

**PEIRCE ON INFERENCE:  
HOW THE MIND OPERATES.**

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## **Abstract**

That the mind performs inferences is pretty much beyond doubt. That some of these inferences are logical inferences is also quite uncontroversial. Peirce, however, presents a fascinatingly plausible thesis to the effect that the only operation that the mind performs is logical inference. In this thesis I explicate what this single type of inference is.

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**INFERENCE.**

It was Peirce's explicit intention to reduce all operations of the mind to a single type of operation, that of logical inference.

In other words, we must, as far as we can do so without additional hypotheses, reduce all kinds of mental action to one general type. [...] We must, as far as we can, without any other supposition than that the mind reasons, reduce all mental action to the formula of valid reasoning.<sup>1</sup>

In this thesis I will present a novel interpretation of Peirce's philosophy that explicates what this single type of inference is.

Before I explain how I will fulfill this aim I need to introduce and define inference, and provide a criterion with which to distinguish two distinct types of inference. To these ends I will articulate Descartes' theory of inference and Hume's theory of inference. To define what an inference is I will examine two similarities between these inferences. To provide a criterion with which to distinguish two distinct types of inference I will extricate a difference between these inferences.

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<sup>1</sup> Edward C. Moore, ed. Max H. Fisch, consult. ed. Christian J. W. Kloesel, snr. assoc. ed. Don D. Roberts, assoc. ed. Lynn A. Zeigler, textual ed. *Writings of Charles S. Peirce: A Chronological Edition, Volume Two* (Bloomington: Indiana University Press, 1982 -) p 220, c.1868.

### 1) Descartes' inference.

Insofar as inference for Descartes is reducible to intuition, I will begin by explaining intuition.<sup>2</sup> First, intuition is carried out by the attentive mind. Here we can consider this text of Descartes' and the editors' footnote inserted on the word 'intuit':

Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge can be attained in no other way [italics removed].<sup>3</sup>

And the relevant footnote is: "[Intuit] Lat. *Intueri*, literally 'to look, gaze at'; used by Descartes as a technical term for immediate mental apprehension."<sup>4</sup> More evidence that intuition is carried out by the attentive mind is presented in Rule three: "Intuition is the indubitable conception of a clear and attentive mind which proceeds solely from the light of reason."<sup>5</sup>

Second, intuition is indubitable in two distinct senses. Intuition is indubitable in the sense that the person who has perceived the intuition cannot disbelieve it.

By 'intuition' I do not mean the fluctuating testimony of the senses or the deceptive judgment of the imagination as it botches

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<sup>2</sup> With respect to intuition Peter Schouls has argued the position that I will advocate here. "For Locke as for Descartes, it is only from the foundation of these fully known contextless items that theorizing can start, that systematic ('general') knowledge can be achieved." Peter A. Schouls, *Reasoned Freedom: John Locke and Enlightenment*. (Cornell University Press, 1992), p 21.

<sup>3</sup> Rene Descartes. "Rules for the Direction of the Mind" in John Cottingham, Robert Stoothoff, and Dugald Murdoch, trans. *The Philosophical Writings of DESCARTES: Volume One*. (Cambridge University Press, 1985). Hereafter referred to as *Rules*. AT X, 366, p 13.

<sup>4</sup> *Rules*, AT X, 366, p 13.

<sup>5</sup> *Rules*, AT X, 368, p 14.

things together, but the conception of a clear and attentive mind, which is so easy and distinct that there can be no room for doubt about what we are understanding.<sup>6</sup>

And intuition is indubitable in the sense that intuitions are actually true: “These simple natures [intuited] are all self-evident and never contain any falsity.”<sup>7</sup>

The final aspect of intuition that I will note is that it plays two roles in inferences for Descartes. Before I do this I will discuss two terms of art that I will use throughout the thesis that deserve some comment. The first is the term *relata*. By the term *relata* I mean ‘relate’, which is defined as: “*Logic*. One of two objects of thought between which a relation subsists.”<sup>8</sup> I cannot use the term ‘relate’ because I need both the singular and the plural, yet I also use the term ‘relates’ in the sense ‘x relates y to z’. To avoid confusion I will use the term ‘relata’ for the plural of relate, and the term ‘relatum’ for the singular of relate.<sup>9</sup> The second term deserving of comment is ‘connexion’. Since the term ‘relation’ refers to both the link that relates the *relata* and the linked ‘relata-relation-relata’ complex, I will use the term ‘connexion’ to refer to the link, and reserve the term ‘relation’ for the complex.

