly observe them in elements of whatever is at any time before the mind in any way. They are the being of positive qualitative possibility, the being of actual fact, and the being of law that will govern facts in the future.¹¹⁷

Pragmaticism takes seriously the tychism of Firstness (by allowing that laws may result in merely a *proportion* of predictable outcomes, as opposed to an always-and-everywhere-obeyed approach to natural laws),¹¹⁸ the brute “actual facts” of Secondness, and the reality of Thirdness that shapes future facts (and is *known* by us, as evidenced by our ability to successfully predict). Clearly, the Categories provide the metaphysical underpinnings for Peirce’s *realistic* pragmaticism.

The Categories and Scotistic Realism

Without question, Peirce saw himself as operating within the scholastic tradition. But equally without question, the Categories represent an *addition* to the philosophy of Scotus. A question among some Peirce scholars, then, involves the precise relationship between Peirce’s Categories and Scotus’s realism. John Boler and Edward C. Moore both see the relationship as perhaps more implicit than explicit: in Scotistic realism Peirce finds a philosophical system that acknowledges three modes of being.¹¹⁹ Robert

¹¹⁷ CP 1.23.

¹¹⁸ Notice that this places Peirce and Cartwright in the same position of arguing *against* what Cartwright calls “scientific fundamentalism.” We will return to this in Chapter 5.

¹¹⁹ Although, as we have already seen in Chapter 3 (see page 133), Boler and Moore do not seem to agree on what Scotus’s three modes of being *are*. Boler calls them the logical, the physical, and the metaphysical. Moore calls them potential matter, potential form, and haecceity. While they may both be right about the *general* influence of Scotus’s three modes of being, I suspect that Boler is closer to the *particular* truth. A detailed exploration of the debate would be a distraction here, but it is noteworthy that Boler says, “Moore’s otherwise excellent thesis is somewhat diminished by” the fact that Moore has not “gone beyond a rather uncritical reading of secondary sources on Scotus” (Boler 1963, 6, n. 13). As a result, says Boler, Moore “finds

Almeder argues a more negative thesis: Peirce's Categories *cannot* be successfully translated into Scotistic terms, despite attempts at such a translation by some Peircian scholars:

E. C. Moore, R. Goodwin, and T. Goudge find the Scotistic solution to the problem of universals in Peirce's doctrine on the categories. They claim that Scotus' *Common Nature*, *Haecceitas*, and *Logical Universal* correspond in nature and function with Peirce Firstness, Secondness and Thirdness.¹²⁰

Almeder rightly argues against this. Concerning Firstness, he says, "Whatever the *Common Nature* is for Scotus, it definitely is not a phenomenal suchness [as is Firstness]."¹²¹ Concerning Secondness, he points out that (for reasons we will explore shortly) in Peirce's philosophy there is no equivalent to the *contraction* of the universal performed by haecceity in Scotus's philosophy. As a result, writes Almeder:

If the nature of a principle of individuation [haecceity] is to be specified in terms of its function as contracting the universal (as is the case in Scotus), then the principle of individuation could not be the same in Scotus and Peirce.¹²²

And concerning Thirdness, he dismisses the possibility that Scotus's *logical* universal (a *second* intention) could be equated in any way with Thirdness, which "is not simply an *ens mentis* with a foundation in fact; it is real operative law, mediation or habit in the universe."¹²³ In fact, says Almeder:

Not only do the Scotistic notions of *Common Nature*, *Haecceitas* and *Logical Universal* not correspond in nature and function with Firstness, Secondness, and

Scotus's position on universals to be very nearly the same as that of Aquinas" (Boler 1963, 56).

¹²⁰ Almeder 1980, 174. Almeder is referring to Moore 1952 and 1964, Goodwin 1961, and Goudge 1950.

¹²¹ Almeder 1980, 174.

¹²² Almeder, 175.

¹²³ Almeder, 175.

Thirdness, but also there is nothing in Scotus' thought that can stand as a counterpart for Firstness or Thirdness.¹²⁴

As such, he argues, any attempt at such a translation must fail.¹²⁵ Perhaps the best analysis is offered by Boler in his 2004 essay, "Peirce and Medieval Thought." In it, he makes a connection *not* to scholastic modes of being but to what he calls an "appeal" to special constituents of the real:

What makes for *Scholastic* realism is the appeal to "constituents," not to real things that are thoughtlike but rather to an aspect of things that must be real if our knowledge is objective.¹²⁶

[T]he ground for Peirce's later identification of (three) modes of being can be found, even in this original presentation, in the genuinely "Scholastic" appeal to constituents, i.e., to a structure in things analogous to the structure of predication.¹²⁷

But Boler warns that, without care, it would be possible to miss the most important difference between Peirce and Scotus: the status of the individual.

[O]ne might be led to think that Peirce means to be talking, as Scotus is, about aspects or features of the sorts of individuals that the medievals (and most of the rest of us) take as making up the familiar world in which we live. On this approach, Firstness, Secondness, and Thirdness could be seen as, say the quality, brute existence, and lawlike behavior exhibited by first substances. Properly understood, however, familiar physical objects for Peirce are lawlike processes, systems, *constituted* by Firstness, Secondness, and Thirdness rather than being supportive of

¹²⁴ Almeder, 176.

¹²⁵ *Although*, Almeder says, "The most that can be said is that what Peirce *meant* by Thirdness corresponds with what Scotus meant by the *Common Nature* as contracted" (176). This is a very strange statement, considering that Almeder has just established (correctly) that Peirce's Thirdness could in no way be conceived as ever *contracted* into the realm of Secondness ("the mode of individuality"). Perhaps he was trying to establish that Thirdness (for Peirce) and the Common Nature (for Scotus) *do* share the power to shape events or objects in what we call the mode of individuality, but even then their causal powers are quite different: Scotus's needs to operate *within* individual suppositis; Peirce's does not.

¹²⁶ Boler 2004, 69–70.

¹²⁷ Boler 2004, 71. Remember—as we have seen in our section on the logic of relatives—the "structure of predication" is much more complex for Peirce than for Scotus.

them.¹²⁸

If Scotus had formulated the Peircian Categories, Boler is saying, Scotus would have described them in the first way Boler mentions: as various aspects of the reality of supposita. Ultimately, for Scotus, the supposita would be ontologically prior to the Categories. But for Peirce, says Boler, the reverse is true: supposita do not support the Categories; rather, the Categories support—or are ontologically prior to—supposita. The Categories provide the larger context *within which* supposita ‘live and breathe and have their being.’

The Categories, Individuals, and Singulars

This emphasis on the status of the individual as one of the primary distinctions between Scotus and Peirce leads us to another aspect of the relationship between Scotistic realism and the Peircian Categories, one to which Boler alludes at the end of the previous passage. What exactly *are* those things we commonly call individuals? Do individuals (as conceived by the Scholastics) actually exist? These are very large questions, and Peirce scholars do not agree on the answers Peirce would have given. I will survey the various positions in order to give the reader a sense of the larger debate.

We begin in 1952, with the publication of Charles K. McKeon’s essay, “Peirce’s Scotistic Realism.” In it, McKeon portrays Peirce as a philosophical example of Newton’s third law of motion.¹²⁹ “To counter the nominalistic view that ‘universals have an unreal mode of being,’ Peirce tends to the contrary, but contradictory, idea that

¹²⁸ Boler 2004, 71.

¹²⁹ For each action, there is an equal and opposite reaction.

‘individuals have an unreal mode of being.’”¹³⁰ To demonstrate this, McKeon makes use of the following comment from Peirce:

The absolute individual can not only not be realized in sense or thought, but cannot exist, properly speaking. For whatever lasts for any time, however short, is capable of logical division, because in that time it will undergo some change in its relations. But what does not exist for any time, however short, does not exist at all. All, therefore, that we perceive or think, or that exists, is general.¹³¹

This leads McKeon to describe individual existence, for Peirce, as “a limit to be approached but never reached,” and to conclude that Peirce has, as one of his “doctrinal tendencies,” “the denial of existence or value to the individual”¹³²

While it is not clear whether Boler read McKeon’s essay, we do know that he refers to the book in which it appears. Whatever the case, eleven years after McKeon’s essay, Boler publishes very nearly the same conclusion, saying that Peirce “is emptying the physical mode of its content,” and that “the denigration of the individual is no mere by-product of Peirce’s theory; it is just what he wants.”¹³³ Boler goes on to flesh out these claims—and make them far more philosophically interesting—through the use of Peirce’s logic of relatives:

Peirce not only holds that Socrates is not an event, but he goes on to say that

¹³⁰ McKeon 1952, 250.

¹³¹ *CP* 3.93, n. 1. By “absolute individual,” Peirce is referring to what he elsewhere calls the “more formal” of two possible definitions of individual: “an individual is an object (or term) not only actually determinate in respect to having or wanting each general character and not both having and wanting any, but is necessitated by its mode of being to be so determinate” (3.611). Any change in an object’s relations, then, no matter how small, would indicate that the object is less than fully determinate and is therefore not an *absolute* individual.

¹³² McKeon 1952, 247.

¹³³ Boler 1963, 64.

Socrates is not strictly an individual.¹³⁴

What we call “things” are not strictly individuals but generals. Socrates is not just a member of a collection, partaking in generality through his similarity to other men; he is a fragment of a system (as in [CP] 4.5). A dynamic process himself, the human person is continuous with that system which is humanity and which is, in turn, continuous with the whole evolution of Reason.¹³⁵

Whether Boler is correct in this analysis of human individuals is open to question, of course. I suspect he is right about Socrates *in particular* but wrong about Peirce’s approach to individuality *in general* (for reasons yet to come).

Moving forward yet another 11 years, we come to Gresham Riley’s article, “Peirce’s Theory of Individuals.” In it, he takes Boler to task, arguing (correctly, I think) that Boler’s analysis is inadequate and misleading. Interestingly—and as a helpful reminder of why we are discussing all of this in the midst of a section on Peirce’s Categories—Riley writes that the cause of Boler’s mistaken analysis is his lack of understanding of the true nature of the Categories,¹³⁶ and of their relationship to the world as we experience it (primarily through our interaction with suppositis):

One crucial assumption which Boler must make if his interpretation is to be plausible is that Secondness and Thirdness, as categories, are not only irreducible but also separable. Secondness and Thirdness have to be totally independent; otherwise, Boler could not assert that the universal is never a “part” of the individual or that the individual (an example of Secondness) is a mere reaction event devoid of meaning. Boler in fact makes this assumption and in so doing distorts Peirce’s realism and his view of individuals.¹³⁷

¹³⁴ Boler 1963, 109.

¹³⁵ Boler 1963, 141.

¹³⁶ This also helps to explain why we spent an entire chapter on Peirce’s Categories: no understanding of Peirce’s philosophy is adequate without a thorough grounding in the Categories. And because Peirce’s philosophy is so inter-connected, a deficient understanding of the Categories can lead to misunderstandings almost everywhere else in Peirce’s philosophy.

¹³⁷ Riley 1974, 151. Indeed, Boler does describe “Peirce’s own attitude toward the individual as a second that contains no thirdness at all” (Boler 1963, 72, n. 26).

Having identified what he feels is Boler's mistake (the separability of the Categories), Riley goes on to describe three principles that would result in a better understanding of the relationship, as Peirce himself sees it, between the Categories and individuality:

(a) [A] proper understanding of Peirce's categories suggest that there is no place within his metaphysics for mere reaction events (pure Secondness). All three categories are constitutive of every thing and every event. Consequently, Thirdness, as the category of meaning, is pervasive in all that is real.

(b) A proper understanding of Thirdness suggests that it presupposes Secondness for its intelligibility as a category. Secondness is constitutive of every thing and every event. Consequently, whatever is analyzable in terms of Thirdness is analyzable in terms of Secondness, is individual, and possesses self-identity.

And (c) the relation between Secondness and Thirdness is not made mysterious by Peirce's rejection of the Scotistic doctrine of contraction. The general *governs* but is not *in* the individual.¹³⁸

For Riley, then—and contrary to what Boler says—it is a Peircian non-negotiable that “every experience as well as all things contain an element of all three categories even though one of the three may be dominant in any given situation.”¹³⁹

Six years later, in 1980, Robert Almeder published *The Philosophy of Charles S. Peirce: A Critical Introduction*. While on the one hand he oversimplifies the issue by saying that Peirce “turned Pragmatism into extreme scholastic realism by simply denying the existence of individuals,”¹⁴⁰ he also adds a chronological awareness of the

¹³⁸ Riley 1974, 159–160. We will soon return, albeit briefly, to the question of the inseparability of the Categories when we discuss the possibility of Scotus's *formal distinction* as the proper way to understand the distinctions among the Categories.

¹³⁹ Riley 1974, 152.

¹⁴⁰ Almeder 1980, 179. This is a highly problematic statement, linking Peirce's self-named “extreme scholastic realism” with a simple denial of the existence of individuals. As I hope will become clear, the logic of relatives does not involve a simple denial of the existence of individuals, but an adjustment in the understanding of what an individual *is*. Not only that, but extreme scholastic realism (as we will see) is a *positive* doctrine (it is concerned to say what *is*), not just a denial (saying what is *not*).

development of Peirce's thought. This awareness leads to a helpful distinction:

Up until the 1890s Peirce had explicitly denied the existence of individuals on the grounds that the vagueness and generality of all our predicates makes it impossible that anything ever be rendered completely determinate. Peirce defined an individual as that which is absolutely determinate with respect to having or not having every known property. If this definition is taken literally no absolute individual (except the universe itself) can exist (3.393, n. 1, 1870). . . . But for the purpose of discourse we may neglect some aspect of an object and treat it as though it were an individual completely determinate, except with reference, for example, to temporal relations. An object so treated Peirce called a *singular* and a singular is one in number from a particular point of view (3.93).¹⁴¹

Almeder's analysis allows us to say two things. First, considered from the perspective of the formal definition of the individual, it is true that Peirce denied the existence of the absolute individual.¹⁴² But second, it is also true that Peirce acknowledged the existence of what Almeder calls a "singular." In fact, Almeder believes that "when Peirce uses the term 'individual' it stands metaphysically for 'singular' as Peirce understood it."¹⁴³

¹⁴¹ Almeder 1980, 171. This act—consideration of one feature of an object while setting aside (or "neglecting") other features—is called "precise abstraction" (CP 4.332) or "pre-scission" (CP 5.449) by Peirce.

¹⁴² Peirce argues that the individual conceived as absolutely determinate would be a logical atom: "The logical atom, or term not capable of logical division, must be one of which every predicate may be universally affirmed or denied" (CP 3.93). After arguing that this sort of term could not possibly be perceived through the senses (which are too specialized to perceive all possible predicates), Peirce also argues that the logical atom could not be perceived through thought: "In thought, an absolutely determinate term cannot be realized, because, not being given by sense, such a concept would have to be formed by synthesis, and there would be no end to the synthesis because there is no limit to the number of possible predicates" (CP 3.93). In fact, says Peirce, "Just as in mathematics we speak of infinitesimals and infinites, which are fictitious limits of continuous quantity, and every statement involving these expressions has its interpretation in the doctrine of limits, so in logic we may define an *individual* . . . as such a term The individual and the simple, as here defined, are ideal limits, and every statement about either is to be interpreted by the doctrine of limits" (CP 3.216).

¹⁴³ Almeder 1980, 174. Almeder has good reason to think this. Peirce says, "This distinction between the absolutely indivisible and that which is one in number from a particular point of view is shadowed forth in the two words *individual* . . . and *singular* . . . ; but as those who have used the word *individual* have not been aware that absolute individuality is merely ideal, it has come to be used in a more general sense" (CP 3.93). Almeder's argument is that Peirce himself has relaxed his usage of the word.

Almeder describes how this plays out in an understanding of the laws of nature:

[I]f a universal must have real instances, I see no reason why it cannot be instanced in “singulars” (as Peirce conceived them) rather than individuals. The behavior of *this* stone when released is an instance of “all stones when released, fall to the earth.” Even *this* stone (and its behavior when released) is not an individual (as determined by Peirce) rather than a singular.¹⁴⁴

Perhaps the concept of “singular,” as described here, is what leads Peirce to offer a second (and what he calls a “preferable”) definition of individual: “something which reacts. . . . Thus any portion of space, so far as it can be regarded as reacting, is for logic a single individual”¹⁴⁵

Skip ahead 13 more years, and we come to 1993 and the end of this brief survey.

Joseph Margolis, in his essay, “Peirce’s View of the Vague and the Definite,” explores how this understanding of a “singular” shapes Peirce’s view of the self. He begins with Peirce’s own words:

[A] person is not absolutely an individual. His thoughts are what he is “saying to himself,” that is, is saying to that other self that is just coming into life in the flow of time. When one reasons, it is that critical self that one is trying to persuade; and all thought whatsoever is a sign, and is mostly of the nature of language.¹⁴⁶

Margolis understands this to mean that the self, the human “individual,” is in fact understood by Peirce to be a “continuum of evolving selves” or a “continuous series of

¹⁴⁴ Almeder 1980, 174.

¹⁴⁵ CP 3.613. Add to this Peirce’s emphasis on continuity, and what is being described is very likely something like ‘a connected continuum of reactions’—language akin to what will soon be offered as Peirce’s view of the human self.

¹⁴⁶ CP 5.421. Elsewhere we find an example of a singular (for which the term *individual* is nevertheless used), when Peirce writes: “Such a term as ‘the second Philip of Macedon’ is still capable of logical division — into Philip drunk and Philip sober, for example; but we call it individual because that which is denoted by it is in only one place at one time. It is a term not *absolutely* indivisible, but indivisible as long as we neglect differences of time and the differences which accompany them” (CP 3.93).

selves,”¹⁴⁷ and that it is “the continuity of a certain regular order of experience and behavior that individuates—without altogether eliminating indeterminacy—one self from another”¹⁴⁸

This ends our brief survey of the debate over Peirce’s views on the existence of individuals. We need not come to a conclusion here. In fact, whatever the eventual consensus on Peirce’s views, we have established the central point: because the question of the existence of individuals is so closely linked to the understanding of Peirce’s Categories, here is yet another way in which the relationship between the Categories and Scotistic realism is a philosophically rich and interesting issue. We conclude our analysis of this relationship with a look at the formal distinction.

The Categories and the Formal Distinction

As we saw in Chapter 3, the formal distinction is a crucial part of Scotus’s realism. It is the way Scotus understands the distinction between what Boler calls the “constituents of reality” that must be presupposed if our knowledge of the world is to have scientific objectivity.¹⁴⁹ And now, in Chapter 4, we see that the Categories are in many ways the same thing: the necessary constituents of reality, presupposed by Peirce’s

¹⁴⁷ Margolis 1993, 147.

¹⁴⁸ Margolis 1993, 149. Notice what this does. It allows for the ‘common sense’ talk of things, individuals, and selves, while simultaneously acknowledging and affirming indeterminacy and vagueness—or, to risk a bit more foreshadowing, what Cartwright calls the “dappledness” of things. We will return to the topic in Chapter 5.

¹⁴⁹ Although, according to Grajewski, formalities cannot be said to *constitute* a thing (Grajewski 1944, 96). If this is to be pursued, it needs to be determined whether Boler and Grajewski mean precisely the same thing by “constituent.” One indication that they do *not* is in Boler 2004, where he equates “constituents” with “formalities” (Boler 2004, 82, n. 61).

logic of relatives, pragmatism, and philosophy of science.

So then: *how* are the Categories distinct? Given Peirce's indebtedness to (and great respect for) Scotus, does Peirce make use of Scotus's formal distinction? No matter how obvious this question may seem to us, it does not seem to have occupied Peirce. While obviously *aware* of Scotus's formal distinction—"His theory of 'formalities' was the subtlest, except perhaps Hegel's logic, ever broached"¹⁵⁰—Peirce appears never to have considered it in anything other than its historical context.¹⁵¹

What is more remarkable than Peirce's apparent silence on the matter is the echoing silence of his commentators—especially so when the *shape* of such an investigation is simple to imagine: start with a definition of the formal distinction, and see if it applies to the Categories. As we saw in Chapter 3, Grajewski identified three necessary characteristics of the formal distinction, as understood by Scotus: it must be (1) a *real* distinction, based on the nature of an extramental, real thing; (2) between formalities (not *things*) which really and only exist in the same thing and therefore are *never* said to actually exist separately from each other; and (3) the formalities must have definitions that do not include each other (they are each conceivable without the other). As I see it, the first and second characteristics would be quite easy to establish as compatible with Peirce's doctrine of the Categories: as we have already seen, the Categories are both *real* and *inseparable*. The third characteristic, however, would be more difficult to argue, as there are indeed times when Peirce seems to say that Thirdness

¹⁵⁰ CP 8.11. See also CP 8.19–20.

¹⁵¹ In CP 2.166, for instance, Peirce is interested in the antipathy the formal distinction (and the overall subtlety and intricacy of Scotus's philosophy) generated in Ockham and his followers.

presupposes or involves the other two Categories.¹⁵² To argue in favour of the formal distinction as operating among the Categories, one would have to establish that what Peirce means by presupposition or involvement is *not* what Grajewski means by inclusion or conceivability.

I will not launch such an investigation here; it is a minor issue in our project to link Peirce and Cartwright. But as I have said, what is remarkable is that no Peircian commentator (that I am aware of) *has* launched such an investigation.¹⁵³ I have said that Peirce's commentators have been silent on the matter; perhaps I should have said *nearly* silent. Boler, for instance, drops hints:

[P]ragmatism also indicates that the would-be is independent of the individual actualities, and therefore that the law is not contracted in the individual. The laws are not simply other individual things: they are of a different mode of being. Relative to the mind—indeed, idea-like in character—they are nevertheless real; and Peirce follows Scotus in calling them realities.¹⁵⁴

To be most accurate, Boler should probably have used the term “Pragmaticism,” but the point is still made and the hint still dropped: *following* Scotus, Peirce calls modes of

¹⁵² As, for example: “Not only does Thirdness suppose and involve the idea of Secondness and Firstness, but never will it be possible to find any Secondness or Firstness in the phenomenon that is not accompanied by Thirdness” (*CP* 5.90). We see here a clear statement of inseparability, but also of *supposition* and *involvement*.

¹⁵³ Murray G. Murphey, in 1961's *The Development of Peirce's Philosophy*, sees the relationship between Peirce and the formal distinction in a modified form that would preclude such an investigation. Murphey points to *CP* 1.549, where Peirce presents three types of distinctions (discrimination, dissociation, and precision), and then suggests that these distinctions are roughly analogous to Scotus's logical, real, and formal distinctions. Only a rough analogy is required, since Murphey suggest that the relationship of Scotus to Peirce (at least, on these distinctions) is one of *influence* rather than *origin*. “Thus is seems very likely that what Peirce has done is to take from Scotus a theory of the degrees of differentiation which he needed for his own purposes, and to reinterpret it so as to make it consistent with his own phenomenalism” (Murphey 1961, 131).