The two roles that intuition plays in Descartes’ theory of inference are, first, it provides the *relata* of inference, and second, it provides the *connexion* whereby the *relata* are logically related.

Secondly, those things which are said to be simple with respect to our intellect are, on our view, either purely intellectual or purely material, or common to both. Those simple natures which the

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<sup>6</sup> *Rules*, AT X, 368, p 14.

<sup>7</sup> *Rules*, AT X, 420, p 45.

<sup>8</sup> Revised and edited by C. T. Onions, *The Shorter Oxford Dictionary On Historical Principles* (Clarendon Press, 1950) p 1694.

<sup>9</sup> I would like to thank Dr. S.E. Lawrence for clarifying to me the usage of these Latin terms.

intellect recognizes by means of a sort of innate light, without the aid of any corporeal image, are purely intellectual. [...] Those simple natures, on the other hand, which are recognized to be present only in bodies –such as shape, extension and motion, etc. –are purely material. Lastly, those simples are to be termed ‘common’ which are ascribed indifferently, now to corporeal things, now to spirits –for instance, existence, unity, duration, and the like. *To this class we must also refer those common notions which are, as it were, links which connect other simple natures together, and whose self-evidence is the basis for all the rational inferences we make* [italics mine].<sup>10</sup>

One further concept is needed before articulating Descartes’ theory of inference. I need to explain the concept of ‘clear and distinct ideas’. All indubitable ideas, either because they are simple intuitions, or because they are logically related clusters of simple intuitions are clear and distinct ideas.

It is certain, however, that we will never mistake the false for the true provided we give our assent only to what we clearly and distinctly perceive.<sup>11</sup>

Inference for Descartes is the relating of ideas by intuition, where the ideas being related are all clear and distinct. To avoid confusion I need to explicate the distinction Descartes’ draws between inference and deduction. The difference being that deduction consists of more than one inference:

There may be some doubt here about our reason for suggesting another mode of knowing in addition to intuition, *viz.* deduction [...]. But this distinction had to be made, since very many facts which are not self-evident are known with certainty, provided they are inferred from true and known principles through a continuous and uninterrupted movement of thought in which each individual proposition is clearly intuited. This is similar to the way in which

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<sup>10</sup> *Rules*, AT X, 419, p 44.

<sup>11</sup> Rene Descartes, “Principles of Philosophy”, in John Cottingham, Robert Stoothoff, and Dugald Murdoch, trans. *The Philosophical Writings of DESCARTES: Volume One*. (Cambridge University Press, 1985). AT VIII A, 21, p 207.

we know that the last link in a long chain is connected to the first: even if we cannot take in at one glance all the intermediate links on which the connection depends, we can have knowledge of the connection provided we survey the links one after the other, and keep in mind that each link from first to last is attached to its neighbour. Hence we are distinguishing mental intuition from certain deduction on the grounds that we are aware of a movement or a sort of sequence in the latter but not in the former.<sup>12</sup>

Thus, all inference, for Descartes, contains two elements, clear and distinct ideas as *relata*, and intuition of the logical connexion between the *relata*. And we can further note that the requirement is strict:

But, whenever even the smallest link is overlooked the chain is immediately broken, and the certainty of the conclusion entirely collapses.<sup>13</sup>

And again:

If in the series of things to be examined we come across something which our intellect is unable to intuit sufficiently well, we must stop at that point, and refrain from the superfluous task of examining the remaining items [*italics removed*].<sup>14</sup>

## 2) **Hume's causal inference.**

Hume propounds a theory of inference that differs from Descartes'. Specifically, whereas the relating of the *relata* in Descartes' inference is carried out by the attentive mind's ability to intuit, the attentive mind plays no role in cognizing the connexion between the *relata* in Hume's causal inference. I will explicate Hume's theory of inference by substantiating this claim.

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<sup>12</sup> *Rules*, AT X, 369, p 15.

<sup>13</sup> *Rules*, AT X, 388, p 25.

<sup>14</sup> *Rules*, AT X, 392, p 28.