¹⁵⁴ Boler 1963, 66.

being “realities.” Considering that Boler elsewhere identifies “realities” with “formalities,”¹⁵⁵ the hint gets less and less subtle.¹⁵⁶

The Categories and Theological Speculation

One final observation, which I add here as an interesting aside. I mentioned in Chapter 3 (page 132) that the formal distinction was first used in a theological context, as Scotus worked through the doctrine of the Trinity. In Peirce, there is a moment where that same doctrine makes a subtle appearance. It occurs as Peirce is criticizing Hegel for recognizing *only* Thirdness:

Had Hegel, instead of regarding the first two [Categories] with his smile of contempt, held on to them as independent or distinct elements of this triune Reality, pragmatism might have looked up to him as the great vindicator of their truth.¹⁵⁷

Notwithstanding Peirce’s use of the word “independent” (which, depending on its precise meaning, might rule out the formal distinction before we can even begin), here we have the word “distinct” all but ready to receive the word “formally” as a prefix—with triune Reality as the noun being described. Admittedly, thus far this connection—between Scotus’s formal distinction and “triune Reality” (which may imply a Triune source)—is an appearance of the doctrine of the Trinity that is very subtle indeed. But recall (again, see page 132) that Scotus’s formal distinction made it possible for his metaphysics to be a “science of reality,” and the parallel with Peirce’s Categories becomes a bit stronger.

Furthermore, there is another connection that may be grounded in Christian

¹⁵⁵ Boler 1963, 54 (as we already saw in Chapter 3—see note on page 132).

¹⁵⁶ He uses the term “realities” again on p. 150.

¹⁵⁷ *CP* 5.436.

doctrine (or the vestigial remnants of it): the link between thought and reality. According to Margolis, Peirce sees the Categories “within the triune whole of thought and reality.”¹⁵⁸ As we will see, Peirce does not consider thought and reality as two completely distinct things; he does not accept the sharp internal/external divide between our inner thoughts and the outer reality that helps shape them.¹⁵⁹ Rather, in the intertwining of thought and reality (or in placing them near each other on a continuum of sorts), Peirce asserts that the structure of reality really does match the structure of our thoughts. He anticipates the obvious objection:

I hear you say: “This smacks too much of an anthropomorphic conception.” I reply that every scientific explanation of a natural phenomenon is a hypothesis that there is something in nature to which the human reason is analogous; and that it really is so all the successes of science in its applications to human convenience are witnesses. They proclaim that truth over the length and breadth of the modern world. In the light of the successes of science to my mind there is a degree of baseness in denying our birthright as children of God and in shamefacedly slinking away from anthropomorphic conceptions of the universe.¹⁶⁰

Here, then, we see another subtle reference to Christian theology: the idea that humans might be, in some metaphorical way, children of God. Sometimes this idea is called the *Imago Dei*: the claim that humanity, sharing some divine characteristics,¹⁶¹ is made in the image of God.

¹⁵⁸ Margolis 1993, 158.

¹⁵⁹ In fact, we will see Peirce argue that this sharp divide *leads* to nominalism.

¹⁶⁰ *CP* 1.316. And elsewhere: “that the well-prepared mind has wonderfully soon guessed each secret of nature is historical truth. All the theories of science have been so obtained” (*CP* 6.476).

¹⁶¹ Just what these characteristics *are* is debated. Some proposals include personhood (conceived as a particular-in-relation), rationality, and moral agency. In the history of science, the image of God has most often been portrayed as the ability to (as Kepler said) think the same kind of thoughts about nature as God must have thought during creation (whether that creation be a one-time event or an ongoing process).

Another, less subtle, connection can be found in a passage from the chronologically arranged *The Writings of Charles S. Peirce*. Here, Peirce discusses the possible agreement between his triadic semiotic and the doctrine of the Trinity:

Indeed I am not aware of any points of disagreement. The interpretant is evidently the Divine *Logos* or word; and if our former guess that a Reference to an interpretant is Paternity be right this would also be the *Son of God*. The *ground*, being that partaking of which is requisite to any communication with the Symbol, corresponds in its function to the Holy Spirit.¹⁶²

So far as I know, this is the only reference Peirce makes to the Trinity, and it is only to say that there is a *lack* of disagreement between the doctrine and one element of his (triune-reality based) philosophy. This, of course, is not nearly the same thing as saying that the doctrine of the Trinity encouraged or inspired him to formulate his Categories.¹⁶³ Nevertheless, in Peirce's philosophy it is at least possible to see some resonance with (if not the subtle influence of) two Christian doctrines (the doctrine of the Trinity and the doctrine of the Imago Dei) in this way: the triune God may be linked with the "elementary triad" Peirce mentions in his speculative cosmology (see Chapter 2, note on page 92); the "triune whole of thought and reality" Margolis mentions may be considered to have its ground in this God; and the ability of humans to participate in both thought and reality could be linked with the Imago Dei. The investigation of these links will have

¹⁶² *Writings of Charles S. Peirce*, Volume 1, page 503. The paternity reference is to CP 7.590: "Has [a] word any such relation as that of father and son? If I write 'Let *Kax* denote a gas furnace,' this sentence is a symbol which is creating another within itself. Here we have a certain analogy with paternity; just as much and no more as when an author speaks of his writings as his offspring"

¹⁶³ That case would be challenging to make, given Peirce's own frequent complaints about the sloppiness of most theological thinking.

to wait for another project.¹⁶⁴

We have now completed our look at the three major “other conceptions” that Peirce adds to Scotistic realism, but let us not forget the purpose of that survey. We are exploring the “philosophical menu” first mentioned on page 152:

- (a) Peirce’s dramatic departure from Scotus on the matter of contraction,
- (b) this strange word, “pragmaticist” (and the implied distinction between pragmaticism and pragmatism),
- (c) Peirce’s own evolution from something “too far in the direction of nominalism” toward his more mature position involving *would-be*’s, and
- (d) Peirce’s declaration for “extreme scholastic realism.”

Our exploration of this menu was to be indirect, and for (a)–(c) it has been. But (d) we will tackle head on. Thanks to the work we have already done, we are now prepared to understand it.

¹⁶⁴ I am certainly not the first to notice the possibility, however, as can be seen in Marianne Shapiro’s 1994 “The Trinity as Semiotic” (Which includes the opening sentence, “The aim of this paper is to demonstrate systematic coherences between Peirce’s categories and the conception of the Christian trinity as it stood at the height of medieval speculation.”—Shapiro, Marianne 1994, 209); Donald L. Gelpi’s 2000 “A Peircean Approach to Trinity as Community: A Response to Some Responses”; and Andrew J. Robinson’s 2004 “C. S. Peirce as Resource for a Theology of Evolution: Continuity, Naturalism, and Contingency: A Theology of Evolution Drawing on the Semiotics of C. S. Peirce and Trinitarian Thought.”

9. Peirce's Extreme Scholastic Realism

Peirce describes himself with this phrase more than once. Here is a typical example: "I am myself a scholastic realist of a somewhat extreme stripe."¹⁶⁵ How are we to understand this? Susan Haack defines extreme scholastic realism in this short passage: "Peirce's 'extreme scholastic realism' could be summed up in the sentence: there are real generals."¹⁶⁶ Boler agrees, but fills in some detail by describing a crucial characteristic of those generals:

[I]t is not so much the commonness of natures that Peirce thinks must be recognized in the objective discoveries of science as it is the reality of "would-be's" that are not exhausted by (or reducible to) any one or more actual events or Seconds (CP 1.422). It is to this that Peirce ultimately ascribes his own "extreme realism" . . .¹⁶⁷

There are *real* generals. They are not, as Boler correctly points out, exhausted by or reducible to any set of actual, empirically available events—no matter how long the list of actual events might be; as a result, these generals have their own mode of being, their own reality. Unlike Scotus, Peirce believes that these generals do not need the actuality of suppositis in order to be fully real,¹⁶⁸ although he *does* state that the best proof of the

¹⁶⁵ CP 5.470.

¹⁶⁶ Haack 1992, 22. Of course, that short summary is only helpful to those who have explored the logic of relatives (with the idea that fragments point us to systems of not-necessarily-similar objects held together through the relatedness of real generals), pragmatism (with its focus on the general would-be), and the Categories (with the reality of Thirdness in an honoured place).

¹⁶⁷ Boler 2004, 72. Boler proceeds immediately to the now-familiar Peircian passage from CP 8.208, in which Peirce recants his earlier comments on the hardness of the diamond and re-describes his position in terms of *would-be*, ending with the statement that his position "amounts to extreme scholastic realism."

¹⁶⁸ This is not to say that Thirdness can be fully separated from Firstness and Secondness. In fact, all three Categories constitute what we have just seen Peirce call "triune Reality" (CP 5.436). Rather, for Peirce, what is important here is that the reality of Thirdness is a genuine reality that is not limited to actual, existing suppositis. This, of course, is the

reality of those generals is our successful prediction, which is, of course, meaningless without the actuality of events and suppositis (since they are what prediction is *about*).

This brings us back to the stone experiment at Harvard. We have left Peirce at the podium, holding a stone in his hand above the floor and laying bets with a somewhat antagonistic audience of nominalistic cognoscenti. Let us now return to that lecture—specifically, to the *end* of the stone experiment—and allow Peirce himself to describe his extreme scholastic realism:

With overwhelming uniformity, in our past experience, direct and indirect, stones left free to fall have fallen. Thereupon two hypotheses only are open to us. Either

1. the uniformity with which those stones have fallen has been due to mere chance and affords no ground whatever, not the slightest for any expectation that the next stone that shall be let go will fall; or
2. the uniformity with which stones have fallen has been due to some *active general principle*, in which case it would be a strange coincidence that it should cease to act at the moment my prediction was based upon it.

That [second] position, gentlemen, will sustain criticism. It is irrefragable.

Of course, every sane man will adopt the latter hypothesis. If he could doubt it in the case of the stone — which he can't — and I may as well drop the stone once for all — I told you so! — if anybody doubts this still, a thousand other such inductive predictions are getting verified every day, and he will have to suppose every one of them to be merely fortuitous in order reasonably to escape the conclusion that **general principles are really operative in nature**.¹⁶⁹

For the listeners that day, Peirce's stone experiment would not have been a stand-alone example. Two lectures earlier,¹⁷⁰ he had prepared the way for the 'specific' of the experiment with this 'general' proclamation:

Just so, let a law of nature — say the law of gravitation — remain a mere uniformity — a mere formula establishing a relation between terms — and what in the world

importance of Peirce's emphasis on *would-be*'s.

¹⁶⁹ *CP* 5.100–101. (Bold lettering is Peirce's.) After this remarkable introduction, Peirce proceeds to lecture—rather dryly, it must be admitted—on various aspects of Thirdness.

¹⁷⁰ Lecture II, found in *CP* 5.41–65, is titled, “The Universal Categories.”

should induce a stone, which is not a term nor a concept but just a plain thing, to act in conformity to that uniformity? All other stones may have done so, and this stone too on former occasions, and it would break the uniformity for it not to do so now. But what of that? There is no use talking reason to a stone. It is deaf and it has no reason. I should ask the objector whether he was a nominalist or a scholastic realist. If he is a nominalist, he holds that laws are mere generals, that is, formulae relating to mere terms; and ordinary good sense ought to force him to acknowledge that there are real connections between individual things regardless of mere formulae. Now any real connection whatsoever between individual things involves a reaction between them in the sense of this category [Thirdness]. The objector may, however, take somewhat stronger ground by confessing himself to be a scholastic realist, holding that generals may be real. A law of nature, then, will be regarded by him as having a sort of *esse in futuro*. That is to say they will have a present reality which consists in the fact that events *will* happen according to the formulation of those laws.¹⁷¹

Peirce is arguing for the reality of generals—for the reality of *active* general principles in nature.

This, then, is yet another point of departure from Scotus, for Peirce grants to these generals a causal status unlike that found in Scotus's realism. Recall that, for Scotus, universals do *not*—in themselves, prior to contraction—have any causal power; rather, causal power is found only in individual suppositis. The role of universals is to *shape* the causal power found in individual suppositis. Peirce, on the other hand, not only grants universals or generals their own mode of reality (Thirdness) but also considers them—in themselves—to have causal power:

Not only may generals be real, but they may also be *physically efficient*, not in every metaphysical sense, but in the common-sense acception in which human purposes are physically efficient. Aside from metaphysical nonsense, no sane man doubts that if I feel the air in my study to be stuffy, that thought may cause the window to be opened. My thought, be it granted, was an individual event. But what determined it to take the particular determination it did, was in part the general fact that stuffy air is unwholesome So, then, when my window was opened, because of the truth that stuffy air is malsain, a physical effort was brought into existence by the efficiency of a general and non-existent truth. . . . Generality is, indeed, an indispensable ingredient of reality; for mere individual existence or actuality without

¹⁷¹ CP 5.48. Notice here the now-familiar double emphasis on the *would-be* of the real general and the *esse in futuro* that makes successful prediction possible.

any regularity whatever is a nullity. Chaos is pure nothing.¹⁷²

Peirce's doctrine of the reality of generals cannot be properly understood without an understanding of his distinction between reality and existence:¹⁷³

I call your attention to the fact that *reality* and *existence* are two different things. . . . Existence, then, is a special mode of reality, which, whatever other characteristics it possesses, has that of being absolutely determinate. Reality, in its turn, is a special mode of being, the characteristic of which is that things that are real are whatever they really are, independently of any assertion about them.¹⁷⁴

It becomes clear that *existence* is the mode of being of individual things (and is connected with Secondness), while *reality* is the mode of being of generals (and is connected with Thirdness). Engel-Tiercelin writes that this distinction is, at its root, a Scotistic one.¹⁷⁵

Certainly, Peirce associates his understanding of existence with Scotus:

Hic et nunc is the phrase perpetually in the mouth of Duns Scotus, who first elucidated individual existence. It is a forcible phrase if understood as Duns did understand it, not as describing individual existence, but as suggesting it by an example of the attributes found in this world to accompany it. . . . for the mode of

¹⁷² CP 5.431.

¹⁷³ That distinction is behind a phrase from the previous passage, a phrase that can be unsettling for the unprepared: "brought into existence by the efficiency of a general and non-existent truth." As will be explained, Peirce insists that generals—while *real*—do not *exist*. Haack sums things up succinctly: "Though what exists is real, what is real may not exist" (Haack 1992, 22).

¹⁷⁴ CP 6.349. Peirce appeals to this very distinction in a 1906 discussion of issues concerning God, when he insists on rewriting a question ("Do you believe in the existence of a Supreme Being?") before answering it: "[Agreeing with Hume:] The phrase 'Supreme Being' is not an equivalent of 'God,' since it neither implies infinity nor any of the other attributes of God, excepting only Being and Supremacy. . . . I shall, therefore, if you please, substitute 'God' for 'Supreme Being' in the question. I will also take the liberty of substituting 'reality' for 'existence.' This is perhaps overscrupulosity; but I myself always use *exist* in its strict philosophical sense of 'react with the other like things in the environment.' Of course, in that sense, it would be fetichism to say that God 'exists.' The word 'reality,' on the contrary, is used in ordinary parlance in its correct philosophical sense. . . . So, then, the question being whether I believe in the reality of God, I answer, Yes" (CP 6.494–496).

¹⁷⁵ Engel-Tiercelin 1992, 78, n. 9.

being of the individual thing is existence; and existence lies in opposition merely.¹⁷⁶

Hence, while Peirce's view of the causal status of generals is sharply different than Scotus's and leads to what Peirce calls *extreme* scholastic realism, the distinction that makes extreme scholastic realism intelligible is itself a Scotistic distinction.

We have now seen Peirce's realist position named and described. We have also seen many of the reasons for that position, especially through our treatment of the "other conceptions" that Peirce felt must be added to Scotistic realism. We conclude the chapter with a look at Peirce's understanding of—and relationship to—nominalism.

10. Peirce and Nominalism

It will be no surprise to the reader that Peirce is not a nominalist, and while we have already seen some direct and indirect Peircian descriptions of nominalism, we would do well to explore, even if briefly, just *how* Peirce defines and describes the position he so clearly disdains. We begin with one of his descriptions of the scholastic debate over universals:

Roughly speaking, the nominalists conceived the *general* element of cognition to be merely a convenience for understanding this and that fact and to amount to nothing except for cognition, while the realists, still more roughly speaking, looked upon the general, not only as the end and aim of knowledge, but also as the most important element of being. Such was and is the question.¹⁷⁷

Elsewhere, Peirce links nominalism with an epistemology that is characterized by a sharp internal/external distinction:

¹⁷⁶ *CP* 1.459.

¹⁷⁷ *CP* 4.1.

We have, it is true, nothing immediately present to us but thoughts. These thoughts, however, have been caused by sensations, and those sensations are constrained by something out of the mind. This thing out of the mind, which directly influences sensation, and through sensation thought, because it *is* out of the mind, is independent of how we think it, and is, in short, the real. Here is one view of reality, a very familiar one. And from this point of view it is clear that the nominalistic answer must be given to the question concerning universals.¹⁷⁸

He illustrates this with an example that is (perhaps purposely) reminiscent of the Socrates-and-Plato-are-both-human example in Chapter 3:

[W]hile from this [nominalistic] standpoint it may be admitted to be true as a rough statement that one man is like another, the exact sense being that the realities external to the mind produce sensations which may be embraced under one conception, yet it can by no means be admitted that the two real men have really anything in common, for to say that they are both men is only to say that the one mental term or thought-sign “man” stands indifferently for either of the sensible objects caused by the two external realities; so that not even the two sensations have in themselves anything in common, and far less is it to be inferred that the external realities have.¹⁷⁹

Realistic epistemology makes for a sharp contrast, and (not surprisingly) does *not* share the same sharp internal/external distinction:

The realist will hold that the very same objects which are immediately present in our minds in experience really exist just as they are experienced out of the mind; that is, he will maintain a doctrine of immediate perception. He will not, therefore, sunder existence out of the mind and being in the mind as two wholly improportionable modes. When a thing is in such relation to the individual mind that that mind cognizes it, it is in the mind; and its being so in the mind will not in the least diminish its external existence. For he does not think of the mind as a receptacle, which if a thing is in, it ceases to be out of.¹⁸⁰

This passage may give the impression of an *infallible* “immediate perception,” but such a view is not Peirce’s. His fallibilism holds that not only *may* we be in error, we are *always*

¹⁷⁸ CP 8.12. Note that Peirce is *not* describing his own view, here. He is simply trying to show how nominalism is the natural—even the *necessary*—conclusion from the premise of a sharp internal/external divide.

¹⁷⁹ CP 8.12. Peirce here implies that even the *nominalistic* idea of similarity cannot be supported by the epistemology of nominalism.

¹⁸⁰ CP 8.16.

in some degree of error. Experience—of both the individual and the community of human learners—is the only reliable guide to the truth.¹⁸¹ We can see this in another of Peirce’s definitions of nominalism and realism:

The nominalists say [an abstraction] is a *mere* name. Strike out the “mere,” and this opinion is approximately true. The realists say it *is* real. Substitute for “is,” *may be*, that is, *is* provided experience and reason shall, as their final upshot, uphold the truth of the particular predicate, and the natural existence of the law it expresses, and this is likewise true. It is certainly a great mistake to look upon an idea, merely because it has not the mode of existence of a haecceity, as a lifeless thing.¹⁸²

Thus, nominalism is the result (in part, at least) of an internal/external epistemology, and is characterized by the conclusion that, since an abstraction is an element of cognition, it is *only* an element of cognition.

We now turn to Peirce’s understanding of the rise and dominance of the nominalistic point of view. We begin with his account of the fall of realism:

Notwithstanding a great outburst of nominalism in the fourteenth century which was connected with politics . . . the Scotists, who were realists, were in most places the predominant party, and retained possession of the universities. At the revival of learning they stubbornly opposed the new studies; and thus the word *Duns*, the proper name of their master, came to mean an adversary of learning. The word originally further implied that the person so called was a master of subtle thought with which the humanists were unable to cope. But in another generation the disputations by which that power of thought was kept in training had lost their liveliness; and the consequence was that Scotism died out when the strong Scotists died. It was a mere change of fashion.¹⁸³

This change of fashion led to the rise of “the humanists,” who “were weak thinkers,” and who “went to the ancients for their philosophy.”¹⁸⁴ Primarily, this took the form of

¹⁸¹ We will return to this idea in the next chapter, when we discuss the relationship between truth-as-eventual-consensus and Peirce’s philosophy of science.

¹⁸² *CP* 3.460.

¹⁸³ *CP* 1.17.

¹⁸⁴ *CP* 1.18.

Epicureanism, Stoicism, and Scepticism, all of which lead quite naturally to nominalism.

In short, there was a tidal wave of nominalism. Descartes was a nominalist. Locke and all his following, Berkeley, Hartley, Hume, and even Reid, were nominalists. Leibniz was an extreme nominalist Kant was a nominalist; although his philosophy would have been rendered compacter, more consistent, and stronger if its author had taken up realism, as he certainly would have done if he had read Scotus. Hegel was a nominalist of realistic yearnings. I might continue the list much further. Thus, in one word, all modern philosophy of every sect has been nominalistic.¹⁸⁵

Notice that Hegel is almost an exception—*almost* an island of realism—in the midst of this “tidal wave of nominalism.” In another passage, we discover what may have kept Hegel under water:

By the time the universities were reformed in the sixteenth century, it had gained a complete victory. Descartes, Leibniz, Locke, Hume, and Kant, the great landmarks of philosophical history, were all pronounced nominalists. Hegel first advocated realism; [but] Hegel unfortunately was about at the average degree of German correctness in logic.¹⁸⁶

Historically speaking, then, nominalism is everywhere—at least, when discussing the modern story of philosophy. But what about the common man in the present time? Even there, one finds a nominalism so sure of itself as to make any other point of view almost unintelligible:

[A]s for the average nominalist whom you meet in the streets, he reminds me of the blind spot on the retina, so wonderfully does he unconsciously smooth over his field of vision and omit facts that stare him in the face, while seeing all round them

¹⁸⁵ *CP* 1.19.

¹⁸⁶ *CP* 4.50. Given our exploration of Peirce’s logic of relatives, and his insistence that logic and metaphysics are intimately linked, it comes as little surprise that Hegel’s problem is to be found in his logic. Elsewhere, in *CP* 5.84, we see that Peirce—in characteristic fashion—laments the waste that bad logic entails: “[I]f logic during those centuries [seventeenth, eighteenth, and nineteenth] had been studied with half the *zeal* and *genius* that has been bestowed upon mathematics, the twentieth century might have opened with the special sciences generally . . . in a decidedly more advanced condition than there is much promise that they will have reached at the end of 1950. I shouldn’t say that human lives were the most precious things in the world; but after all they have their value; and only think how many lives might thus have been saved. . . . Think of the labor of a generation of Germany being allowed to flow off into Hegelianism!”

without perceiving any gap in his view of the world. That any man not demented should be a realist is something he cannot conceive.¹⁸⁷

This sense that nominalism involves a kind of blindness to facts that stare us in the face—facts that, if perceived clearly, would lead us to change our position to realism—is a sense that pervades Peirce’s treatment of the nominalism/realism debate. It is especially clear in his description of what he feels is the *inevitable* journey from nominalism to realism. To this description we now turn.

11. From Nominalism to Realism

While there is some debate about whether Peirce began his philosophical life as a nominalist,¹⁸⁸ there is no doubt where he ended. Questions over his own experience notwithstanding, the journey from nominalism to realism is one Peirce recommends, based primarily on the scientific method and on the view that nominalism is the simpler view of the two. We see that latter view in Peirce’s historical treatment of the problem, as he describes the beginning of the debate in its scholastic form:

The metaphysics of Aquinas, a modified Aristotelianism, had been immensely elaborated and deeply transformed by the vast logical genius of the British Duns Scotus, who died in 1308. The extreme intricacy of this system was felt to be an objection to it, and various attempts were made to introduce Nominalism—the simplest possible of all Logico-Metaphysical theories, *if it can be sustained*. These efforts finally culminated in the system of another Englishman, William Ockham.¹⁸⁹

¹⁸⁷ CP 4.1. The paragraph immediately following this passage contains the description Peirce gives of his own plan for “defeating nominalism”: to attack it through the logic of relatives. The irony of the situation presented by the juxtaposition of these paragraphs—the fact that the “average nominalist whom you meet in the streets” will be thoroughly unprepared to understand the logic of relatives and will therefore remain a nominalist—does not seem to have occurred to Peirce.

¹⁸⁸ See Boler 2004, 85 n. 84, for references to this debate.

¹⁸⁹ CP 2.166. Emphasis mine.

If nominalism is indeed the simplest possible theory, then “the burden of proof is undoubtedly upon the realists, because the nominalistic hypothesis is the simpler.”¹⁹⁰

This is where the practice of science shapes the debate:

It appears therefore that in scientific method the nominalists are entirely right. Everybody ought to be a nominalist at first, and to continue in that opinion until he is driven out of it by the *force majeure* of irreconcilable facts.¹⁹¹

Much of what Peirce means by the “*force majeure* of irreconcilable facts” we have already explored: over and over again, he returns to what he feels is the single most difficult problem for the nominalist (and, therefore, the most obvious “irreconcilable fact” with nominalism): *we successfully predict*. And once more, along these lines we find Peirce describing the dropping of stones:

Thus, a nominalist may admit that there is in the events themselves an agreement consisting in the uniformity with which all stones dropped from the hand fall to the ground; but if he admits that there is anything at all, except the mere fact that they happen to do so, that should in any sense *determine* the different stones to fall every time they are dropped, he ceases to be a good nominalist and becomes a mediaeval realist.¹⁹²

As we have seen before, Peirce’s debate with the nominalists is often—in his description, at least—centred around the word “mere.” Peirce has a problem not with the statement that there are facts, but with the statement that there are *merely* facts. Or again, Peirce’s problem is not with the statement that generals are thoughts, but with the statement that they are *merely* thoughts. Here we see this most clearly:

To say that a prediction has a decided tendency to be fulfilled, is to say that the future events are in a measure really governed by a law. . . . If the prediction has a

¹⁹⁰ CP 4.1.

¹⁹¹ CP 4.1.

¹⁹² CP 6.377.

tendency to be fulfilled, it must be that future events have a tendency to conform to a general rule. “Oh,” but say the nominalists, “this general rule is nothing but a mere word or couple of words!” I reply, “Nobody ever dreamed of denying that what is general is of the nature of a general sign; but the question is whether future events will conform to it or not. If they will, your adjective ‘mere’ seems to be ill-placed.” A rule to which future events have a tendency to conform is *ipso facto* an important thing, an important element in the happening of those events.¹⁹³

Therefore, for Peirce, once the *fact* of our successful prediction is considered, the journey from nominalism to realism¹⁹⁴ is all but inevitable, and it becomes no surprise at all “how many other powerful minds have found themselves compelled to come over to realism.”¹⁹⁵ Indeed, once the facts are fully considered, thinks Peirce, the situation is obvious enough to warrant his saying *this* during his fifth Lowell Lecture at Harvard:

Most, if not all of you, are, I doubt not, Nominalists; and I beg you will not take offence at a truth which is just as plain and undeniable to me as is the truth that children do not understand human life. To be a nominalist consists in the undeveloped state in one’s mind of the apprehension of Thirdness as Thirdness.¹⁹⁶

The scholastics, *perhaps*, can be forgiven their nominalism, but we moderns have no excuse:

In the fourteenth century Nominalism was rendered a respectable opinion by the halting realism of Scotus and by the extravagant unpragmatism of his followers. But after physical science has discovered so many general principles in Nature, nominalism becomes a disgraceful habitude of thought.¹⁹⁷

¹⁹³ CP 1.26. Peirce continues: “This mode of being which *consists*, mind my word if you please, the mode of being which *consists* in the fact that future facts of Secondness will take on a determinate general character, I call a Thirdness.”

¹⁹⁴ A realism that includes the implied doctrines of the logic of relatives, pragmatism, and the Categories.

¹⁹⁵ CP 4.1. How well this statement can be reconciled with the ‘tidal wave of nominalism’ is unclear. Perhaps Peirce felt he was speaking prophetically.

¹⁹⁶ CP 5.121. The fact that Peirce thought it possible for his audience *not* to “take offence” may be an example of the common view that Peirce’s own difficult personality may have been the single greatest obstacle to his ever attaining a permanent academic appointment.

¹⁹⁷ CP 6.175.

This reference to modern science brings our attention to Peirce's own time, which is where we will end this chapter.

We have, as promised, spent this chapter looking from Peirce *backward* in time toward Scotus, and we have seen in Peirce a philosopher deeply indebted to, but not restricted to, Scotistic realism. Recall that the "other conceptions" Peirce added to Scotus were required, in Peirce's view, in order to render Scotistic realism consistent with—and supportive of—the realities of modern science. In the next (and final) chapter, we will explore the resulting Peircian philosophy of science, focussing on those aspects that have special relevance for *Cartwright's* philosophy of science.

Chapter 5

Return to Cartwright (Peirce, Cartwright, and the Philosophy of Science)

1. Introduction

In this chapter our circle is completed. We began with Cartwright's philosophy of science, then turned to Peirce's Categories, and finished our journey back in time with a look at Scotus and the problem of universals. Last chapter, we moved forward to Peirce again, analysing in some detail his critical interaction with Scotus. Now we move forward again, back to Cartwright.

We are now ready for a critical analysis of Cartwright's philosophy of science that is comprised of more than the hinting and foreshadowing found in the previous four chapters. This chapter is just such an analysis, in which I attempt to construct a 'conversation' between Peirce and Cartwright. I will begin with a preliminary outline of my critique of Cartwright's philosophy of science, a critique undertaken primarily in light of what we have seen in the thought of Scotus and Peirce. Then I will return to Peirce, particularly to his philosophy of science. As we make our way through Peirce's thought,

we will—where appropriate—stop to describe and explore the connections, similarities, and contrasts with Cartwright’s philosophy of science. In this way we will fill in the details of the preliminary outline.

2. Critique of Cartwright: A Preliminary Outline

Recall some of the basics of Cartwright’s philosophy of science: the world is dappled; laws are *not* universal in their coverage, always and everywhere obeyed. Rather, laws are the *local* regularities that result when the capacities found in nature are arranged to form what Cartwright calls a nomological machine. Remember, also, that a nomological machine can produce law-like regularities only if it is shielded from the ‘interference’ that *other* capacities in nature can cause.¹ (Hence, the solar system is a naturally shielded nomological machine, while a vacuum chamber can house an artificially shielded nomological machine. As a result of the shielding, both produce law-like regularities.) Through what I call her doctrine of the primacy of capacities—the position that capacities are both *primary* and *real*—Cartwright asserts that capacities are, in a sense, more primary than the regular behaviours (sometimes called “secondary,” sometimes “epiphenomenal”) that capacities can cause through nomological machines. Capacities are more basic, she says, to our understanding of nature and of science.

For this preliminary outline of my critique, I will mention two related difficulties in Cartwright’s philosophy of science: (1) tension in the treatment of Humean regularity

¹ This is one reason why Cartwright says laws—that is, regularities produced by nomological machines—are *local*: the shielding itself is always local.

theory, and (2) a truncated understanding of capacities.

Tension in the Treatment of Humean Regularity Theory

Let us return to the introduction to *The Dappled World*:

Specifically, I shall defend three theses in this book:

(1) The impressive empirical successes of our best physics theories may argue for the truth of these theories but not for their universality. . . .

(2) Laws, where they do apply, hold only *ceteris paribus*. By ‘laws’ I mean descriptions of what regularly happens, whether regular associations or singular causings that occur with regularity, where we may, if we wish, allow counterfactual as well as actual regularities or add the proviso that the regularities in question must occur ‘by necessity.’ Laws hold as a consequence of the repeated, successful operation of what, I shall argue, is reasonably thought of as a *nomological machine*.

(3) Our most wide-ranging scientific knowledge is not knowledge of laws but knowledge of the *natures* of things, knowledge that allows us to build new nomological machines never before seen giving rise to new laws never before dreamt of.²

This is how Cartwright introduces the book that is, I believe, the fullest formulation of her philosophy of science, a formulation that (as we saw in Chapter 1) includes a strong critique of Humean regularity theory. But in thesis (2) above, we can see that Cartwright nevertheless retains a *Humean* understanding of “law.” Later in the same book she insists that ‘regularity talk’ alone is not enough to account for the success and practice of science; she insists that we need capacities. But in thesis (2) above, we see that she still defines laws as a Humean would: “descriptions of what regularly happens” (as opposed to a definition of law as something that *explains* why regularities happen).

We can see the tension in Cartwright’s treatment of Humean philosophy of science in the following two statements: (1) Through the doctrine of the primacy of

² Cartwright 1999, 4.

capacities, Cartwright (like Peirce) argues that the regularity-only, nominalistic understanding of science is inadequate; (2) however, unlike Peirce, Cartwright seems unwilling to redefine or reconceptualize “law” in a way that is substantially different from that inadequate nominalistic understanding. Later in this chapter,³ I will argue that this tension is the result of an internal inconsistency—an inconsistency that can be made more clear after a detailed look at aspects of Peirce’s philosophy of science.

It seems to me that one reason for this tension is Cartwright’s effort to avoid what she calls scientific fundamentalism: unwarranted belief in the universal coverage of natural law. This avoidance may result in her avoiding any formulation that portrays laws or generals as *active*. Rather, since laws are just descriptions of “what regularly happens” (although she *does* seem to allow for what regularly *would* happen when she allows for “counterfactual” regularities), they are, in a very real sense, merely passive. There needs to be activity *somewhere*, of course,⁴ so Cartwright locates it in capacities or natures. Lest these seem too Aristotelian or scholastic, she quickly moves to a description of these capacities as the *building blocks* of nomological *machines*. Notice what is happening here. Aristotelian natures are often associated with the *organism* metaphor for conceptualizing nature, whereas modern science (in general) has shifted to the *machine* metaphor.⁵ Arguing that strict nominalism and the associated Humean regularity theory is not adequate to describe how and why we do science, Cartwright

³ Page 258.

⁴ After all, science is about what *happens*.

⁵ For an interesting and helpful description of the organism and machine metaphors (and of the transition from the first to the second), see Ruse 2010, 11–116.

carefully tries to bring back into the discussion something *like* active generals by making use of Aristotelian natures in a way that is acceptable to the modern philosopher of science.⁶ Hence, capacities are described as building blocks of machines, and laws are seen as (most often, anyway) the result of human contrivance.⁷ Laws are secondary; capacities are primary.

I will argue that although Cartwright may have moved the *word* “law” to the ‘after-the-fact column,’ the *concept* “law” (as Peirce understands it) is still alive and well in her philosophy of science, primarily through her doctrine of the primacy of capacities. Again: there is an inconsistency here. While arguing that Humean regularity theory is inadequate to describe or account for the practice of science, she seems unable (or unwilling) to throw out the Humean *descriptive* understanding of law. Peirce not only provides a metaphysics that supports Cartwright’s philosophy of science, but he also offers an understanding of *law* that is supported by the doctrine of reality and primacy of capacities—thereby rendering Cartwright’s philosophy of science more consistent.

Truncated Understanding of Capacities

Capacities are clearly central to Cartwright’s philosophy of science. *Nature’s Capacities and Their Measurement* begins this way: “Science is measurement; capacities can be measured; and science cannot be understood without them. These are the three

⁶ One way to do this is to call these Aristotelian natures “capacities.”

⁷ “[W]e always need a machine like this to get laws—any laws, causal or otherwise. Sometimes God supplies the arrangements—as in the planetary systems—but very often we must supply them ourselves . . .” (Cartwright 1999, 122).

major theses of this book.”⁸ The centrality of capacities, for Cartwright, marks the main contrast between her approach and Humean regularity theory.⁹ Once again: Cartwright calls her approach “practical empiricism,” contrasts it with “Humean empiricism” and “radical empiricism,” and describes it this way:

The most stringent kind of empiricism that seems to me to make sense is the empiricism of practice that I advocate throughout; the empiricism that demands that each quantity be measured and each claim be tested. And the principal argument of this book is that causes and capacities are as empirical in that sense as it is possible to be.¹⁰

The *main* (but by no means the *only*) criticism I think Peirce would have of Cartwright’s philosophy of science is that her understanding of capacities is characterized by the truncation typical of nominalism: she has failed to understand the deeply relational and general nature of capacities, treating them instead as individual things with causal powers.¹¹ It is my view that in claiming that capacities can be measured, Cartwright has opened herself up to the following Peircian criticism: ‘No, capacities cannot be measured. But the *effects* of those capacities on individual objects and particular situations can be. Capacities are active generals and are real. Their mode of being is Thirdness, and while they have real causal power over future Seconds—over particulars which we *can* measure—capacities themselves are not exhausted by any finite set of

⁸ Cartwright 1989, 1.

⁹ For the regularity theorist, *regularities* are primary. For Cartwright, *capacities* are (and may or may not result in regularities).

¹⁰ Cartwright 1989, 167. For our initial treatment of this topic, see page 16.

¹¹ In Peircian language, Cartwright understands capacities as Seconds, when in reality they are Thirds.

particulars.¹²

In Peircian terms, Cartwright is, along with Scotus, using the older, scholastic logic and is therefore limited to the ideas of collections and similarity. But capacities, properly understood, should be approached through the logic of relatives, with the associated ideas of fragments, systems, and the reality of Thirdness. A brief outline of the argument will suffice, here. Capacities, as Cartwright describes them, are *predictive* in nature. They are what Peirce calls would-be's, generals¹³ that help us understand what *would* happen in certain situations, thus allowing the construction of nomological machines. Shielding, too, is predictive in nature, allowing us to keep out what *would* interfere with the regularity we are trying to create. For their very reality, then, capacities and shielding require the *reality of prediction*.¹⁴ As we have seen in Chapter 4, for Peirce the reality of prediction is linked with the logic of relatives, the would-be's of pragmatism, the position of extreme scholastic realism, and the reality of Thirdness (which for Peirce is *law*). Therefore, as I reconstruct Peirce's view of Cartwright's philosophy, an understanding of capacities that does not move from fragment to system is truncated and ultimately incomplete—it is an understanding that is hampered by an inadequate logic. Later, I will argue that this truncation has led to the 'crisis' that resulted in Cartwright's recent call for a metaphysics that supports how we *hunt* causes and how we *use* them.

¹² Later in this chapter, I will also argue that Peirce would question Cartwright's claim that science is measurement. I believe he would agree that science *involves* measurement, but not (as might be inferred from her statement) that science involves *only* measurement.

¹³ Remember: *all* would-be's are, by nature, generals.

¹⁴ An act of prediction, because it is a would-be, is also an act of generalization.

3. Peirce and Cartwright

Remarkably, despite their striking similarities, Cartwright (to my knowledge) makes *no* reference to Peirce in any of her books or articles. The omission is even more striking when one sees that there is good reason to believe that Cartwright has been introduced to some of Peirce's philosophy. I say this primarily because of what I have found in Ian Hacking's 1983 book, *Representing and Intervening*. Hacking's book was published the same year as Cartwright's first book, and there is evidence of a *significant* interaction between the two thinkers as these books were being prepared. Here, from the "Acknowledgements" of Hacking's book:

What follows was written while Nancy Cartwright, of the Stanford University Philosophy Department, was working out the ideas for her book, *How the Laws of Physics Lie*. There are several parallels between her book and mine. Both play down the truthfulness of theories but favour some theoretical entities. . . . I owe a good deal to her discussion of these topics.¹⁵

Given that, it is significant that Hacking makes repeated use of and reference to Peirce, saying that "[Peirce's] essays are in my opinion so popular and yet so deep that they improve with rereading every couple of years or so."¹⁶ And elsewhere, Hacking's fascination with Peirce is even more evident:

Peirce has suffered from readers of narrow vision, so he is praised for having had this precise thought in logic, or that inscrutable idea about signs. We should instead see him as a wild man, one of the handful who understood the philosophical events of his century and set out to cast his stamp upon them. He did not succeed. He finished almost nothing, but he began almost everything.¹⁷

¹⁵ Hacking 1983, vii.

¹⁶ Hacking 1983, 278.

¹⁷ Hacking 1983, 61. It is unclear to me that Hacking is right about Peirce's lack of success; I think we *still* do not know if that is true. While Peirce may have finished little, his various 'starts' (and their relatedness) have nevertheless managed to sustain philosophical exploration for almost a century. Given this sustained interest, it seems to me that Peirce's

Hacking is certainly right to say that Peirce has suffered from readers who have neither the time nor the inclination to read Peirce broadly enough to gain an accurate understanding of his thought. Unfortunately, in my view Hacking has made the same mistake, most obviously in the following passage on retroduction/abduction/hypothesis:

The idea of ‘inference to the best explanation’ is quite old. C. S. Peirce (1839–1914) called it the method of hypothesis, or abduction. The idea is that if, confronted by some phenomenon, you find one explanation (perhaps with some initial plausibility) that makes sense of what is otherwise inexplicable, then you should conclude that the explanation is probably right. *At the start of his career Peirce thought that there are three fundamental modes of scientific inference: deduction, induction and hypothesis. The older he got the more sceptical he became of the third category, and by the end of his life he attached no weight at all to ‘inference to the best explanation.’*

Was Peirce right to recant so thoroughly? I think so, but we need not decide that now. We are concerned only with inference to the best explanation as an argument for realism.¹⁸

Somewhat disturbing is Hacking’s inadequate description of Peirce’s understanding of abduction. Truly disturbing is Hacking’s report that Peirce recanted, for that is simply an insupportable claim. For example, from c. 1910—only four years before his death—we find these passages in a letter to Paul Carus:

The general body of logicians had also at all times come very near recognizing the trichotomy. They only failed to do so by having so narrow and formalistic a conception of inference (as necessarily having formulated judgments for its premises) that they did not recognize Hypothesis (or, as I now term it, *retroduction*) as an *inference*.¹⁹

As for the validity of the hypothesis, the retroduction, there seems at first to be no room at all for the question of what supports it, since from an actual fact it only infers a *may-be* (*may-be* and *may-be not*). But there is a decided leaning to the affirmative side and the frequency with which that turns out to be an actual fact is to

influence is waxing rather than waning.

¹⁸ Hacking 1983, 52. Emphasis mine.

¹⁹ *CP* 8.228.

me quite the most surprising of all the wonders of the universe.²⁰

And then, from late 1913, in a letter to “Frederick Adams Woods, M. D., . . . a lecturer in biology at the Massachusetts Institute of Technology”:²¹

I have always, since early in the sixties, recognized three different types of reasoning, viz: 1st, *Deduction* which depends on our confidence in our ability to analyze the meanings of the signs in or by which we think; 2nd, *Induction*, which depends upon our confidence that a run of one kind of experience will not be changed or cease without some indication before it ceases; and 3rd, *Retroduction*, or Hypothetic Inference, which depends on our hope, sooner or later, to guess at the conditions under which a given kind of phenomenon will present itself.²²

These passages hardly constitute a recantation; precisely the opposite, in fact. And thirteen years prior to Hacking’s claim, K. T. Fann—in the 1970 monograph, *Peirce’s Theory of Abduction*—had already come to this same, ‘opposite’ conclusion. Fann traces the role abduction plays in the development of Peirce’s philosophy and concludes with this:

In the later period the concept of inference is widened to include methodological process as well as evidencing process. The three kinds of reasoning became three stages of inquiry. Abduction is the process of forming or inventing an explanatory hypothesis to account for the facts. Deduction explicates hypotheses and induction consists in the process of testing them.²³

Whether or not Fann’s monograph was available to Hacking, I cannot say. Whatever the case, we have seen enough to conclude that *if* Cartwright was exposed to Peirce’s philosophy primarily through Hacking, then what she was exposed to was an inaccurate rendering (especially as Peirce’s philosophy relates to Cartwright’s interest in the

²⁰ *CP* 8.238.

²¹ *Collected Papers*, Volume 8, p. 246, n. 1. This is a note added by the editors.

²² *CP* 8.385.

²³ Fann 1970, 55.

methods and practices of scientists). However it may be, Cartwright’s silence on Peirce is striking.

But, more striking than that, I have found only one article in the philosophical literature that makes *any connection at all* between Peirce and Cartwright: Stephen Pratten’s 2007 “The Scope of Ontological Theorising.” But as it turns out, Pratten’s article is not concerned with an overall philosophy of science but with the different kinds of ontological theorising found in economics. In fact, the article does not even explicitly connect Peirce with Cartwright. Rather, Cartwright is compared and contrasted with another economics thinker, Tony Lawson, and it is *Lawson* (not Cartwright) who is connected with Peirce—specifically, with Peirce’s ideas on what constitutes a sustainable metaphysical project.

Nevertheless, Pratten’s article is helpful in that it describes two ways “ontological theorising” is often understood in economics:

Some . . . see the role of ontology as being primarily descriptive, concerned with revealing the ontological commitments of economists. . . . Others suggest that beyond this, ontological theorising can and should set and defend an account of the basic features of social reality.²⁴

For the first group, metaphysics is seen as a project limited only to producing and analysing the most minimal list of the assumptions made by our most successful science (or, in this case, economics). Pratten calls this group more “descriptive,” concerned only with describing presuppositions. For the second group, metaphysics goes beyond this, toward a fuller account of the structure of all reality. This group is, by necessity, more speculative. Therefore, says Pratten, the relationship between the two groups is uneasy:

²⁴ Pratten 2007, 236.

Those occupying each end of the spectrum of views concerning the nature and role of ontological analysis regard those located at the other pole with a degree of suspicion. Those at the more descriptive end view those at the other end of the spectrum as engaged in rather wild and rash metaphysical speculations and prone to loose characterisations of economists' ontological commitments. Meanwhile, those who elaborate and defend a position in social ontology . . . see any limiting of the role of ontological theorising to outlining the metaphysical commitments of others as altogether too timid an option.²⁵

This tension is not limited to the economists, of course. We can see it in philosophy in general,²⁶ in the philosophy of science more particularly, and even within Cartwright's own body of work.²⁷

For example, here is Cartwright in the introduction to *The Dappled World*, explaining the motives behind her philosophy of science:

I look at the claims of science, at the possible effects of science as a body of knowledge, in order to see what we can achieve with this knowledge. . . . Mine is the motive of the social engineer. Ian Hacking distinguishes two significant aims for science: representing and intervening. Most of my colleagues in philosophy are interested in representing I am interested in intervening. So I begin from a different question: how can the world be changed by science to make it the way it should be?²⁸

²⁵ Pratten 2007, 236.

²⁶ In the introduction to his 1959 book, *Individuals*, P. F. Strawson makes a similar sounding distinction: "Metaphysics has been often revisionary, and less often descriptive. Descriptive metaphysics is content to describe the actual structure of our thought about the world, revisionary metaphysics is concerned to produce a better structure. . . . Perhaps no actual metaphysician has ever been, both in intention and effect, wholly the one thing or the other. But we can distinguish broadly: Descartes, Leibniz, Berkeley are revisionary, Aristotle and Kant descriptive" (Strawson 1959, 9). I think the best link between what Pratten and Strawson are doing is this: *both* types of metaphysics described by Pratten are what Strawson calls "descriptive," although one limits itself to human presuppositions while the other attempts to follow the implications for external reality.

²⁷ While Pratten does not offer the *only* analysis of different understandings of metaphysics, his analysis will nevertheless help structure our exploration of Cartwright's metaphysical project (*and* her metaphysical reluctance). The fact that Pratten writes about Cartwright and about one of her specialities (philosophy of economics) helps to make his work an appropriate structuring device.

²⁸ Cartwright 1999, 5.

As I understand this passage,²⁹ by “representing” Cartwright means *explaining*: science explains the phenomena of the world; philosophy of science explains the phenomenon of science. (These explanations, by necessity, are theoretical.) By “intervening,” Cartwright means *altering*: science alters future phenomena (preventing disease, etc.); philosophy of science alters the future methodology of science. (These alterations, by necessity, are practical.) As we have seen, a major part of Cartwright’s philosophy of science is concerned with the built-in *limitations* of science (and the implications for scientific methodology). Her exploration of the limitations of science brings her to argue against scientific fundamentalism, an argument that rests upon the idea of law-as-result-of-nomological-machine, which in turn rests upon the ideas of capacities and shielding. In other words, although Cartwright may be more interested in intervening and altering than in representing or explaining, she simply cannot help returning to representation and explanation via *capacities*, as the *capacity* concept provides the foundation for the intervention she urges. To paraphrase a line from the American Revolution: No intervention without representation.³⁰

²⁹ My understanding is based on what Hacking writes: that representing is about theories, and intervening about experiments. See Hacking 1983, xv.

³⁰ Clearly, Cartwright wants to do the former and not the latter. However, her capacity-based, entity realism seems to require at least a bit of speculative ontology. Not only that, but if Cartwright *really* wants (or wants someone else) to formulate a metaphysics that provides a bridge between representing and intervening—or, as she puts it in the title of her 2007 book—between “hunting” causes and “using” them—she is in all likelihood going to need more ontology than she might want.

Our Agenda

Once again, my position is that while Peirce provides a critique of Cartwright's philosophy of science, he also provides what Cartwright has called for: a metaphysics that takes the centrality of capacities seriously and provides the bridge between hunting and using causes. This will be a fairly comfortable match, since Peirce (as we have seen) agrees with Cartwright about the non-universal coverage of the laws of nature, the inadequacy of Humean regularity theory, the fallibility of the scientific enterprise, and the way to conceive of science (as not just a rational body of knowledge but also as a *practice*).

But Peirce provides much *more* than what Cartwright has called for: his metaphysics provides an *accounting for* the dappledness of the world, rather than (as with Cartwright) just a presentation of it as a likely ultimate fact, belief in which is optional. This accounting³¹ allows the work of logicians and scientists to be situated within the larger context of what Peirce calls vagueness and Cartwright calls dappledness. Peirce also provides an analysis of a very important—necessary, in fact—element of Cartwright's bridge: the human being. At times, humanity is nearly invisible in Cartwright's analysis; other times, humans come across as little more than 'measurement machines,' with the argument being primarily about *what* we measure (regularities for the Humean, capacities for Cartwright) rather than *how it is* that we can do science at all. Any metaphysics that is going to be of use to Cartwright is going to have to address what *nature* is, what the *activity* of science involves, and *how it is* that humans can and do

³¹ Which we will explore later in the chapter.

participate in the scientific project. The *much more* that Peirce provides does all of these things.

Providing first what Cartwright *calls for* and then *much more*: admittedly, this is a somewhat arbitrary distinction, but if nothing else it will help to structure what follows. First we will look at an analysis of what science is, what its limits are, what the limits of its practitioners are, and we will look at the search for a metaphysics that properly and sufficiently undergirds modern science and the centrality of capacities. (These are what Cartwright *calls for*.) Then we will explore truncation in Cartwright's treatment of capacities, as well as Peirce's positions on the metaphysics of dappledness and the human potential for science. (These constitute the *much more* which, I contend, is what Cartwright *needs*.)

4. Peirce: What Science Is

Recall that Cartwright is often associated with the 'Stanford School,' which means primarily that the *actual practice of scientists* guides her philosophy of science. C. F. Delaney, in the essay, "Peirce on the Conditions of the Possibility of Science," describes Peirce's interests in similar terms, perhaps most clearly when he contrasts the thinking of Kant and Peirce on science:

It is in their conceptions of science that Kant and Peirce fundamentally differ, a difference which has its ultimate ground in the centrality of the notions of "history" and "community" in Peirce's overall philosophical orientation. This general orientation disposed Peirce to what I will call a concrete, as opposed to an abstract, conception of science. In contrast to the focal conception of science being that of a static set of propositions (Euclidean geometry or Newtonian mechanics), he

conceived of it as a sociohistorical process of inquiry with a specific structure.³²

Peirce's understanding of what science *is* moves the emphasis from propositions to process, from timeless abstraction to temporal unfolding, and from the individual to the community. We can see all of these when Peirce says

Science is to mean for us a mode of life whose single, animating purpose is to find out the real truth, which pursues this purpose by a well-considered method, founded on thorough acquaintance with such scientific results already ascertained by others as may be available, and which seeks co-operation in the hope that the truth may be found, if not by any of the actual inquirers, yet ultimately by those who come after them and who shall make use of their results. It makes no difference how imperfect a man's knowledge may be, how mixed with error and prejudice; from the moment that he engages in an inquiry in the spirit described, that which occupies him is *science* as the word will here be used.³³

Science, then, is a mode of life and not just a set of statements about the physical world.

But while it is a mode of life made possible by a *community*, it is nevertheless true that

many discoveries *are* made by individuals. In a long passage not included in the

Collected Papers, Peirce describes what such a discovery is like:

The scientific man finds himself confronted by phenomena which he seeks to generalize or to explain. His first attempts to do this, though they will be suggested by the phenomena, can yet, after all, be reckoned but mere conjectures; albeit, unless there be something like inspiration in them, he never could make a successful step.³⁴ Of these conjectures—to make a long matter short—he selects one to be tested. In this choice, he ought to be governed solely by considerations of economy. If, for example, the prospect is that a good many hypotheses to account for any one set of facts, will probably have to be taken up and rejected, and if it so happens that, among these hypotheses, one that is unlikely to be true can probably be disposed of by a single easy experiment, it may be excellent economy to begin by taking up that.³⁵ In

³² Delaney 1993, 17–18.

³³ *CP* 7.54.

³⁴ This comes back to what we will see is a Peircian theme: we *do* make good conjectures, which seems to imply something about us. What it implies, and *how* it is that we have become good guessers, we will cover later in this chapter.

³⁵ Notice the Popperian emphasis on falsification (both here and as the paragraph unfolds). It is interesting to note that Peirce wrote this one year before Popper was born.

this part of his work, the scientist can learn something from the business man's wisdom. At last, however, a hypothesis will have been provisionally adopted, on probation; and now, the effort ought to be to search out the most unlikely necessary consequence of it that can be thought of, and that is among those that are readily capable of being brought to test of experiment.³⁶ The experiment is made. If the prediction from the hypothesis fails, its failure may be so utter as to be conclusive; or, maybe, nothing more than an alteration of the defective theory need be undertaken. If, notwithstanding its unlikelihood, the prediction be verified, and if the same thing happen again and again, although each time the most unlikely of the (convenient) predictions has been tried, one begins to doff one's cap to the rising star that nature herself seems to favor.³⁷

Peirce goes on to say that the dawning reality of successful prediction leads to the sense that a "law" has been discovered, a law that is considered *real*, not a law that is considered the result of human contrivance, mental or otherwise.³⁸ But the realism of science is (or always *should* be) tempered by the fallibilism of science:

The scientific man certainly looks upon a law, if it really *be* a law, as a matter of fact as objective as fact can be. The only way in which, to the scientist's apprehension, a newly recognized law differs from a fact directly observed is, that he is, perhaps, not quite sure that it *is* a law. Ultimately, the law becomes for him much *more* reliable than any single observation. It now begins to stand before the scientific man, the hardest of hard facts, by no means a fabrication of his; his exhumation rather, almost to be called a thing of power; although, even now, it might conceivably be brought to naught by a sufficient array of new observations; and, indeed, the presumption is that the time will come when it will have to be reformed, or perhaps even superseded.³⁹

Notice the importance of *time* in Peirce's description of the scientific endeavour.

Delaney, once again contrasting Peirce with Kant, sees this as a key to the difference

³⁶ Notice that we have now seen retroduction, deduction, and induction (in that order), which we have already seen in Chapter 2 to be the three types of inference required to build a "bridge" across the "chasm" of our ignorance (see page 103).

³⁷ Wiener 1958, 302. (A collection of Peirce's writings.)

³⁸ "[N]o mistake can be greater than to suppose that Ockhamistic thought is naturally allied to the conception of modern science: it is anti-scientific in essence. A scientific man whose only metaphysics has been such as his own studies have suggested will be definitely adverse to the ideas of Ockham, and, so far as his simple conceptions go, will agree with Scotus" (CP 2.166).

³⁹ Wiener 1958, 302–303.

between them, although Peirce clearly follows Kant's general method in exploring what it is that allows science to be the success that it is:

Peirce's attempt to delineate the conditions of the possibility of science . . . is unmistakably Kantian, but in its execution, it takes a decidedly pragmatic turn. We have seen the principal difference between the two variants to be traceable to differing conceptions of the focal meaning of the word "science," the meaning shifting from that of a given body of propositions to that of a sociohistorical process of inquiry. . . . [S]peaking metaphorically, the function of the phenomenal/noumenal distinction can be seen to be transposed from the spatial to the temporal axis. There is still a functional distinction between how things are represented by us and how they really are in themselves, but the contrast now is between our present, imperfect representations and the ultimately adequate ones of the scientific community in the long run. Fallibilism and realism are seen to be facets of one and the same overall picture of science.⁴⁰

Delaney is correct that this co-existence of realism and fallibilism is crucial for Peirce's understanding of the nature of scientific truth, which (to use Delaney's image) is located at the asymptotically approached end of the eternally long temporal axis. We can see this interrelatedness of realism, fallibilism, and temporal process in the following Peircian passage regarding truth:

There is, then, to every question a true answer, a final conclusion, to which the opinion of every man is constantly gravitating. He may for a time recede from it, but give him more experience and time for consideration, and he will finally approach it. The individual may not live to reach the truth; there is a residuum of error in every individual's opinions. No matter; it remains that there is a definite opinion to which the mind of man is, on the whole and in the long run, tending. On many questions the final agreement is already reached, on all it will be reached if time enough is given. The arbitrary will or other individual peculiarities of a sufficiently large number of minds may postpone the general agreement in that opinion indefinitely; but it cannot affect what the character of that opinion shall be when it is reached. This final opinion, then, is independent, not indeed of thought in general, but of all that is arbitrary and individual in thought; is quite independent of how you, or I, or any number of men think. Everything, therefore, which will be thought to exist in the final opinion is real, and nothing else.⁴¹

This rather optimistic view ("to every question a true answer") was published in 1871.

⁴⁰ Delaney 1993, 28–29.

⁴¹ *CP* 8.12.

Thirty years later, Peirce was a co-contributor to the article “Truth and Falsity and Error” in the *Dictionary of Philosophy and Psychology*, in which we can see a refinement of his position. First, we can see definitions marking the distinction between *truth* and *reality*:

Truth is a character which attaches to an abstract proposition, such as a person might utter. . . . Reality is that mode of being by virtue of which the real thing is as it is, irrespectively of what any mind or any definite collection of minds may represent it to be.⁴²

Second, we can see a pulling back from the position that there is a true answer to *every* question:

If our hope is vain; if in respect to some question — say that of the freedom of the will — no matter how long the discussion goes on, no matter how scientific our methods may become, there never will be a time when we can fully satisfy ourselves either that the question has no meaning, or that one answer or the other explains the facts, then in regard to that question there certainly is no *truth*.⁴³

And finally, we find a slightly revised definition of this “character” called truth:

Truth is that concordance of an abstract statement with the ideal limit towards which endless investigation would tend to bring scientific belief, which concordance the abstract statement may possess by virtue of the confession of its inaccuracy and one-sidedness, and this confession is an essential ingredient of truth.⁴⁴

Although this refinement in Peirce’s view is still rather optimistic (in that his realism is still strong), it is nevertheless important to remember, as Haack says, that

Peirce’s position is thoroughly fallibilist; he allowed that the supposed laws accepted by scientists at any given time might turn out not to be genuine, that the supposed real kinds they posited might turn out not to be real after all. Which generals are real

⁴² *CP* 5.565.

⁴³ *CP* 5.565. But Peirce quickly adds that this need not necessarily undermine the *reality* behind the question: “But whether or not there would be perhaps any *reality* is a question for the metaphysician, not the logician. Even if the metaphysician decides that where there is no truth there is no reality, still the distinction between the character of truth and the character of reality is plain and definable.”

⁴⁴ *CP* 5.565. In 5.566, Peirce acknowledges that he has (thus far) been discussing only “positive scientific truth,” but he also says that “the same definitions equally hold in the normative sciences.”

is a matter which would only be finally settled in a hypothetical completed science.⁴⁵

Notice that science is only *hypothetically* completed, even in the most idealised case.

Mathematically, this is known as a *limit*, as something approached for eternity;

oftentimes, a function can get eternally closer and closer to a limit without ever arriving.⁴⁶

Science, then, while continually removing error, is never without error, and scientific *truth* is the limit that scientific community's "final opinion" is forever approaching.⁴⁷

This is our understanding of what Peirce thinks science *is*: a socio-historical process whereby a *community* commits to a particular method in the search for truth—a method that presupposes both *realism* and *fallibilism*. For Peirce, this understanding of science does not stand alone; rather, it is intimately connected with his metaphysics, logic, and pragmatism.

Cartwright Connections

At this point, we pause to consider some links or contrasts with Cartwright. It

⁴⁵ Haack 1992, 28–29.

⁴⁶ As a relatively accessible example, consider the plight of Little Jimmy, the boy who decided to dig holes in the backyard rather than study for his first Kindergarten test. As a result, despite the fact that he scored a 100% on every single test for the rest of his school career, his cumulative school test average—while continually *approaching* 100%—never actually *arrived* at 100%. (This, he now claims, is the reason he was forced to major in psychology.)

⁴⁷ Notice that, in a sense, this allows for aspects of both the coherence and correspondence theories of truth. Coherence: truth is the final opinion of the scientific *community*. An individual scientist's findings *must* be checked against the work of others. Correspondence: ultimately, the community's "final opinion" will cohere *because* there is a common reality against which to check that opinion. But Christopher Hookway does not see Peirce here offering a formal theory of truth: "Peirce is not offering an account of what it is for a proposition to be true. Instead he is clarifying (1) What commitments we incur when we take a proposition to be true. (2) What commitments we incur when we seek truth in some area. . . . And, as we have noticed, our commitment may be to no more than the reasonableness of *hoping* that inquiry will produce convergence" (Hookway 2004, 147).

seems to me quite obvious, given what we have already heard from her,⁴⁸ that she would support the practical and empirical approach Peirce takes in his description of science. Like her, he does not see science as a static set of abstract theories or laws that have universal coverage and whose explanatory power is complete. Rather, he describes the dynamic, messy, and fallible process that science actually *is*. Peirce describes science as we *have* it and not as we *wish* it—something Cartwright supports. I believe she would especially appreciate Peirce’s insistence that each scientific theory or law include a “confession of its inaccuracy and one-sidedness, and this confession is an essential ingredient of truth.”⁵⁰

However, I think Cartwright would be rather uncomfortable with the optimism inherent in Peirce’s conceptualization of scientific truth, for two main reasons. First, Peirce’s view that the final scientific opinion will eventually cohere is founded upon his full-blooded realism, the reality of Thirdness, and the ultimate relatedness of all reality. This, it seems, may be too unlike the dappled world envisioned by Cartwright, in which “There is no universal cover of law,”⁵¹ and in which, “For all we know, most of what occurs in nature occurs by hap, subject to no law at all.”⁵² However, Thirdness is not the

⁴⁸ For instance, her insistence that a truly *empirical* look at the results of scientific experiments undermines the belief in the universal coverage of the laws of nature.

⁴⁹ I use the subjunctive here (and elsewhere, when discussing Cartwright’s response to Peirce) to indicate that, while it was impossible for Peirce to directly address Cartwright, it is still conceivable that Cartwright might publish a response to Peirce. My comments, therefore, are speculations about what that response might be.

⁵⁰ *CP* 5.565. If this confession were more commonly accepted, for instance, Cartwright would never have had to accuse the laws of physics of lying.

⁵¹ Cartwright 1999, 6.

⁵² Cartwright 1999, 1.

only mode of being in Peirce's metaphysics. In Secondness, we see that the existence of particulars is as irreducible and undeniable as Thirdness. In Firstness, we see the mode of being that supports Peirce's tychism (his view that chance and spontaneity are genuine and permanent features of the world, and not just the result of gaps in our scientific knowledge). In other words, Peirce's *triadic* metaphysics, taken as a whole, may be more compatible with dappledness than it first appears.⁵³

If the first reason Cartwright might be uncomfortable with Peirce's scientific optimism is metaphysical, the second reason is more epistemological. I think her strong stance against scientific fundamentalism would make it difficult to accept Peirce's faith that we *will* eventually (as time approaches infinity) approach complete knowledge of the laws of nature. I am fairly sure she would see this as simply a new flavour of scientific fundamentalism: a scientific fundamentalism with an *esse in futuro* (a term Peirce himself uses to describe the character of an active general that makes our successful prediction possible). All scientific fundamentalism has a kind of *esse in futuro*, of course: 'One day it will be possible to predict where that \$1000 bill will land, once we understand enough about the laws governing air turbulence and the like.' But Peirce's unique flavour has a more strict *esse in futuro*: while we will *never* arrive at full scientific knowledge, we *will* spend eternity approaching it.

To summarise: both Peirce and Cartwright affirm both *fallibilism* and *realism* in their understandings of science as a practice. I think Cartwright is in strong agreement with Peirce about the fallibilism, but as I see it, from Cartwright's perspective it is the

⁵³ We will return to this when we discuss the links between Peirce's vagueness and Cartwright's dappledness.

extent and nature of the realism that is in question.

This is especially true when it comes to the reality of *law*. For Peirce, the reality of law is as fundamental as (because it is equivalent to) the reality of Thirdness. Laws are active generals, and their reality is wrapped up with his logic of relatives and his pragmatism (especially with pragmatism's focus on would-be's and prediction). For Cartwright, on the other hand, there is a kind of anti-realism about laws. Laws are not fundamental; capacities are. Laws are simply what we call the regularities that result when the fundamental capacities are arranged to form a nomological machine. As I mentioned in the introduction to this chapter, Cartwright retains a Humean understanding of the term: an after-the-fact-ness that means the essence of law is found in the past and not the future. Therefore, Cartwright would most likely be quite dismayed to hear Peirce characterise a law (from a scientist's point of view) as being "much *more* reliable than any single observation. It now begins to stand before the scientific man, the hardest of hard facts" ⁵⁴

But Cartwright's anti-realism about laws is also counterbalanced by a realism about capacities. Granted, she does not want to acknowledge anything more than a "local realism," but it remains to be seen ⁵⁵ whether Cartwright can maintain even *local* realism without, by implication, affirming what Peirce would call the reality of Thirdness (and of law). We will return to this ⁵⁶ in our discussion of the truncation of capacities. For now, as I see it, this difference between Peirce and Cartwright amounts to the fact that they

⁵⁴ Again, a passage not found in the *Collected Papers* but in Wiener 1958, 302–303.

⁵⁵ Page 262.

⁵⁶ Pages 250ff.

simply do not mean the same thing by “law.” In fact, later in this chapter⁵⁷ I will argue that when Peirce speaks of *laws*, it is very similar to the way Cartwright speaks of *capacities*. In other words, it is on these two (seemingly separate) subjects that comparisons between the two thinkers should be drawn. And once we do that, we see less difference than previously supposed. Peirce’s comment that law is more reliable (or as reliable) as any single observation does not sound as outlandish when one remembers that Cartwright considers capacities to be similarly fundamental, such as when she says, “Causal laws can be tested and causal capacities can be measured as surely—or as unsurely—as anything else that science deals with.”⁵⁸

Having established what science *is* for Peirce—and having guessed Cartwright’s response to it—we move on now to the metaphysics Peirce believes is required to underpin modern science. This, of course, is the subject of Cartwright’s 2007 call for a metaphysics.

Logically speaking, for Peirce, all science requires or assumes metaphysics, although he allows that it is perfectly possible (on a practical level) to do science without thinking about metaphysics at all. He does not recommend this, however. In fact, from a passage in which Peirce is giving advice concerning the scientific method, we find him saying that a scientist should

reform his metaphysics, if the question [the scientist is investigating] is a broad one. Perhaps he thinks he has not metaphysics, and does not wish to have any. That will be a sure sign that he is badly handicapped with metaphysics of the crudest quality.

⁵⁷ Pages 256ff. See especially 258.

⁵⁸ Cartwright 1989, 7.

The only way to disburden himself of it is to direct his attention to it. But he cannot reduce himself to anything like absolute scepticism in metaphysics without arresting his work.⁵⁹

Peirce acknowledges, however, that the scientist is not always the best equipped person for the task of a metaphysics of science. In fact,

It does not belong to the function of a scientific man to ascertain the metaphysical essence of laws of nature. On the contrary, that task calls for talents widely different from those which he requires. Still, the metaphysician's account of law ought to be in harmony with the practice of the scientific man in discovering the laws; and in the mind of the typical scientific man, untroubled by dabbling with metaphysical theories, there will grow up a notion of law rooted in his own practice.⁶⁰

In one case, Peirce seems to require the scientist to do some metaphysics; in the other, he implies that the scientist should just carry on and leave metaphysics to the professionals.

I think the apparent contradiction can be dissolved when one considers that Peirce recommends metaphysical thinking for the scientist investigating only *broad* questions.

Whatever the case, it seems that metaphysics—while *related* to science—is something *other than* science. And while metaphysics must not *clash* with science, it should be

done with an awareness of the *practice* of science. It becomes clear that, for Peirce, science and metaphysics are involved in some kind of conceptual dance; what is *less*

clear, however, is the nature of that dance. Our project involves claims about the

relationships among science, philosophy of science, and metaphysics; therefore, it is

appropriate for us to take some time to explore how Peirce conceived of those realms and the relationships among them.

⁵⁹ *CP* 7.82.

⁶⁰ Wiener 1958, 301–302. Presumably this notion will grow because scientists (in Peirce's view) come to find *laws* more reliable than *individual experimental results* (see page 224 above).

5. Peirce on Science, Philosophy of Science, and Metaphysics

Like Cartwright, Peirce can appear conflicted about metaphysics. There are times when Peirce sounds intensely anti-metaphysical, and in these passages he often criticizes metaphysics for being anti-scientific. For example:

[I]n science a question is not regarded as settled or its solution as certain until all intelligent and informed doubt has ceased and all competent persons have come to a catholic agreement, whereas fifty metaphysicians, each holding opinions that no one of the other forty-nine can admit, will nevertheless generally regard their fifty opposite opinions as more certain than that the sun will rise tomorrow.⁶¹

Peirce's apparent metaphysical unsettledness was also evident to his students, according to Christine Ladd-Franklin, a Johns Hopkins student who attended Peirce's lectures on logic (and who eventually, herself, lectured on logic at Johns Hopkins):

No effort was made to create a connected and not inconsistent whole out of the matter of each lecture. In fact, so devious and unpredictable was his course that he once, to the delight of his students, proposed at the end of his lecture, that we should form (for greater freedom of discussion) a Metaphysical Club, though he had begun the lecture by defining metaphysics to be "the science of unclear thinking."⁶²

As a result of this confusion in Peirce's writings, those who flip through the *Collected Papers* with a predisposition to an anti-metaphysical outlook can latch onto Peircian phrases such as these, listed here in order of increasing intensity:

[M]etaphysical conceptions are primarily and at bottom thoughts about words, or

⁶¹ *CP* 1.32.

⁶² Ladd-Franklin 1916, 716–717. This comes from an issue of *The Journal of Philosophy* that was published two years after Peirce's death, an issue that is devoted to remembering Peirce the lecturer and Peirce the philosopher. Ladd-Franklin's article remembers both with remarkable warmth: "[Peirce] had all the air . . . of the typical philosopher who is engaged, at the moment, in bringing fresh truth by divination out of some inexhaustible well. He got his effect not by anything that could be called an inspiring personality, in the usual sense of the term, but rather by creating the impression that we had before us a profound, original, dispassionate and impassioned seeker of truth" (716).

thoughts about thoughts⁶³

[A]lmost every proposition of ontological metaphysics is either meaningless gibberish — one word being defined by other words, and they by still others, without any real conception ever being reached — or else is downright absurd⁶⁴

The demonstrations of the metaphysicians are all moonshine.⁶⁵

On the other hand, those with a metaphysical predilection can find an ally in Peirce: we have already seen his work as a metaphysician in Chapter 2, when we looked closely at his Categories, and there he certainly appears open to metaphysical speculation.

It seems to me that the reason Peirce’s position on metaphysics is unclear—other than the usual difficulty in understanding his work⁶⁶—is this: Peirce is just as concerned to say what metaphysics is *not* as he is to say what metaphysics *is*. Unfortunately, when Peirce is criticizing metaphysics (saying what it is *not*—or, perhaps better, what it *should not be*), he still uses the word “metaphysics,” not always prefacing it with “inadequate” or “faulty,” and therefore leaving the possibility that the reader will conclude Peirce is throwing out all of metaphysics. In order to clarify Peirce’s statements on metaphysics,

⁶³ CP 5.294.

⁶⁴ CP 5.423.

⁶⁵ CP 1.7.

⁶⁶ “It is not always easy to understand Peirce. He never regretted the fact that most people found it hard to follow his ideas. He deliberately chose that most of his researches should be concerned with highly technical topics and should be secure from the intrusion of the uncalled. Upon occasion he could be brilliantly clear in his expressions of highly complex and recondite problems, although this clearness was a capricious fact in his life and in his writings, and was frequently interrupted by a mode of expression which often seemed to me to be due to the fear, after all, that in case mediocre minds found themselves understanding too many of his ideas, they would be led to form too high an impression of their own powers. One finds this tendency towards what might be called ‘impenetrability’ especially evident in his manuscripts. Too often the reader meets with a thought of surpassing brilliancy and follows it eagerly, only to have it disappear like the cuttlefish in an inky blackness of its own secretion” (Royce and Kernan 1916, 707). So write Josiah Royce and Fergus Kernan in their 1916 essay “Charles Sanders Peirce,” an overall account of Peirce’s life, work, and legacy.

then, we will first survey some of Peirce's statements on what metaphysics is *not*, after which we will look at what Peirce says metaphysics *is*.

What Metaphysics Is *Not*

As I see it, Peirce's concern is that metaphysics should avoid two extremes. On the one hand, it should avoid the kind of dogmatic discourse that (in Peirce's view) characterizes theology; on the other hand, it should avoid collapsing into what we call science (that is to say, into physical science). As we will see, Peirce is very clear (aided by some emotional intensity) in describing the first extreme (theology) and its dangers. The other extreme (science), however, is more difficult to perceive as one reads through Peirce's writings. In fact, Peirce uses so many science-like words to describe the ideal metaphysics that it is possible to conclude there is no real distinction (for Peirce) between metaphysics and physics. (I think that conclusion is inaccurate, for reasons I will outline below.) We will look at each extreme in turn.

First, the extreme of theology. We begin by establishing Peirce's strong anti-theological leanings, which is not a difficult task.

In my opinion, the present infantile condition of philosophy . . . is due to the fact that during this century it has chiefly been pursued by men who have not been nurtured in dissecting-rooms and other laboratories, and who consequently have not been animated by the true scientific *Eros*; but who have on the contrary come from theological seminaries . . .⁶⁷

We see here the setting up of a distinction between theology and science—and the hint that those trained as theologians cannot think scientifically (or at least, not *well*). We see this again, when Peirce writes:

⁶⁷ *CP* 1.620.

It is not necessary to read far in almost any work of philosophy written by a man whose training is that of a theologian, in order to see how helpless such minds are in attempting to deal with continuity. Now continuity, it is not too much to say, is the leading conception of science.⁶⁸

Some critics may very well disagree with Peirce that continuity's being the leading conception of science is "not too much to say," but whatever the result of that debate it is clear that—for Peirce—theologians are incapable of coming to a true understanding of science. This, coming from Peirce, is not high praise.

Into this general mistrust and dislike of theology comes a link with metaphysics, through the passages in which we find Peirce warning against the extreme of theology. For example, in a passage linking *truth* and *external reality* with the eventual opinion of the community of human knowers (as we have seen on page 227), Peirce hints at the problem theology can cause for metaphysics when he says that

to assert that there are external things which can be known only as exerting a power on our sense, is nothing different from asserting that there is a general *drift* in the history of human thought which will lead it to one general agreement, one catholic consent. And any truth more perfect than this destined conclusion, any reality more absolute than what is thought in it, is a fiction of metaphysics. It is obvious how this way of thinking harmonizes with a belief in an infallible Church, and how much more natural it would be in the Middle Ages than in Protestant or positivist times.⁶⁹

Again, this is merely a hint, linking fictional metaphysics with theological doctrine.

Elsewhere, Peirce goes beyond hinting:

[H]ad the business of metaphysics been intrusted to ordinary parish priests it would have been performed unscientifically enough. But what has in fact been its fate has been far more tragic, in that it has been given over not to parish priests but to the caste of theologians. . . . Now the principal business of theologians is to make men feel the enormity of the slightest departure from the metaphysics they assume to be

⁶⁸ *CP* 1.62.

⁶⁹ *CP* 8.12.

connected with the standard faith.⁷⁰

Here we can see the problematic influence of what Peirce calls theology: it brings into metaphysics, he thinks, the tendency to set the conclusion before the investigation, the finding before the seeking. And we also see one source of the confusion surrounding Peirce's views on metaphysics: his criticism of *theological metaphysics* is worded as criticism of simply *metaphysics*.

Now we turn to the other extreme Peirce feels metaphysics should avoid: the collapse into science. As I have said, this Peircian position is more subtle and therefore a bit more difficult to perceive from his writings, but it is most clearly seen through a distinction that Peirce consistently draws but does not always explain: the distinction between metaphysics and the physical sciences. Notice how that distinction is simply assumed in the following passage:

There is and can be no doubt that this immature condition of Metaphysics has very greatly hampered the progress of one of the two great branches of special science, I mean the Moral or Psychological Sciences. . . . To my mind it is equally clear that defective and bad metaphysics has been almost as injurious to the physical sciences, and is the real reason why all that depends upon the science of the constitution of matter, even physiology, is more or less rolling in the trough of the sea in rudderless fashion.⁷¹

It seems to me that in order for Peirce to have written that “defective and bad metaphysics” has been “injurious to the physical sciences,” he must be assuming that metaphysics is something *other than* the physical sciences. This is not a necessary conclusion from the passage,⁷² but it is at least reasonable. Along the same lines,

⁷⁰ CP 6.3.

⁷¹ CP 6.2.

⁷² After all, *defective* metaphysics might be distinct from the physical sciences, but *good* metaphysics might not be. We will see later on, however, that this is not the case for Peirce.

remember that we have recently seen (page 231) Peirce advising scientists that a bad metaphysics can hamper their work; again, this makes the most sense if (bad) metaphysics and the physical sciences are not the same thing.⁷³

We have seen what Peirce thinks metaphysics should avoid: the extremes of theology and physical science. We now turn to what metaphysics should be.

What Metaphysics Is

In Peirce's writings, we can find at least four major themes in his positive accounts of metaphysics:

- (1) It is an abstract science,
- (2) It should make use of the best available logic,
- (3) It should be linked with the totality of human experience (including, but not limited to, the physical sciences), and
- (4) It should be scientific (in Peirce's broad meaning of the word).

We will proceed to explore these in order.

First—and in another example of the distinction he makes between metaphysics and the physical science—Peirce categorizes metaphysics as an abstract science:

Logic requires that the more abstract sciences should be developed earlier than the more concrete ones. For the more concrete sciences require as fundamental principles the results of the more abstract sciences, while the latter only make use of the results of the former as data; and if one fact is wanting, some other will generally serve to support the same generalization.

But notwithstanding this, there is one highly abstract science which is in a

⁷³ Other similar examples can be found in *CP* 6.2, 6.4, and 5.423.

deplorably backward condition. I mean Metaphysics.⁷⁴

We see here, also, that metaphysics—*qua* abstract science—is in some way *logically prior* to the physical (“more concrete”) sciences. Again, that is not possible if metaphysics is itself a physical science.

Second, Peirce believes that the very best metaphysics will require the very best logic:

That [the theory of reasoning] is absolutely essential in metaphysics, I am as sure as I am of any truth of philosophy. . . . The truths that the metaphysician infers can be brought to the test of experience, if at all, only in a department of experience quite foreign from that which furnishes his premisses. . . . The consequence is that unless the metaphysician is a most thorough master of formal logic — and especially of the inductive side of the logic of relatives, immeasurably more important and difficult than all the rest of formal logic put together — he will inevitably fall into the practice of deciding upon the validity of reasonings in the same manner in which, for example, the practical politician decides as to the weight that ought to be allowed to different considerations, that is to say, by the impression those reasonings make upon the mind⁷⁵

Logic, Peirce insists, will help the metaphysician sort out what *is* right from what *sounds* right. Sometimes his optimism about the metaphysical tool of logic gets the better of him, as perhaps in this passage:

Pragmatism is one of the results of my study of the formal laws of signs, a study guided by mathematics and by the familiar facts of everyday experience and by no other science whatever. It is a maxim of logic from which issues a metaphysics very easily. It solves almost all problems of metaphysics in short metre and it solves them in such a way as never to bar the way of any positive inquiry.⁷⁶

⁷⁴ *CP* 6.1–2. In 6.2, Peirce makes clear that mathematics and logic are also abstract sciences.

⁷⁵ *CP* 1.623–624. In 1.624, Peirce continues, “For this reason, then, if for no other, the metaphysician who is not prepared to grapple with all the difficulties of modern exact logic had better put up his shutters and go out of the trade. Unless he will do one or the other, I tell him to his conscience that he is not the genuine, honest, earnest, resolute, energetic, industrious, and accomplished doubter that it is his duty to be.”

⁷⁶ Ladd-Franklin 1916, 720. This is an excerpt from a letter written by Peirce to Ladd-Franklin sometime around 1903.

That last phrase is significant, for it clarifies just how metaphysics should proceed differently from theology: ideally, metaphysics should not rule out (*a priori*) any possible empirical exploration, but should remain open and revisable.⁷⁷ Also significant for our investigation is the implication that Peirce *is describing himself* as a metaphysician. Yet again, we see that the best way to make sense of Peirce's apparently contradictory statements regarding metaphysics is to take his negative comments as *criticisms* of metaphysics gone wrong, and his positive comments as *prescriptions* about how metaphysics ought to be done.

Third, metaphysics should be linked with the totality of human experience. This is a crucial point if we are to truly understand Peirce here: metaphysics takes as its data, as its premises, *all* experience—including what might be considered the common, ordinary happenings that humans universally experience. As we will see, while metaphysical *conclusions* may not be directly open to observation, Peirce says that the *premises* (these common experiences) are. Here, Peirce compares metaphysics to the physical sciences in this very aspect:

The things that any science discovers are beyond the reach of direct observation. We cannot see energy, nor the attraction of gravitation, nor the flying molecules of gases, nor the luminiferous ether, nor the forests of the carbonaceous era, nor the explosions in nerve-cells. It is only the premisses of science, not its conclusions, which are directly observed. But metaphysics, even bad metaphysics, really rests on observations, whether consciously or not; and the only reason that this is not

⁷⁷ Peirce praises Scotus's realism for doing just this: "[I] will not countenance the rejection of a theory because of metaphysical difficulties. The great object of the metaphysics of Duns Scotus is so to state the results of ordinary experience, that it shall not close any positive experimental inquiry, or pronounce anything possibly observable to be *a priori* impossible" (*CP* 7.395). The implication is clear: the ability of a metaphysics to harmonize with experience—and to rule out no possible experience—is more important than whether that metaphysics is easy or difficult or simple or complex.

universally recognized is that it rests upon kinds of phenomena with which every man's experience is so saturated that he usually pays no particular attention to them. The data of metaphysics are not less open to observation, but immeasurably more so, than the data, say, of the very highly developed science of astronomy⁷⁸

What metaphysicians are to do, then, is to take the broadest possible look at human experience and, using the very best logic, reach conclusions about the structure of reality that best harmonizes with that experience. We can see that theme figure prominently in yet another reformulation of the problem of universals:

The question of realism and nominalism, which means the question *how far real facts are analogous to logical relations, and why*, is a very serious one, which has to be carefully and deliberately studied, and not decided offhand, and not decided on the ground that one or another answer to it is "inconceivable."⁷⁹

This insistence that metaphysics begins with the totality of human experience is the reason Peirce defines metaphysics as that which "endeavors to comprehend the Reality of Phenomena. . . . Metaphysics is the science of Reality."⁸⁰

This definition—of metaphysics as a science—brings us to our fourth and final theme in this exploration of Peirce's understanding of metaphysics: the scientific nature of metaphysics. This should not be surprising; we have just seen metaphysics described as an "abstract science." But Peirce's use of terminology usually associated with the physical sciences, as I have hinted, often leads to confusion about whether or not

⁷⁸ CP 6.2.

⁷⁹ CP 4.68. Emphasis mine.

⁸⁰ CP 5.121. And what reality *is*, according to Peirce, helps explain his focus on logic. "[S]o far as there is any reality, what that reality consists in is this: that there is in the being of things something which corresponds to the process of reasoning, that the world *lives*, and *moves*, and *has its being*, in a logic of events. We all think of nature as syllogizing. Even the mechanical philosopher, who is as nominalistic as a scientific man can be, does that" (Eisele 1976, 343–344). This passage is from a collection of Peircian writings (*The New Elements of Mathematics*) edited by C. Eisele. According to Jérôme Havenel, this particular passage dates to 1898 (see Havenel 2008, 131 n. 76).

metaphysics is just another physical science. As we have seen, of course, Peirce does *not* think metaphysics is another physical science; nevertheless, he insists that it be *scientific*. The question, of course, is just what Peirce means by “scientific” when he describes (prescribes, actually) the ideal metaphysics. In my view, he is referring to what he often calls the scientific *spirit*, “which is determined not to rest satisfied with existing opinions, but to press on to the real truth of nature.”⁸¹ Elsewhere, Peirce describes what he calls the logic of observational science—which also comes across as the *moral* logic of observational science, as seen here:

[N]othing can be more unscientific than the attitude of minds who are trying to confirm themselves in early beliefs. The struggle of the scientific man is to try to see the errors of his beliefs — if he can be said to have any beliefs.⁸² The logic which observational science uses is not, like the logic that the books teach, quite independent of the motive and spirit of the reasoner. There is an ethics indissolubly bound up with it — an ethics of fairness and impartiality — and a writer, who teaches, by his example, to find arguments for a conclusion which he wishes to believe, saps the very foundations of science by trifling with its morals.⁸³

Metaphysics, as Peirce has described it, *is* an observational science, although not a physical science; as we have seen (both in the third theme above *and* in Chapter 2's

⁸¹ *CP* 6.428. In this same paragraph, Peirce says, “That which constitutes science, then, is not so much correct conclusions, as it is a correct method. But the method of science is itself a scientific result. It did not spring out of the brain of a beginner: it was a historic attainment and a scientific achievement.” We see, yet again, an emphasis on dynamic method over static knowledge.

⁸² This may appear to be an odd phrase, until one realizes that in *CP* 5.589, while discussing the process of science, Peirce defines belief as “the willingness to risk a great deal upon a proposition. But this belief is no concern of science, which has nothing at stake on any temporal venture but is in pursuit of eternal verities (not semblances to truth) and looks upon this pursuit, not as the work of one man’s life, but as that of generation after generation, indefinitely.”

⁸³ *CP* 6.3. This theme of ‘scientific morality’ can be found elsewhere, also, as in this passage criticizing the Scotists (as opposed to Scotus) for their “principal fault, which may with justice be called a sin, since it involved a certain moral delinquency, was that they set up their idle logical distinctions as precluding all physical inquiry” (*CP* 6.361).

exploration of the Categories), the data it *observes* is not strictly limited to the physical realm. Therefore, the scientific spirit here described is also intended for the practice of metaphysics. In the following passage, Peirce makes this clear:

Historically we are astonished to find that [metaphysics] has been a mere arena of ceaseless and trivial disputation. But we also find that it has been pursued in a spirit the very contrary of that of wishing to learn the truth, which is the most essential requirement of the logic of science; and it is worth trying whether by proceeding modestly, recognizing in metaphysics an observational science, and applying to it the universal methods of such science, without caring one straw what kind of conclusions we reach or what their tendencies may be, but just honestly applying induction and hypothesis, we cannot gain some ground for hoping that the disputes and obscurities of the subject may at last disappear.⁸⁴

A few comments on this passage. First, we can see in it some of the reasons there is confusion about Peirce's view of metaphysics: we see criticism of metaphysics gone wrong ("ceaseless and trivial disputation") *and* his view of what it ought to be, which includes terms that might appear to the casual reader to conflate metaphysics and the physical sciences ("observational science," "universal methods of . . . science," and "induction and hypothesis"). Second, Peirce's reference to "induction and hypothesis" is more significant (yet again) than might first appear. He is referring to two (induction and *retroduction*) of the three forms of inference that he feels are required for any advance in human knowledge. Also significantly, he leaves out deduction. I speculate that he does this *not* because he feels deduction plays no role in the observational science of metaphysics, but because he wants to remind the reader that metaphysics must not be

⁸⁴ *CP* 6.5. In another passage, Peirce laments the distinction between the scientific spirit and what he too often sees as the philosophical spirit: "[Science] does not consist so much in *knowing*, nor even in 'organized knowledge,' as it does in diligent inquiry into truth for truth's sake, without any sort of axe to grind, nor for the sake of the delight of contemplating it, but from an impulse to penetrate into the reason of things. . . . Science and philosophy seem to have been changed in their cradles. For it is not knowing, but the love of learning, that characterizes the scientific man; while the 'philosopher' is a man with a system which he thinks embodies all that is best worth knowing" (*CP* 1.44).

about *only* deduction if it is to be what Peirce calls a “scientific metaphysics.” Scientific metaphysics must also involve speculative guesses (retroduction) and enquiry into whether or not those guesses bear fruit (induction). In Peirce, we see a call to be both bold and humble when it comes to metaphysics. As in physical science itself, submission to the arbitration of experience is required (hence the humility). But as we also find in physical science, “conceivability” is not always a reliable guide, and one must be willing to follow fruitful speculation where it leads (hence the boldness).

To end this sub-section on what metaphysics *is* (or should be), here is a last word from Peirce:

[The business of metaphysics] is to study the most general features of reality and real objects. But in its present condition it is . . . a puny, rickety, and scrofulous science. It is only too plain that those who pretend to cultivate it carry not the hearts of true men of science within their breast. . . . Only a small number out of the great catalogue of problems which it is their business to solve have they ever taken up at all, and those few most feebly. Here let us set down almost at random a small specimen of the questions of metaphysics which press, not for hasty answers, but for industrious and solid investigation:

Whether or not there be any real indefiniteness, or real possibility and impossibility?
 Whether or not there is any definite indeterminacy?
 Whether there be any strictly individual existence?
 Whether there is any distinction, other than one of more and less, between fact and fancy? Or between the external and the internal worlds? . . .⁸⁵

Peirce’s list of questions goes on; I have shortened it to include just those questions most relevant for our investigation.

⁸⁵ CP 6.6.

Metaphysics and Philosophy of Science

We conclude this section on “Peirce and Science, Philosophy of Science, and Metaphysics” with a discussion of what has been mentioned only in the headings thus far: philosophy of science. Perhaps surprisingly, it is a phrase nearly if not entirely missing from Peirce’s writings. In my view, this is because “science” has a broader meaning for Peirce than for us (as seen above), a meaning that *includes* what philosophy should be in its ideal state. As a result, philosophy of the (broadly construed) sciences *is* the metaphysics Peirce calls for, and what we call philosophy of science would be, for Peirce, those portions of metaphysics that concerns themselves primarily with the logical exploration of the physical sciences (not just its results, but also its possibility, presuppositions, methods, and implications). Nynfa Bosco, in his essay “Peirce and Metaphysics,” reaches a similar conclusion (note that when he refers to the “sciences” he means the “physical sciences”):

Peirce himself recognizes, even though obscurely, that it is not so much a matter of assigning to metaphysics and the sciences that which properly belongs to each but a matter of illuminating the subtle relationship between the two, when he adds that those parts assigned to metaphysics “are very peculiar parts, extremely unlike the rest” [CP 1.282]. In reality the parts assigned to metaphysics are so peculiar and unlike the rest that they fall outside the realm of science; they stand on either side of science as working hypotheses, categories, and suggestions of possible viewpoints.⁸⁶

What Bosco says Peirce’s metaphysics does for science is just what philosophy of science sets out to do.

Bosco’s essay is a frustrating combination of two things: insightful statements about Peirce’s general philosophical themes, and a lack of detailed references allowing the reader to verify those statements. Nevertheless, after investigating Peirce’s scientific

⁸⁶ Bosco 1964, 348.

metaphysics and its relationship with the physical sciences, we have verified that Bosco describes that relationship clearly and accurately when he writes:

[W]hen looking randomly at the metaphysical propositions scattered throughout the *Collected Papers*, one notices that these propositions can be divided into two groups: one group includes the propositions concerned with the fundamental assumptions underlying science and common sense along with the categories employed by each; the other group includes those propositions that attempt to gather together into a unified picture of the universe the various viewpoints suggested by our different cognitions, in the present state of civilization. In both cases it is a question of propositions which are not part of science but are “scientific” in the sense in which Peirce employs this term; that is, the propositions are derived from the sciences, in harmony with them, and in turn, are better able to explain the significance of the sciences and, therefore, are truly positive and efficacious, although in a different way than the special sciences are.⁸⁷

Having explained Peirce’s approach to metaphysics, the physical sciences, and what we call the philosophy of science, we return to the task of exploring the metaphysics that Peirce says best harmonizes with physical science.

6. Scholastic Realism and the *Possibility* of Science

We begin with the barest of beginnings: the very *possibility* of science, which Haack distinguishes from the *success* of science before going on to describe why Peirce feels scholastic realism is required to support even the possibility of modern science:

Peirce’s position was not that the success of the science of his time showed that scholastic realism is true, but that *the possibility of there being genuine science at all* required that there be real generals. Without generals, explanation, prediction, induction would all be impossible; without explanation, prediction, and induction, genuine science would be impossible.⁸⁸

In somewhat fuller form, the argument would run as follows: science aims not simply to describe but to *explain* how things are; this means that it seeks, not simply true statements of regularity, but genuine *laws*; true generalizations, that is, which

⁸⁷ Bosco 1964, 348.

⁸⁸ Haack 1992, 28.

govern not only all actual, but all *possible*, instances which say what *would* happen if . . . , not just what does happen when . . . ; otherwise, *prediction* would be impossible and *induction* baseless; and there would be such laws only if there are kinds of things in the world which really do behave in a lawlike way, only, that is, if there are real kinds, *real generals*.⁸⁹

If Haack is correct—and because her analysis largely matches my own in Chapter 4, I assume that she *is*—then Peirce’s view is that *realism* is required for the *possibility* of science. This helps explain why Peirce says, “[I]t is clearly seen that physical science gives its assent much more to scholastic realism (limited closely to its formal statement) than it does to nominalism”⁹⁰

But scholastic realism is still a bit too broad. For Peirce, the best scholastic formulation—by which I mean the formulation most harmonizable with modern science—is the one put forward by Scotus. Recall Peirce’s critical praise of Scotus:

The works of Duns Scotus have strongly influenced me. If his logic and metaphysics, not slavishly worshipped, but torn away from its medievalism, be adapted to modern culture, under continual wholesome reminders of nominalistic criticisms, I am convinced that it will go far toward supplying the philosophy which is best to harmonize with physical science. But other conceptions have to be drawn from the history of science and from mathematics.⁹¹

We have already explored those other conceptions in the previous chapter: Peirce’s logic of relatives, pragmatism (with its emphasis on would-be’s and prediction), and triadic metaphysics. With these additions, says Almeder,

the effect was of such a magnitude that Peirce felt he had supplied the only justifiable metaphysics capable of being harmonized with the physical sciences. Such a metaphysics accounts for the generality and vagueness of all predicates which, in turn, accounts for the essential corrigibility of all our physical

⁸⁹ Haack 1992, 25.

⁹⁰ *CP* 6.361. We will soon see why Peirce felt he must add the caveat “limited closely to its formal statement” when we explore his views on the virtues and sins of Scotistic realism.

⁹¹ *CP* 1.6.

knowledge.⁹²

Whether Almeder is correct about that remains to be seen, but without knowing it, Almeder (writing in 1980) was describing just what Cartwright would call for 27 years later: a metaphysics that grounds (1) how we hunt and use causes, (2) the dappledness of the world, and (3) the limits of our knowledge (including the limits of science).

Cartwright Connections

It seems to me that Cartwright would agree that a metaphysics should be scientific in spirit, and not contrary to (or closed to) physical experience. And, I think she would agree with the limitations Peirce places upon his own metaphysical project, as described in 1897:

Thus, in brief, my philosophy may be described as the attempt of a physicist to make such conjecture as to the constitution of the universe as the methods of science may permit, with the aid of all that has been done by previous philosophers. I shall support my propositions by such arguments as I can. Demonstrative proof is not to be thought of. The demonstrations of the metaphysicians are all moonshine. The best that can be done is to supply a hypothesis, not devoid of all likelihood, in the general line of growth of scientific ideas, and capable of being verified or refuted by future observers.⁹³

She might even agree with Peirce that an inadequate metaphysics can be a handicap for a scientist or a group of scientists. After all, as we have already seen, she *does* link metaphysics with scientific method, and she *does* issue a call for a metaphysics to support what scientists in fact do.

This brings us to the difficult task of actually *formulating* an appropriate,

⁹² Almeder 1980, 179.

⁹³ *CP* 1.7.

scientific metaphysics.⁹⁴ What will it look like? At this point—especially in the context of science and all the aesthetic preferences that are found in that context—we must be careful not to let scientific prejudices exert too much pre-emptive influence on our investigation. I am thinking, especially, of the scientific predilection towards *simplicity* over complexity. Both Peirce and Cartwright are keenly aware of (and resistant to) this particular prejudice. We have just seen Peirce say that the concordance of a metaphysics with real, physical facts⁹⁵ should be the deciding factor. Given that, a seemingly complex metaphysics is at least *possible*. In Chapter 2, we saw that Cartwright seems to echo that view:

I have argued that nature is complex through and through: even at the level of fundamental theory, simplicity is gained only at the cost of misrepresentation. . . . Matters are always likely to be more complicated than one thinks, rather than less. . . . Simplicity is an artefact of too narrow a focus.⁹⁶

The question, then, is this: just how complex (and speculative *sounding*) a metaphysics should we allow? For a practically-minded empirical philosopher of science such as Cartwright, the answer should be: a metaphysics that is *as complex as is necessary*—even if it is more complex than we might expect or prefer.

Which brings us back to what Peirce calls the scientific spirit, to “the *pursuit* of those who are devoured by a desire to find things out.”⁹⁷ In fact, Peirce writes, “My book

⁹⁴ “Scientific” in the two senses we have seen: (1) conforming, in general, to the scientific method, and (2) providing the necessary *foundation* for the reality and practice of science.

⁹⁵ Indeed, not just with physical facts but also with *all* experience. However, in the context of Cartwright’s philosophy of science we are focussing here on physical facts.

⁹⁶ Cartwright 1989, 72–3.

⁹⁷ *CP* 1.8. Emphasis mine.

is meant for people who *want to find out*; and people who want philosophy ladled out to them can go elsewhere.”⁹⁸ With all this in mind, consider again Peirce’s criterion for evaluating a metaphysics: look at “how far real facts are analogous to logical relations, and why.”⁹⁹ It seems to me—based on her comparative metaphysical reluctance—that while Cartwright is just as motivated as Peirce to ensure that “real facts are analogous to logical relations,” she is not quite as motivated as Peirce to find out “why.” This idea that Peirce pushes further than Cartwright in his desire *to find out* leads us quite naturally, then, to a discussion of how Peirce supplies *much more* than Cartwright calls for.

7. Truncation

We begin our treatment of this *much more* with what I think is the most important criticism Peirce has for Cartwright: his claim that she has truncated laws of relation into individual essences or natures. We will reconstruct this criticism by first connecting Cartwright with scholasticism. Then, because of that connection, we will explore Peirce’s critique of the scholastic understanding of *nature* and *law* before reconstructing his critique of Cartwright.

Cartwright and Scholasticism

Recall that Cartwright herself links her own views with at least *some* elements of scholasticism. Here, from Chapter 1, are some representative statements:

⁹⁸ CP 1.11. The “book” Peirce is referring to here is unknown. This is found in a fragment dated to c. 1897.

⁹⁹ CP 4.68.

This book takes its title from a poem by Gerard Manley Hopkins. Hopkins was a follower of Duns Scotus; so too am I.¹⁰⁰

Most of my arguments about capacities could have been put in terms of natures had I recognised soon enough how similar capacities, as I see them, are to Aristotelian natures. On the other hand, the use of the term ‘natures’ would seem very odd in the contemporary philosophical literature on causation, and would probably divert attention from the central points I want to make there about capacities versus laws, so perhaps it is not such a bad idea to keep both terms.¹⁰¹

I reject the conventional categories of British empiricism and turn instead to more ancient ones. A concept like Aristotle’s notion of *nature* is far more suitable than the concepts of *law*, *regularity* and *occurrent property* to describe the kind of knowledge we have in modern science: knowledge that provides us the understanding and the power to change the regularities around us and produce the laws we want.¹⁰²

[T]he use of Aristotelian-style natures is central to the modern explanatory programme.¹⁰³

[T]he [thesis] that I am most prepared to defend follows Aristotle in seeing natures as primary and behaviours, even very regular behaviours, as derivative.¹⁰⁴

This connection between Cartwright and Aristotelian-style natures¹⁰⁵ makes the

¹⁰⁰ Cartwright 1999, 104.

¹⁰¹ Cartwright 1999, 85. Here we see what I have called Cartwright’s sensitivity to the fact that Aristotelian natures might not seem mechanistic enough for contemporary philosophers of science.

¹⁰² Cartwright 1999, 78. Here again: Cartwright is associating Aristotelian natures with the building blocks *we* assemble to create the nomological machines that produce law-like regularities.

¹⁰³ Cartwright 1999, 81.

¹⁰⁴ Cartwright 1999, 149. Here again is Cartwright’s doctrine of the primacy of capacities.

¹⁰⁵ Although, like Peirce, it would seem that she would like to accept the Scholastics’ philosophy of science while rejecting their theology. This raises the question of whether that sort of picking and choosing is indeed possible—especially if “theology” is understood to mean the broadest assumptions one can make about the source and shape of reality. My suspicion, which I will not pursue here, is that divorcing philosophy of science from theology (broadly construed) is not as simple as either Peirce or Cartwright would wish, primarily because of the possibly inevitable overlap in domains (claims made about the ‘logic of all things’).

reconstruction of Peirce's critique of Cartwright quite a straightforward exercise, as his critique of scholasticism's use of Aristotelian-style natures (or essences or forms) is well documented in the secondary literature. To that literature, and to some primary Peircian material, we now turn.

Once again, Boler's *Charles Peirce and Scholastic Realism* proves quite helpful (and, in fact, has provided the term "truncation"). In the following two passages, Boler shows that, in Peirce's view, the scholastics were held back by their underdeveloped logic:

Peirce's only objection to the scholastic substantial form as a dispositional character—aside from the question of how scientific one is in determining distinguishing characters (6.361)—is that it fails to reveal the relational structure which is ultimately involved. That is, the scholastics were right as far as they went, but their limited logic did not allow them to see that the nature, power, or disposition represented in these monadic predicates is only a truncated image of a relational law. Apparently it was the old logic's inability to handle abstractions properly that was mainly at fault (3.642). I take this to mean that the scholastics did not realize that their most important abstractions were really hypostatized relations and, therefore, that real abstractions indicated real relations—laws and not forms.¹⁰⁶

The schoolmen, as Peirce sees them, realized the importance of habits or dispositions, but unfortunately they treated them as forms. Lacking the logic of relatives and pragmatism, they were unable to do justice to the relational structure of real generals. The result was a static doctrine of substantial forms that could not account for the important elements of continuity and process.

Scholastic realism was a step beyond nominalism, for it could account for the generality of qualitative possibility, the generality of monadic predicates. But the notion of potentiality, of would-be instead of might-be, could only be grasped in the dynamic conception of law.¹⁰⁷

¹⁰⁶ Boler 1963, 102–103.

¹⁰⁷ Boler 1963, 148. Note: this paragraph of Boler's shows up again ten years later (in *barely* altered form) in an article by Robert Almeder, but with no credit given to Boler. I include two lengthy passages for the reader's consideration. First, a passage from Boler's 1963 book, *Charles Peirce and Scholastic Realism*:

It should be clear by now that Peirce's pragmatism involves not only the belief that generals are real, but a special conception of the nature of real generals. This brings us to the last phase of Peirce's realism, where he criticizes the attempt to

Forty-one years later, Boler writes a description of Scotus and the scholastics, contrasting their position with Peirce's:

account for real generality by form alone. The schoolmen, as Peirce sees them, realized the importance of habits or dispositions, but unfortunately they treated them as forms. Lacking the logic of relatives and pragmatism, they were unable to do justice to the relational structure of real generals. The result was a static doctrine of substantial forms that could not account for the important elements of continuity and process.

Scholastic realism was a step beyond nominalism, for it could account for the generality of qualitative possibility, the generality of monadic predicates. (Boler 1963, 148)

Second, a remarkably similar passage from Almeder's 1973 article, "Peirce's Pragmatism and Scotistic Realism":

It should now be clear that Peirce's pragmatism involves not only a belief that generals or universals are real but also a very special conception of the nature of generality or universality. It was precisely this new conception of the nature of generality which turned Peirce into such a critic of the schoolmen who attempted to explain real universality in terms of form alone. The schoolmen, as Peirce saw them, realized the importance of habits or dispositions but unfortunately treated them as forms. The Scholastics were unable to do justice to the relational structure of real generals. The result was a static doctrine of forms which could not account for the important elements of continuity and process. For Peirce, scholastic realism was a step beyond nominalism because it could account for the generality of monadic predicates, but even the best of scholastic realists (Scotus) was too nominalistic. (Almeder 1973, 9–10)

Note that there is no use of quotation marks and no mention of Boler. At first blush, the very next sentence *seems* to ameliorate the situation: "Boler has alluded to this point rather clearly: . . ." (Almeder 1973, 10). However, as can be seen from the colon, this sentence merely introduces *another* passage from Boler 1963 (a passage that is quoted inaccurately—including an inserted sentence—and ascribed to the incorrect page number), and there is *still* no clear acknowledgement that Boler is the author of the preceding material.

The situation gets even more strange. In 1980, Almeder reuses his 1973 article as Chapter 5 of his book, *The Philosophy of Charles S. Peirce*. The article appears to be left largely unchanged; certainly, the passage in question is just as we see it above. Five years after *that*, in 1985, Boler (the actual and unacknowledged author of the passage) writes a review of Almeder's book for the journal *Philosophy of Science*. And although Boler *does* notice that Chapter 5's title is listed incorrectly in the Table of Contents, he does *not* notice that, for one paragraph, Almeder's material looks just like Boler's own. Of course, by this time, 22 years have elapsed since Boler first wrote the passage in question, so we cannot automatically assume that he did not read Chapter 5 carefully.

Currently, both Boler and Almeder act as consulting editors for the journal, *Transactions of the Charles S. Peirce Society*. I can find no evidence that anyone else has noticed this similarity.

The second role of contraction for Scotus is that it grounds the activity of substances in their individual natures. For Peirce, as we have seen, the reality of Thirdness is located in objective “would-be’s” which are not exhausted in any act or actual condition of things. The scholastics, of course, relied heavily on potencies in their explanation of the activities of things, but they still saw the ground for that activity in certain actual conditions (e.g., forms or natures) of individual substances.¹⁰⁸

Again, I am using Boler because of his expertise in the relationship between Peirce and Scotus; however, that last sentence, it seems to me, could just as easily be a description of Cartwright’s view, especially remembering that Cartwright describes herself as following Aristotle “in seeing natures as primary and behaviours, even very regular behaviours, as derivative.”¹⁰⁹ If I am correct, then we can see in Boler’s analysis—which I take to be correct—a major difference between Peirce and Cartwright: their location of the ground for what Boler has just called “the activities of things.” Cartwright says that she, like Scotus, affirms “the particular over the universal.”¹¹⁰ It is my view that she does that, at least in part, through her insistence on the primacy of capacities. This brings to mind the discussion from Chapter 3 about the ontological ground of efficient causation—especially the description of the Aristotelian model given to us by Kluge:

The substances that act as accidental efficient causes do impose form on matter—that is integral in the Aristotelian theory of efficient causation. Moreover, the manner in which they impose form on matter must be a function of their natures—which is to say, it must find its explanation in the natures of their substantial forms.¹¹¹

As I see it, Cartwright is clearly aligning herself with this view. The primary challenge for Cartwright, then, comes (as Boler has hinted) from Peirce’s analysis of habits,

¹⁰⁸ Boler 2004, 73.

¹⁰⁹ Cartwright 1999, 149.

¹¹⁰ Cartwright 1999, 104.

¹¹¹ Kluge 2008, 245.

relational systems, and law (and his consequent criticism of the truncated essences and natures of the scholastics).

Peirce and Habits

We have made a few references to the importance of “habits” for Peirce, but we have yet to define what he means by them. Here, then, is one of his definitions:

Let us use the word “habit,” throughout this book, . . . in its wider and perhaps still more usual sense, in which it denotes such a specialization, original or acquired, of the nature of a man, or an animal, or a vine, or a crystallizable chemical substance, or anything else, that he or it will behave, or always tend to behave, in a way describable in general terms upon every occasion (or upon a considerable proportion of the occasions) that may present itself of a generally describable character.¹¹²

Notice that a habit is a regularity—but not necessarily a *perfect* regularity—that is described using general terms. This sounds very much like the discussion Peirce has about pragmaticism and would-be’s, and so it should be unsurprising to find that he does indeed link habits with would-be’s. Here are two passages from an essay titled “The Doctrine of Chances”:

I am, then, to define the meanings of the statement that the *probability*, that if a die be thrown from a dice box it will turn up a number divisible by three, is one-third. The statement means that the die has a certain “would-be”; and to say that a die has a “would-be” is to say that it has a property, quite analogous to any *habit* that a man might have.¹¹³

To get back, then, to the die and its habit — its “would-be” — I really know no other way of defining a habit than by describing the kind of behavior in which the habit becomes actualized. So I am obliged to define the statement that there is a probability of one-third that the die when thrown will turn up either a three or a six by stating how the numbers *will* run when the die is thrown.¹¹⁴

¹¹² CP 5.538.

¹¹³ CP 2.664.

¹¹⁴ CP 2.666. Emphasis mine.

The linkage of terms is expanded even further in this analysis of what it means to say that an object has a certain “character”:

At the same time, we must dismiss the idea that the occult state of things (be it a relation among atoms or something else), which constitutes the reality of a diamond’s hardness can possibly consist in anything but in the truth of a general conditional proposition. For to what else does the entire teaching of chemistry relate except to the “behavior” of different possible kinds of material substance? And in what does that behavior consist except that if a substance of a certain kind should be exposed to an agency of a certain kind, a certain kind of sensible result *would* ensure, according to our experiences hitherto. As for the pragmaticist, it is precisely his position that nothing else than this can be so much as *meant* by saying that an object possesses a character.¹¹⁵

For Peirce, then, a habit is a regular would-be that is best described in a “general conditional proposition.” In fact, for the pragmaticist, to say that an object has a certain character *is* to say that such a habit *would* display itself under the correct conditions.

I take it that what Peirce describes here as a “character” is just what Cartwright calls a “capacity.” To illustrate this, consider yet again the hardness of a diamond. For Peirce, it is a *character*, a hypostatized relation, a would-be. For Cartwright, it is a *capacity*: the capacity to resist scratching (or *to* scratch, depending on the set up). In both cases, I claim, they are ultimately speaking *predictively*.

And yet, there is an important difference in their analysis of the hardness of a diamond. For Cartwright, the *nature* or the *essence* is the ground for the diamond’s predictable activities, for the diamond’s *habit* of resisting scratching. But for Peirce, the essence is not the *ground* of the habit; the essence *is* the habit. To repeat:¹¹⁶ Cartwright has definitely aligned herself with the scholastics on this question. For her, natures are

¹¹⁵ CP 5.457. Surely Peirce has set the record for extracting the most philosophy out of the hardness of a diamond.

¹¹⁶ From page 254 above.

primary and behaviours derivative. It is not difficult, therefore, to reconstruct a Peircian critique of Cartwright's view from his analysis of the parallel scholastic view.

Peirce, Properties, and Laws

Law plays a significant role in that analysis. We have already seen that any capacity, property, or character is described by Peirce as a would-be. As such, it has what he calls an *esse in futuro*. With that in mind, consider this Peircian analysis of law:

A law, then, which never will operate has no positive existence. Consequently, a law which has operated for the last time has ceased to exist as a law, except as a mere empty formula which it may be convenient to allow to remain. Hence to assert that a law positively exists is to assert that it will operate, and therefore to refer to the future, even though only conditionally. But to say that a body is hard, or red, or heavy, or of a given weight, or has any other property, is to say that it is subject to law and therefore is a statement referring to the future.¹¹⁷

Notice that Peirce's final list of properties could just as easily be Cartwright's list of capacities or natures. For Cartwright, to say that an object has a capacity is to say that it *could* be used in a nomological machine to *create* what we call a law; for Peirce, however, to say that an object has a capacity *is* to say that the object is *already* subject to law. For Peirce, talk of capacities *is* talk of law. They are inseparable.

Peirce, Natures, and Laws

But rather than seeing this aspect of his own position as something *other* than the scholastic view, Peirce asserts that this actually *is* the scholastic view:

The Scotistic opinion, which had ruled the universities before the Reformation, had, in Hume's day, quite disappeared. That opinion, it is necessary to remember, had been that, in addition to Actual Existence, there are various modes of Imperfect

¹¹⁷ CP 5.545.

Being, all of them varieties of Being *in futuro*—which we talk of when we say that ‘Christmas *really is coming*’—and in one of those modes of being, it was held that there really was something, which we of today should call a ‘law of nature,’ but which in the Latin language is simply a ‘nature’; and the Being *in futuro* of this law of nature was held to *consist in* this, that future events would conform to it. The theoretical element in that opinion lay precisely in the supposition that that which the ordinary course of things is bound (if not hindered) to bring about, already has a Germinal Being. That was no scholastic invention: it was the very heart of Aristotle’s philosophy. But in Hume’s day, nobody any longer believed in any such thing as that.¹¹⁸

This sounds very much like Cartwright’s insistence that an Aristotelian empiricism, with its emphasis on natures (as opposed to a Humean empiricism, with its emphasis on regularities) is what best harmonizes with modern science. This also illuminates what may be a confusion in Cartwright’s position: her insistence on both a *scholastic* understanding of “nature” and a *Humean* understanding of “law.” If Peirce is correct that the scholastic¹¹⁹ understanding of law is equivalent to (or inseparable from) the scholastic understanding of nature—that a “nature” is a “*law of nature*”—then there is the very real danger of a contradiction in Cartwright’s philosophy: holding a *scholastic* understanding of a law of nature while at the same time insisting on a *Humean* understanding of the very same thing.

Of course, this holds only *if* Peirce is correct. Once again Boler’s work is relevant, as it helps to make intelligible Peirce’s claim. And to do that work, Boler appeals to Peirce’s analysis of hypostatization:

If my interpretation is correct, there is some subtlety in describing pragmatism as a method for understanding abstractions. The pragmatic maxim transforms ‘x is hard’ into ‘If x were scratched by carborundum, it would not leave a mark’; the *hardness* is

¹¹⁸ Wiener 1958, 292. As with earlier references to Wiener, this is a Peircian passage that was not included in the *Collected Papers*.

¹¹⁹ Or at least, Scotistic, which would be especially attractive to Cartwright, given her self-proclaimed status as a “follower” of Scotus.

the hypostatization of the relation between test and response.¹²⁰

This is how a capacity, property, character, nature, or essence can be collapsed into a law. In every case, the capacity¹²¹ can be understood as a hypostatization of a *relationship*. And in every case, this relationship is one describable by a general conditional: ‘If situation *X* were to be actualized, then result *Y* would take place.’ Notice once again that the general conditional is predictive in nature (what Peirce would call a “would-be” with an *esse in futuro*). In other words, a *nature* or a *capacity* has precisely the characteristics of a *law* (as Peirce conceives law, not as Hume conceives it): it is a would-be with an *esse in futuro*, it describes a probable outcome with a probability high enough that the result may be called a regularity, and it is *real* (as demonstrated by our successful prediction).

There is another implication for Cartwright, if Peirce is indeed correct that natures/capacities *are* laws. Aside from suggesting that Cartwright is embracing contradictory understandings of *law*, it may also (at first) seem to ‘tautologize’ her claim that laws rely upon nomological machines which in turn rely upon capacities. That claim appears to become, ‘Laws rely upon the results of laws, which in turn rely upon laws.’ However, I do not think Peirce would describe Cartwright’s view as a tautology, for this reason: what she calls “law” (the result of a nomological machine) is a higher order of relatedness than what she calls “capacity.” In Chapter 4 we saw that one way Peirce understood “law” was as a relation *of* relations. I believe this is how he would understand

¹²⁰ Boler 1963, 91. I accept Boler’s interpretation, finding it consistent with my Chapter 4 analysis of the relationships among would-be’s, pragmatism, and realism.

¹²¹ I am choosing this representative from the list for an obvious reason: it is the word Cartwright uses most frequently.

what Cartwright calls a “nomological machine”: a higher-level relation (Cartwright’s “law”) of lower-level relations (Cartwright’s “capacities”). In this way, we are able to preserve both Peirce’s view that capacities and laws have the same mode of being (Thirdness)¹²² and Cartwright’s view that there is a distinction between the two.

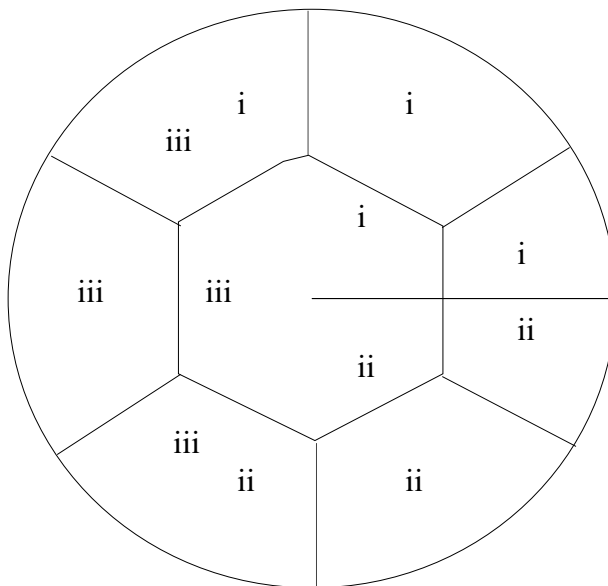
This concludes our reconstruction of Peirce’s critique of Cartwright’s understanding of capacities (including his suggested corrections). But before moving on to other matters, it may be useful to move Peirce’s reconstructed analysis of Cartwright to another level, bringing in the Categories.

8. Truncation and the Categories

At this new level, Cartwright’s truncation may be understood as the truncation of Thirdness into a kind of Secondness: the relationality (Thirdness) that Peirce considers to be the mode of being of both law and capacities has been truncated by Cartwright into the mode of being of existing particulars (Secondness). Recall Peirce’s diagram concerning various types of metaphysics (in which the Roman numerals *i*, *ii*, and *iii* represent the Categories of Firstness, Secondness, and Thirdness). (This diagram appears on the following page.)

¹²² It is significant, in my view, that Peirce describes the discovery of laws the same way Cartwright describes the discovery of capacities. They both say that simply looking for regularities is not enough and that, under the correct conditions, one experiment is sufficient to make the discovery.

Diagram of Metaphysical Possibilities (Based on the Categories)



Recall, also, Peirce's list of various philosophies and where they fit in this diagram:

- i. Nihilism, so-called, and idealistic sensualism.
- ii. The doctrine of [Wincenty] Lutoslawski and his unpronounceable master [Mickiewicz].
- iii. Hegelianism of all shades.
- ii iii. Cartesianism of all kinds, Leibnizianism, Spinozism, and the metaphysics of the physicists of today.
- i iii. Berkeleyanism.
- i ii. Ordinary Nominalism.
- i ii iii. The metaphysics that recognizes all the categories. It ought to be subdivided, but I shall not stop to consider its subdivisions. It embraces Kantism, Reid's Philosophy, and the Platonic philosophy of which Aristotelianism is a special development.¹²³

It would seem, then, that Cartwright's truncation of Thirdness into Secondness implies what Peirce calls "ordinary nominalism" in this diagram. The Thirdness of law, for

¹²³ CP 5.77, n. 1.

Cartwright, is not an irreducible reality. Rather, it *can* be reduced (through the concept of a nomological machine) to the properties of its particular components. To put Cartwright's view in Peircian terms: the Secondness of the components is primary, while the Thirdness of the nomological machine is derivative.¹²⁴

I believe, then, that Peirce would say Cartwright is in a bit of a bind for a self-proclaimed empiricist: she recognizes the primacy, the open-endedness, and even (to a limited degree) the relationality of capacities in the scientific understanding of law and regular (although not necessarily *perfectly* regular) behaviour. However, Peirce would say, one cannot let in just a *little* bit of Thirdness. Thirdness is the deep relationality required for the reality of active generals—*and what are real capacities if not active generals?* (Recall Cartwright's claim that "What makes things happen in nature is the operation of capacities," from page 14 in Chapter 1. I take Cartwright's *operating capacities* and Peirce's *active generals* to be the same.) If Cartwright is to reject Thirdness, she must also reject the doctrine of the reality and primacy of capacities and then return to the regularity-theory she finds inadequate. But if she is to retain even the *local* realism of capacities, she must reject the truncation of scholastic logic and accept the logic of relatives, pragmatism, and extreme scholastic realism. These things are required in a metaphysics that can be harmonized with the assumptions and methods of modern science.

¹²⁴ Putting this in Peircian terms exposes a Peircian problem right away: as we saw in Chapter 2, Thirdness (for Peirce) *cannot* be derived from any possible combination of Firsts and/or Seconds.

This brings us back to Cartwright's call for a metaphysics that supports how we hunt and use causes. I believe Cartwright's metaphysical 'crisis' results from her truncation, which has made the *hunting* and *using* two significantly different things that now need connecting. For example, it seems that she thinks of *hunting* as something primarily historical, primarily concerned with the past; when scientists hunt causes, they find out what *happened*. On the other hand, *using* appears to have something to do with the future; when scientists use causes, they must plan with a confidence that they can predict what *will* happen. In this way, the metaphysical 'crisis' can be understood as stemming from the need to find a way to link the past with the future, which is something her residual Humean leanings (especially when it comes to understanding "law") make difficult.

However, if Peirce's analysis is correct, then capacities, *qua* capacities, are relational, general, and predictive: as would-be's, there is a sense in which capacities are *always* about the future. To say that an object *has* a capacity is *not* merely to describe how it has behaved in the past; rather, it is to assert how—given the right conditions—the object *would* behave in the future. A capacity is alive with possibility (and dead without it). Indeed, when describing his pragmatism, Peirce seems to make this very point:

Another thing: in representing the pragmatist as making rational meaning to consist in an experiment (which you speak of as an event in the past), you strikingly fail to catch his attitude of mind. Indeed, it is not in an experiment, but in *experimental phenomena*, that rational meaning is said to consist. When an experimentalist speaks of a *phenomenon*, such as "Hall's phenomenon," "Zeemann's phenomenon" and its modification, "Michelson's phenomenon," or "the chessboard phenomenon," he does not mean any particular event that did happen to somebody in the dead past, but what *surely will* happen to everybody in the living future who shall fulfill certain conditions. The phenomenon consists in the fact that when an experimentalist shall come to *act* according to a certain scheme that he has in mind, then will something else happen, and shatter the doubts of sceptics, like the celestial

fire upon the altar of Elijah.¹²⁵

A metaphysics of capacities, then, is a metaphysics that affirms the reality of Thirdness. *Hunting* and *using* causes are no longer separate activities; they have been linked through the metaphysics that supports Peirce's pragmatism and extreme scholastic realism.

This, then, is how Peirce's metaphysics supplies what Cartwright *calls for* (a metaphysics that links the hunting and using of causes), but it comes at the cost of supplying *much more*: a critical analysis of her philosophy of science—most especially, a critique of her attempt to truncate relational systems into component capacities.

Of course, I have suggested that Peirce's metaphysics can do even more than that: it can account for the *dappledness* of the world, or what Cartwright calls “the messy world that we inevitably inhabit,”¹²⁶ in which “what happens on most occasions is dictated by no law at all.”¹²⁷ It is clear that Cartwright's hesitation to embrace realism stems from her assumption that realism leads to an understanding of the universe that leaves no room for chance.¹²⁸ But as we will soon see, Peirce's claim is precisely the opposite: in Peirce's metaphysics, we see a self-proclaimed *extreme* realist who also strongly affirms the reality of chance and (had he known to use the word) dappledness.

¹²⁵ CP 5.425. The final image is a reference to 1 Kings 18:16–39.

¹²⁶ Cartwright 1999, 18.

¹²⁷ Cartwright 1983, 49.

¹²⁸ “Covering-law theorists tend to think that nature is well-regulated; in the extreme, that there is a law to cover every case” (Cartwright 1983, 49). Earlier in the same 1983 book, Cartwright associates realism with the view that “the creator of the universe worked like a French mathematician” (p. 19), and that as a result *all things* are unified through the mathematical abstractions of natural laws. In this 1983 book, at least, Cartwright links realism with covering-law theory.

What follows is a look at how this works in Peirce's philosophy.

9. Vagueness

This introduction will come in two parts: first, a look at how vagueness relates (in Peirce's philosophy) to the question of realism versus nominalism; and second, a look at how Peirce's understanding of vagueness relates to what Cartwright calls the dappledness of things.

Vagueness and Realism

We begin with Peirce's striking claim that scholastic realism entails an understanding of the *real* unsettledness of the universe:

Modern thought has been extravagantly Ockhamistic, owing to the accidental circumstance that, at the revival of learning, the obscurantists, the fogeys, were adherents of Duns, of whom the politician Ockham was the typical opponent. . . . Get rid, thoughtful Reader, of the Ockhamistic prejudice of political partizanship [*sic*] that in thought, in being, and in development the indefinite is due to a degeneration from a primary state of perfect definiteness. The truth is rather on the side of the scholastic realists that the unsettled is the primal state, and that definiteness and determinateness, the two poles of settledness, are, in the large, approximations, developmentally, epistemologically, and metaphysically.¹²⁹

There are three major themes here for us to explore: (1) the link of idealized order with *nominalism*¹³⁰ and not realism, (2) the claim that realism is not only compatible with unsettledness but actually *requires* it, and (3) the assertion that settledness ("definiteness and determinateness") is never absolutely certain. We will explore (2) before (1), leaving

¹²⁹ CP 6.348.

¹³⁰ For Peirce, as we have already seen, "Ockhamistic" is interchangeable with "nominalistic."

(3) for the subsequent mini-section on “Vagueness and Dappledness.”

In exploring the claim that realism entails the view that “the unsettled is the primal state,” we must first understand Peirce’s definitions of “general” and “vague”:

Perhaps a more scientific pair of definitions would be that anything is *general* in so far as the principle of excluded middle does not apply to it and is *vague* in so far as the principle of contradiction does not apply to it.¹³¹

Peirce later adds examples to those definitions:

The *general* might be defined as that to which the principle of excluded middle does not apply. A triangle in general is not isosceles nor equilateral; nor is a triangle in general scalene. The *vague* might be defined as that to which the principle of contradiction does not apply. For it is false neither that an animal (in a vague sense) is male, nor that an animal is female.¹³²

It appears, then, that “general” is most usually applied to concepts¹³³ while “vague” is most usually applied to particular propositions. The *concept* “triangle” is general; it is neither this nor not-this particular triangle. The *proposition* “A triangle is equilateral” is vague; it is neither true nor false.

Now we can explore the reasons Peirce holds generality and vagueness to be necessary components of scholastic realism:

[Scholastic realism] is usually defined as the opinion that there are real objects that are general, among the number being the modes of determination of existent singulars, if, indeed, these be not the only such objects. But the belief in this can hardly escape being accompanied by the acknowledgement that there are, besides, real *vagues*, and especially real possibilities. For possibility being the denial of a necessity, which is a kind of generality, is vague like any other contradiction of a general. Indeed, it is the reality of some possibilities that pragmatism is most concerned to insist upon.¹³⁴

¹³¹ CP 5.448.

¹³² CP 5.505.

¹³³ Including laws, or hypostatized relations.

¹³⁴ CP 5.453. Here we see an added dimension to Peirce’s use of the terms “general” and “vague”: any proposition that contradicts or denies a general is itself vague. Presumably, this is

It is clear that possibility plays a key role in Peirce's understanding of *vague*; elsewhere, he makes that link explicit:

In the simplest case, the most subjective meaning, if a person does not know that a proposition is false, he calls it *possible*. If, however, he knows that it is *true*, it is much more than possible. Restricting the word to its characteristic applicability, a state of things has the Modality of the possible—that is, of the merely possible—only in case the contradictory state of things is likewise possible, which proves possibility to be the vague modality.¹³⁵

To review: for Peirce, scholastic realism is the view that there are real generals. If there are real generals, then real *possibility* must also be assumed (for reasons we are about to explore). Since possibility is “the vague modality,” then scholastic realism entails the doctrine of the *reality* of vagueness.

Now we turn to the link between real generals and real possibility, which is seen most clearly in Peirce's pragmatism:

[D]o not overlook the fact that the pragmatist maxim says nothing of single experiments or of single experimental phenomena (for what is conditionally true *in futuro* can hardly be singular), but only speaks of *general kinds* of experimental phenomena.¹³⁶

General conditionals simply *cannot* be reduced to discrete events. This, as Engel-Tiercelin rightly points out, is one important reason why Peirce's pragmatism—which affirms the reality of active generals—is incompatible with nominalism *and* is necessarily linked with the reality of possibility:

because a general is that for which the law of excluded middle does not apply; it does not need to commit to being either ‘this’ or ‘not-this.’ (Put another way: a general cannot be pinned down to a fully determined particular.) As a result, the proposition that negates that general can be neither true nor false—and is therefore vague.

¹³⁵ CP 5.454.

¹³⁶ CP 5.426.

[I]f ‘the conception of the practical effect’ expressed by the pragmatist maxim is conveyed under the form of a conditional, it cannot be reduced to any statement in terms of singular or discrete events (which incidentally forbids any verificationistic reading of the maxim), for the open, indeterminate aspect of the conditional is here fundamental [I]f one refuses to reduce the meaning of a proposition to actual individual events and if one reduces it instead to relations between events, one must admit that the possible is real.¹³⁷

Here we have, then, another finding with an important implication for Cartwright.

Capacities, as Cartwright assumes implicitly and Peirce understands explicitly, are would-be’s: their mode of being is that of a future-looking general conditional. To affirm their reality, as Cartwright does, is (as Engel-Tiercelin has just said) to “admit that the possible is real.” But Peirce’s logical analysis of possibility shows that it has the same modal quality as vagueness; therefore, Cartwright’s doctrine of the primacy and reality of capacities necessarily entails the reality of dappledness. But Cartwright herself does not make that connection; in fact, she often separates the two, downplaying her belief in the dappled world as a metaphysical opinion separable from her insistence on the primacy of capacities. Peirce’s analysis shows, however, that there are more metaphysical implications flowing from the primacy of capacities than Cartwright seems to realize. If capacities are real, then generality and possibility are real.¹³⁸ If possibility is real, then vagueness is real. If vagueness is real, then (as Peirce has said) unsettledness is part of “the primal state.” The doctrine of dappledness, then, is *not* logically separable from the doctrine of capacities. In a sense, this Peircian analysis strengthens Cartwright’s assertion that the world is dappled; but it also *commits* her to that assertion and contradicts this typical (for her) retreat from any strong metaphysical claim:

¹³⁷ Engel-Tiercelin, 64.

¹³⁸ And the doctrine of real generals is what Peirce calls “scholastic realism.”

This is not a metaphysical picture that I urge. My claim is that this picture is as plausible as the alternative. God may have written just a few laws and grown tired. We do not know whether we are in a tidy universe or an untidy one.¹³⁹

My point is this: if Peirce's analysis is correct—as I take it to be—then Cartwright's claim of dappledness is *not* “as plausible as the alternative”; rather, it is inescapable. We *do* know: we are in an untidy universe.

Peirce and Cartwright are aware, of course, that there is another interpretation of the perceived untidiness of the universe: it is only *perceived*. Dappledness does not reflect the *reality* of the universe but rather the *incompleteness* of our knowledge of the universe. Peirce describes the alternative this way: “One may entertain the theory that all vagueness is due to a defect of cogitation or cognition. It [the ‘defect’ theory] is a natural kind of nominalism”¹⁴⁰ Because Peirce writes this in the midst of a 1905 treatise on “Definite Positive Integers,” he does not elaborate on the connection between the defect theory and nominalism; however, based on what he has written elsewhere, the argument is easy to reconstruct. The nominalist insists that only particular things or events are real, all other concepts (generals, universals, laws, etc.) being convenient fictions of the mind. As a result, when the nominalist analyses a finite list of events, there either *is* or *is not* a regularity in the data. The law of excluded middle applies. As a result, the related proposition, ‘All *Xs* lead to *Ys*’ must have a truth value of either True or False. The law of non-contradiction also applies. As a result, using Peirce's own definitions, there is no real generality or vagueness in the situation. To say that the question ‘Do all *Xs* lead to *Ys*?’ is vague, for the nominalist, is simply to admit that one does not yet have all the

¹³⁹ Cartwright 1983, 49.

¹⁴⁰ *CP* 4.344.

data.¹⁴¹ The question itself, for the nominalist, simply *cannot* be vague. This is why the nominalist's conception of law—if that law is to be *true*—cannot allow for the idea of exceptions or discrepancies; and this is why any exceptions or discrepancies must be attributed to an epistemological defect.

In other words, what Peirce calls the nominalistic understanding of *law* is precisely what Cartwright, in *How the Laws of Physics Lie*, calls the understanding of laws according to the realist or covering law theorist. (She goes on to call this view “scientific fundamentalism” in *The Dappled World*.) However, scientific fundamentalism is not connected with realism at all, according to Peirce. Precisely the opposite: it is a necessary implication of a nominalistic understanding of the laws of nature.¹⁴²

Vagueness and Dappledness

If nominalism and scientific fundamentalism are linked, then Cartwright's

¹⁴¹ Or . . . to admit that one has lost track of what is actually *real* under nominalism.

¹⁴² It can also be the result of plain old ignorance (although the line between nominalism and ignorance, for Peirce, is a fine one, indeed), as Peirce describes in *CP* 6.201: “There is one class of objectors to [the doctrine of the reality of chance] who are so impressed with what they have read in popular books about the triumphs of science that they really imagine that science has *proved* that the universe is regulated by law down to every detail. Such men are theologians, perhaps, or perhaps they have been brought up in surroundings where everything was so minutely regulated that they have come to believe that every tendency that exists at all in Nature must be carried to its furthest limit. Or, there is I know not what other explanation of their state of mind; but I do know one thing: they cannot be real students of physical science—they cannot be *chemists*, for example. They are wrong in their logic.” Here we see, once again, significant parallels with Cartwright: (1) through the reference to “theologians,” a hint that the view may be a fundamentalism of sorts; (2) through the line about being “students of science,” an affirmation that the best way to philosophize about science is to actually observe the process of science; and (3) a claim that there is a logical inadequacy at work in what Cartwright calls scientific fundamentalism.

opposition to the one is also opposition to the other, and she lands squarely in the same camp as Peirce: scholastic realism, which leads to the reality of vagueness and the *real* dappledness of the world. We now look at Peirce's understanding of that real vagueness—particularly, at the relationship between the unsettledness of the “primal state” and the settledness of human logic and scientific knowledge.

That very relationship is the primary subject of Margolis's helpful essay, “Peirce's View of the Vague and the Definite.” Concerning the limits of human knowledge in the face of the primal unsettledness of reality, Margolis writes: “[Peirce] certainly regarded the world as too complex in its structure, too instantly altered by every effort to understand and interpret it, to admit any conceptual mapping as final and true.”¹⁴³

However, the Peircian view that our human knowledge is limited does not undermine the fact that we *do* have some precise human knowledge. Rather, according to Margolis, the untidiness of the world is seen by Peirce as the *context within which* the tidying action of thoughtful precision can take place:

[T]hinking is itself a part of nature and affects the structure of nature; but we misread the precision of propositions (hence, of formal reasoning as well) if we fail to remember its natural source and natural function. . . . [T]he rigorous effort to interpret signs and the sign-infected nature of whatever is real, for the purpose of rendering it definite or determinate (as opposed to vague or general), is a deliberate (volitional) effort made within the encompassing space of the general and vague—an effort that cannot succeed, in real-time terms, in actually eliminating the essentially general or vague. . . . Congruently, the real world is thoroughly vague and general, though it is also hospitable, within limits, to the logician's and scientist's deliberate

¹⁴³ Margolis 1993, 139. Cartwright clearly shares this view: “Nature tends to a wild profusion, which our thinking does not wholly confine” (Cartwright 1983, 19). The difference between the two thinkers, it seems to me, comes down to this: for Cartwright, the dappledness of the world is a (negotiable) ultimate fact, while for Peirce, the dappledness of the world is a necessary implication of his extreme realism and is capable of being explained. If I am correct that Peirce's realism must be presupposed by Cartwright's doctrine of the primacy of capacities, then it is Peirce who sees most clearly the nature of (and the reasons for) the dappledness of the world.

effort. The world is really precisised through science—but on the world’s own terms.¹⁴⁴

In Margolis’s excellent summary of Peirce’s views, we see an even larger view.

Peirce is not only interested in the limits to the work of precision (an interest related to what Cartwright calls “intervening”)—he is also interested in the larger metaphysical picture that makes intelligible those limits (an interest related to what Cartwright calls “representing”):

Peirce gives experiential priority to the vague over the definite; treats the definite as a critical precisising of the vague; construes that precisising as a form of self-control, which explains the equation of the logical and the ethical (CP 5.419); admits that the objectively vague cannot be eliminated and, correspondingly, . . . the existence of signs that cannot be brought under voluntary control; treats the vague as actual or real, though it may be precisised under favorable conditions; construes the work of logic and mathematics as changing the nature of what is actual by making it more definite; and therefore enlarges the conception of logic to include reflection on the conditions under which the rigor of formal deduction and related instruments are applied to the objectively vague and general.¹⁴⁵

Notice a resonance with the subtitle (and sub-theme) of Cartwright’s *The Dappled World: A Study of the Boundaries of Science*. Notice also that Peirce is not content to merely demarcate those boundaries, or to assume that the boundaries are no more than ultimate

¹⁴⁴ Margolis 1993, 142–144.

¹⁴⁵ Margolis 1993, 147. The Peircian reference (CP 5.419) is to the following: “Now, thinking is a species of conduct which is largely subject to self-control. In all their features (which there is no room to describe here), logical self-control is a perfect mirror of ethical self-control—unless it be rather a species under that genus.” At this point, the editors of the *Collected Papers* point the reader to 5.440, a paragraph in a later essay in which Peirce evidently had more room for elaboration: “[T]he secret of rational consciousness is not so much to be sought in the study of this one peculiar nucleolus, as in the review of the process of self-control in its entirety. The machinery of logical self-control works on the same plan as does moral self-control, in multiform detail. The greatest difference, perhaps, is that the latter serves to inhibit mad puttings forth of energy, while the former most characteristically insures us against the quandary of Buridan’s ass. The formation of habits under imaginary action . . . is one of the most essential ingredients of both; but in the logical process the imagination takes far wider flights, proportioned to the generality of the field of inquiry, being bounded in pure mathematics solely by the limits of its own powers, while in the moral process we consider only situations that may be apprehended or anticipated.”

facts; instead, he is driven to find the reasons behind them.

Habit, Chance, and Law

Part of that careful metaphysical speculation concerns something we saw in Chapter 2: Peirce's understanding of habit taking and its relation to law. With a more thorough understanding of vagueness and dappledness—and in the interest of following Peirce's desire *to find out*—let us return briefly to his treatment of habit, chance, and law. First, we have already seen that—like Cartwright—Peirce is not committed to the universal coverage of natural law.¹⁴⁶ Now we can see that he is not even committed to the *unchanging* quality of whatever natural laws there might be, regardless of their coverage:

The hypothesis suggested by the present writer is that all laws are results of evolution; that underlying all other laws is the only tendency which can grow by its own virtue, the tendency of all things to take habits. . . . Meantime, if law is a result of evolution, which is a process lasting through all time, it follows that no law is absolute. That is, we must suppose that the phenomena themselves involve departures from law analogous to errors of observation. . . . But the chance divergences from law are perpetually acting to increase the variety of the world¹⁴⁷

Demetra Sfondoni-Mentzou explains how habit, chance, and law work together in Peirce's philosophy:

Consequently, growth and evolution represent a “positive violation of law” (CP 6.613) which is made possible through the factor of chance. This is the second essential of habit [the first is that it can be understood as a *final cause*]: it can function only through *chance*. The reason Peirce uses chance, he says, is “to make room for a principle of generalization, or tendency to form habits” (CP 6.63). So habit is “the only bridge that can span the chasm between the chance medley of

¹⁴⁶ Except, of course, in the infinitely distant future (see page 227 above).

¹⁴⁷ CP 6.101.

chaos and the cosmos of order and law” (CP 6.262).¹⁴⁸

Peirce has developed a speculative metaphysics that affirms the reality of law *and* the reality of chance; in his view, reality has room for both genuine order and genuine novelty.¹⁴⁹

Evolution, Abduction, and the Human Guessing Instinct

In the midst of this richly conceived world, the work of science goes on. On this, Peirce and Cartwright are most certainly agreed. But while Cartwright is content to study the limits of science through the empirically available facts of scientific practice, we see in Peirce a greater desire to find out *why* and *how* humanity is able to participate in that practice at all. Here is one tantalizing hint at the problem and its solution:

I do not think a better definition of a *law of nature* can be given than this: it is a foreknowing generalization of observations. This said, the question is instantly started, How can the reason of a man attain such foreknowledge?

How shall we answer? Must we not say that the fact that he can so attain proves that there is an energizing reasonableness that shapes phenomena in some sense, and that this same working reasonableness has molded the reason of man into something like its own image? These questions must remain for the reader to decide to his own

¹⁴⁸ Sfendoni-Mentzou 1993, 249. The reference to final causes is not without merit. Peirce writes, “Now since this same [habit-taking] tendency is the one sole fundamental law of mind, it follows that the physical evolution works towards ends in the same way that mental action works towards ends, and thus in one aspect of the matter it would be perfectly true to say that final causation is alone primary. Yet, on the other hand, the law of habit is a simple formal law, a law of efficient causation; so that either way of regarding the matter is equally true, although the former is more fully intelligent” (CP 6.101).

¹⁴⁹ This tension between novelty and order may be as old as philosophy itself. It is certainly central to the ancient problem of the One and the Many. Aristotle, long before Peirce, attempts to find a way to formulate an account of reality that has room for both novelty and order; this can be seen (partially, at least) in Aristotle’s account of change in the *Physics*, perhaps especially in *Physics* 1.7, 189^b30–191^a22, in which Aristotle formulates what might be called a triadic analysis of change: the subject (that does not change) and the two contraries (the property that comes to be, and the absence that it fills).

satisfaction.¹⁵⁰

That is not all Peirce has to say on the matter, however; the reader is not left alone for long. We can find plenty of other analyses, many of them grounded in the history and actual practice of scientists. Consider this observation, for instance:

A modern physicist on examining Galileo's works is surprised to find how little experiment had to do with the establishment of the foundations of mechanics. His [Galileo's] principal appeal is to common sense and *il lume naturale*.¹⁵¹

Although Peirce does not explain *why* the modern physicist is surprised, I believe that he is referring to the same thing that bothered Goethe about Newton's light experiment (as described by Cartwright): not enough work was done to sort out the real correlations from the false. There are, Peirce knows, an overwhelmingly large number of possible explanations for any experimental result (or set of results). In this passage he wonders (rhetorically) just how it is that science has managed to be so successful:

Is it by chance? Consider the multitude of theories that might have been suggested. A physicist comes across some new phenomenon in his laboratory. How does he know but the conjunctions of the planets have something to do with it or that it is not perhaps because the dowager empress of China has at that same time a year ago chanced to pronounce some word of mystical power or some invisible jinnee may be present. Think of what trillions of trillions of hypotheses might be made of which one only is true; and yet after two or three or at the very most a dozen guesses, the physicist hits pretty nearly on the correct hypothesis. By chance he would not have been likely to do so in the whole time that has elapsed since the earth was solidified.¹⁵²

¹⁵⁰ A non-*Collected Papers* document written by Peirce, published in Wiener 1958, 291.

¹⁵¹ *CP* 6.10.

¹⁵² *CP* 5.172. In the same paragraph, Peirce goes on to anticipate this objection: the physicist does *not* have to start over when faced with each new result, because magical guesses have—in the history of scientific research—been largely discarded. Peirce's response is to say that "the matter is not to be accounted for in any considerable measure in that way. Take a broad view of the matter. Man has not been engaged upon scientific problems for over twenty thousand years or so. But put it at ten times that if you like. But that is not a hundred thousandth part of the time that he might have been expected to have been searching for his first scientific theory."

From this ‘unlikeliness’ of science, Peirce concludes that we have something (in the general category of instinct) that allows us, when proposing explanations, to guess relatively well:

However man may have acquired his faculty of divining the ways of Nature, it has certainly not been by a self-controlled and critical logic. Even now he cannot give any exact reason for his best guesses. It appears to me that the clearest statement we can make of the logical situation—the freest from all questionable admixture—is to say that man has a certain Insight, not strong enough to be oftener right than wrong, but strong enough not to be overwhelmingly more often wrong than right, into the Thirdnesses, the general elements, of Nature. An Insight, I call it, because it is to be referred to the same general class of operations to which Perceptive Judgments belong. This Faculty is at the same time of the general nature of Instinct, resembling the instincts of the animals in its so far surpassing the general powers of our reason and for its directing us as if we were in possession of facts that are entirely beyond the reach of our senses. It resembles instinct too in its small liability to error; for though it goes wrong oftener than right, yet the relative frequency with which it is right is on the whole the most wonderful thing in our constitution.¹⁵³

This, it may be objected, is not far from the nominalistic “ultimate fact” Peirce so strongly detests: a term posing as an explanation, but which in fact is just a fancy way of saying that there is no explanation. After all, after setting up the success of science as an almost infinitely unlikely event, is it really much of an explanation to say, ‘Well, we must have an instinct for it’?

Fortunately, Peirce does not leave it there. The instinct itself, under Peirce’s extreme realism which emphasizes the reality of active generals, *is* (he believes) susceptible of an explanation that makes some use of the ideas in evolutionary theory:

[O]ur minds having been formed under the influence of phenomena governed by the laws of mechanics, certain conceptions entering into those laws become implanted in our minds, so that we readily guess at what the laws are. Without such a natural prompting, having to search blindfold for a law which would suit the phenomena,

¹⁵³ CP 5.173.

our chance of finding it would be as one to infinity.¹⁵⁴

But [a man] is provided with certain instincts, that is, with certain natural beliefs that are true. They relate in part to forces, in part to the action of minds. The manner in which he comes to have this knowledge seems to me tolerably clear. Certain uniformities, that is to say certain general ideas of action, prevail throughout the universe, and the reasoning mind is [it]self a product of this universe. These same laws are thus, by logical necessity, incorporated in his own being.¹⁵⁵

In this way, general considerations concerning the universe, strictly philosophical considerations, all but demonstrate that if the universe conforms, with any approach to accuracy, to certain highly pervasive laws, and if man's mind has been developed under the influence of those laws, it is to be expected that he should have a *natural light*, or *light of nature*, or *instinctive insight*, or genius, tending to make him guess those laws aright, or nearly aright.¹⁵⁶

And so we see that Peirce's view is just what one would expect, given his realism: we have evolved in an environment that includes *real* and active generals; therefore, it is not surprising that we have evolved and adapted in such a way that we have become rather good at comprehending those active generals. Here is a concluding, summative passage:

How is it that man ever came by any correct theories about nature? We know by Induction that man has correct theories; for they produce predictions that are fulfilled. But by what process of thought were they ever brought to his mind? . . . You cannot say that it happened by chance, because the possible theories, if not strictly innumerable, at any rate exceed a trillion—or the third power of a million; and therefore the chances are too overwhelmingly against the single true theory in the twenty or thirty thousand years during which man has been a thinking animal, ever having come into any man's head. Besides, you cannot seriously think that every little chicken, that is hatched, has to rummage through all possible theories until it lights upon the good idea of picking up something and eating it. On the contrary, you think the chicken has an innate idea of doing this; that is to say, that it can think of this, but has no faculty of thinking anything else. The chicken, you say, picks by instinct. But if you are going to think every poor chicken endowed with an innate tendency toward a positive truth, why should you think that to man alone this gift is denied? If you carefully consider with an unbiassed mind all the circumstances of the early history of science and all the other facts bearing on the question, which are far too various to be specifically alluded to in this lecture, I am quite sure that you must be brought to acknowledge that *man's mind has a natural*

¹⁵⁴ CP 6.10.

¹⁵⁵ CP 5.603.

¹⁵⁶ CP 5.604.

adaptation to imagining correct theories of some kinds, and in particular to correct theories about forces, without some glimmer of which he could not form social ties and consequently could not reproduce his kind. In short, the instincts conducive to assimilation of food, and the instincts conducive to reproduction, must have involved from the beginning certain tendencies to think truly about physics, on the one hand, and about psychics, on the other. It is somehow more than a mere figure of speech to say that nature fecundates the mind of man with ideas which, when those ideas grow up, will resemble their father, Nature.¹⁵⁷

At first blush it is surprising that Cartwright's analysis of the processes, successes, and limits of science does not include discussion of evolution or natural selection. But consider this: she has proven reluctant to discuss metaphysics at all. How much more reluctant might she be to follow metaphysics where it leads?

10. Peirce and Cartwright's Contemporary Commentators

At the end of Chapter 1, we looked at what Cartwright's contemporaries are saying about her work. We will end Chapter 5 the same way, but with the addition of what we have seen of Peirce's philosophy and its connections with Cartwright's. Here, then, is a taste of what our analysis of Peirce and Cartwright can add to the current discussion in philosophy of science. I will survey some of that discussion and suggest ways that Peirce's philosophy can make contributions.

We turn again to essays from *Nancy Cartwright's Philosophy of Science* (2008), many of which we have already discussed in Chapter 1. In Carl Hoefer's introductory essay, he describes Cartwright's conception of law this way:

Laws, to the extent that we need them, arise because of, and are true only in, *nomological machines*: setups, usually made by us but sometimes found in nature, that combine a simple/stable structure and sufficient shielding from outside

¹⁵⁷ CP 5.591. Emphasis mine.

influences so as to give rise to regular behavior.¹⁵⁸

There is nothing particularly surprising here, but I want to draw the reader's attention to the phrase, "usually made by us but sometimes found in nature." Nomological machines, then, are not just human artifacts; sometimes, they are the way nature really is. This is often overlooked in the literature surrounding Cartwright's claims. Peirce's philosophy helps address the rarely asked question: *How is it* that nomological machines *can* and sometimes *do* occur *in nature*? He offers a realistic metaphysics that can account for (1) the reality of Thirdness and law, (2) the reality of dappledness, and (3) our ability to perceive, understand, and explain both (1) and (2). Cartwright herself seems to call for just such a metaphysics:

One of the central aims of *The Dappled World* is to offer a metaphysical account of the patchwork way in which successful science operates as opposed to an epistemological account that relies on our ignorance and cognitive limitations. The challenge then is to account for how there can be the kinds of regularity and precise predictability that we see in a world that is not ordered through and through by some fundamental and precise, regularity-type laws.¹⁵⁹

I argue that our analysis of Peirce (and his putative analysis of Cartwright) helps us see what is required for Cartwright to meet this very challenge.

Stathis Psillos says that the goal Cartwright has set for herself is a difficult one, and that she has not yet met it:

Though we can easily see how attractive it is to be realist about capacities, I think it's really hard to be one. So, though Humeanism is certainly independent of scientific realism, I argue that we have not been given compelling reasons for a non-Humean metaphysics of capacities.¹⁶⁰

¹⁵⁸ Hoefer 2008a, 5.

¹⁵⁹ In Hartmann, *et al.* 2008, 337.

¹⁶⁰ Psillos 2008, 168.

Again, Peirce can be of use to Cartwright, as he spends a lot of time and energy compiling just what Psillos says Cartwright has not yet given. In fact, our analysis of Peirce's philosophy helps us see that Psillos is correct: Cartwright has *not* given those compelling reasons explicitly. However, with Peirce's help, we can see (even if she cannot) that Cartwright's philosophy of science can be argued to entail those Peircian compelling reasons.

Psillos has two other criticisms of Cartwright: that her commitment to capacities entails a commitment to laws, and that her capacity-realism only works if she allows for ampliative reasoning in the work of science.¹⁶¹ For Psillos these are strikes *against* Cartwright. Here again, Peirce would be a helpful ally. His metaphysics allows for a transformed (non-Humean) understanding of the reality of law, and his logic of relatives and pragmatism allow for the possibility of—indeed, the *necessity* of—retroduction (a species of ampliative reasoning). This affirmation of retroduction, however, would be a dramatic shift for Cartwright; it is clear that she neither trusts nor accepts it:

The culprit . . . that provides the appearance of warrant for the high-level claims is the hypothetico-deductive method. Despite universal recognition that this method commits the fallacy of affirming the consequent, it seems to be generally presupposed by realists and anti-realists alike; hence the scramble to find some possible truth-making characteristics for the 'best' explanation; simplicity, unification, invariance. . . . I am convinced that the fallacy is a fallacy and also that the case that any of these 'nice' features are truth-makers has not been made.¹⁶²

This is clearly a problem. Can science *really* be as successful as it is, based on a *fallacy*?

Interestingly, Cartwright goes on to imply that those wanting to attack this problem

should “refocus our attention from deductive to inductive methods and to study how best

¹⁶¹ Psillos 2008, 171–172.

¹⁶² In Hartmann, *et al.* 2008, 166.

to formulate these for contemporary science.”¹⁶³ Peirce, of course, does just this (adding retroductive methods to the discussion).

Another way Peirce’s philosophy can contribute to the contemporary debate is by exposing and eliminating false choices. We will look at three examples. First, from Carl Hoefer’s other essay in the collection, “For Fundamentalism”:

Cartwright’s patchwork of laws and capacities offers us a picture of science and its possibilities that is very faithful to the current state of theory and practice. That is its weakness: It holds out no reason to think that our deepest explanations can get significantly better (though at least our engineering can). The fundamentalists’ view does however aim at significantly deeper and better explanations at a fundamental level—even though they may not help us with our engineering. To engineers and experimentalists, I commend Cartwright’s philosophy of science wholeheartedly. But I hope to have made space for theoreticians and philosophers of physics to keep their faith in a world with fundamental physical laws.¹⁶⁴

Hoefer sets up distinctions between experimentalists and theorists, between the present and the future. To current experimentalists, he recommends Cartwright’s philosophy of science; to future-oriented theorists, he recommends something else altogether. But Peirce does not ask us to choose. Peirce’s view is that *all* science—indeed, any truth-seeking enterprise—is by nature future oriented: the present day scientist plays a role in the scientific community’s *eventual* arrival at a consensus about the world and its laws. Not only that, but theoreticians and philosophers of science (metaphysicians all, in Peirce’s view) should *always* keep the results and practices of experimentalists and engineers in mind.

Second, from Michael Esfeld’s essay, “Cartwright on Wholism.” After rightly seeing that Cartwright’s approach to capacities entails a collapse of the property/capacity

¹⁶³ In Hartmann, *et al.* 2008, 166.

¹⁶⁴ Hoefer 2008b, 320.

distinction, he links her philosophy with a radical relationality:

Cartwright's metaphysics of capacities can thus be combined with a view of nature as being one interacting whole instead of there being unknowable intrinsic properties of individual things on which their dispositions are grounded.¹⁶⁵

Esfeld sets up the distinction between an atomistic metaphysics (in which individuality is primary) and a wholistic metaphysics (in which relationality is primary). But Peirce does not ask us to choose. His triadic metaphysics (the Categories) affirm three modes of being (Esfeld is only addressing Secondness and Thirdness here), *all of which* we must address if we are to have a complete understanding of the *triune whole* of reality.

Peirce's metaphysics is wholistic, yes, but it is not a wholism of Thirdness alone.

Third, from one of Cartwright's responses, in which she worries about having been too metaphysical.¹⁶⁶

I think that the hermeneutic reading that Nordmann proposes of my views show them in a light far more acceptable to the kind of in-the-world empiricism and particularism that we might ascribe to Hampshire, and that I would wish to emulate, than does the framing in terms of realism, universalism, unification, simplicity, and the like familiar in contemporary philosophy of science.¹⁶⁷

Cartwright sets up a distinction between in-the-world empiricism and (among other things) realism. But yet again, Peirce does not ask us to choose. His pragmatism emphasizes the need for empirical results, but it also entails (in his view) realism. In fact, it is precisely our ability to make successful, in-the-world predictions that makes realism the only reasonable position to take.

¹⁶⁵ Esfeld 2008, 328.

¹⁶⁶ See Chapter 1, page 57, for what reads almost like a philosophical repentance.

¹⁶⁷ In Hartmann, *et al.* 2008, 389–390.

One final point. In that same response, Cartwright aligns herself with what she calls Alfred Nordmann's "modest" philosophy of science:

I especially embrace Nordmann's descriptions of science—really good science—that take us . . . to something far more modest: 'The success of science,' Nordmann tells us, 'consists in the establishment of a more or less local, more or less robust alignment of phenomena, models, and theories' (Nordmann this volume: 371).¹⁶⁸

Perhaps Nordmann is correct; perhaps not. But either way, a *philosophy* of science should do more than tell us when science achieves a success, for that alone would be a mere journalism of science. Philosophy of science goes further, exploring *how* and *why* the success is possible. This, in her more metaphysically courageous moments, Cartwright attempts to do. Peirce, I argue, helps by providing metaphysical support for her enterprise.

11. Conclusion

It is in the desire to press boldly into metaphysics and its implications that Peirce is strikingly unique among modern philosophers. According to Joseph Margolis,

Peirce unmistakably stands at the very beginning of that enormously influential tradition of analytic philosophy that (understandably enough) has been worried about the realism (or the realist-preserving function) of formal logic and mathematics in application to the actual world that is, as in Frege, Carnap, Tarski, Wittgenstein, Quine, and an army of more recent enthusiasts. It was never the tautological character of deductive reasoning that worried or reassured Peirce. He seems to have been remarkably prompt in developing a truth-table analysis of necessary truth (*CP* 3.387; cf. Tarski, 1983:40 n. 2);¹⁶⁹ it was rather the import of applying such precised instruments to, and within, the actual world. None of the figures of the tradition mentioned can claim a command of the metaphysics of thought equal to Peirce's. Put less grandly: none has explored the implications of treating thinking as a natural

¹⁶⁸ In Hartmann, *et al.* 2008, 391.

¹⁶⁹ This refers to the listing, "Tarski, Alfred. 1983. Investigations into the Sentential Calculus. In *Logic, Semantics, Metamathematics*, 2d ed., trans. J. H. Woodger, ed. John Corcoran, 38–59. Indianapolis: Hackett," 160.

process blessed and cursed with the ability to generate isolatable sentences.¹⁷⁰

This “command of the metaphysics of thought” is precisely what I claim Peirce can contribute to Cartwright’s project: not just what she is calling for, but much more: a deep desire *to find out*—to “penetrate into the reason of things”¹⁷¹ and discover “how far real facts are analogous to logical relations, and why”¹⁷²—and the courage to follow that desire into the unsettling (for some contemporary philosophers of science, at least) world of careful metaphysical speculation.

¹⁷⁰ Margolis 1993, 144.

¹⁷¹ *CP* 1.44.

¹⁷² *CP* 4.68.

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