For Hume, all ideas are derived from impressions. Our idea of causation too, is derived from an impression.

To begin regularly, we must consider the idea of *causation*, and see from what origin it is deriv'd. 'Tis impossible to reason justly, without understanding perfectly the idea concerning which we reason; and 'tis impossible perfectly to understand any idea, without tracing it up to its origin, and examining that primary impression, from which it arises.<sup>15</sup>

By examining Hume's quest for the impression responsible for the idea of causation we find that Hume proposes a type of inference where the attentive mind is not responsible for perceiving the connexion between the relata.

Hume first discovers that the idea of causation is not copied from an impression derived from the objects deemed to belong in causal relations.<sup>16</sup> He next examines the connexion between the objects deemed to belong in causal relations, but in this connexion he discovers only contiguity and succession.<sup>17</sup> Nor, Hume claims, are contiguity and succession sufficient explanations for our idea of causation but "there is a NECESSARY CONNEXION to be taken into consideration; and that relation is of much greater importance, than any of the other two above-mention'd [contiguity and succession]."<sup>18</sup>

Here again I turn the object on all sides, in order to discover the nature of this necessary connexion, and find the impression, or impressions, from which its idea may be deriv'd. When I cast my eye on the *known qualities* of objects, I immediately discover the

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<sup>15</sup> L. A. Selby-Bigge, ed, P. H. Nidditch, rev. second edition. *David Hume: A Treatise of Human Nature*. (Oxford, Clarendon Press. 1978) Hereafter referred to as *Treatise*. 1, 3, 2, p 74.

<sup>16</sup> *Treatise*, 1, 3, 2, p 75.

<sup>17</sup> *Treatise*, 1, 3, 2, p 75.

<sup>18</sup> *Treatise*, 1, 3, 2, p 77.

relation of cause and effect depends not in the least upon *them*. When I consider their *relations*, I can find none but those of contiguity and succession; which I have already regarded as imperfect and unsatisfactory.<sup>19</sup>

Lamenting this inability to discover the impression responsible for our idea of causation, Hume approaches the task from a different angle. He asks: “Why we conclude, that such particular causes must necessarily have such particular effects, and why we form an inference from one to another? [italics removed]”<sup>20</sup>

To this question Hume answers: The inferences we form from ‘cause’ to ‘effect’ are customs embedded in the mind. These customs are established because the mind is immersed in experience, and this experience contains objects that are constantly conjoined. Essentially, we become accustomed to expect that a certain type of object be followed by another type of object because it has always done so in experience. This expectation is the causal inference.

We have no other notion of cause and effect, but that of certain objects, which have been *always conjoin'd* together, and which in all past instances have been found inseparable. We cannot penetrate into the reason of the conjunction. We only observe the thing itself, and always find that from the constant conjunction the objects acquire an union in the imagination. When the impression of one becomes present to us, we immediately form an idea of its usual attendant.<sup>21</sup>

The inference, it must be stressed, is the blind compulsion of the mind, such that when it is aware of one idea its usual attendant is inexplicably, and almost inexorably, brought to consciousness also.

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<sup>19</sup> *Treatise*, 1, 3, 2, p 77.

<sup>20</sup> *Treatise*, 1, 3, 4, p 82.

<sup>21</sup> *Treatise*, 1, 3, 6, p 93.

First, We have already observ'd, that the mind is determin'd by custom to pass from any cause to its effect, and that upon the appearance of the one, 'tis almost impossible for it not to form the idea of the other. Their constant conjunction in past instances has produc'd such a habit in the mind, that it always conjoins them in its thought, and infers the existence of the one from that of its usual attendant.<sup>22</sup>

Hume claims that the impression responsible for our idea of causation is the causal inferences that we make as these create an impression upon the mind.<sup>23</sup>

There is, then, nothing new either discover'd or produc'd in any objects by their constant conjunction, and by the uninterrupted resemblance of their relations of succession and contiguity. But 'tis from this resemblance, that the ideas of necessity, of power, and of efficacy are deriv'd. [...] Tho' the several resembling instances, which give rise to the idea of power, have no influence on each other, and can never produce any new quality *in the object*, which can be the model of that idea, yet the *observation* of this resemblance produces a new impression *in the mind*, which is its real model.<sup>24</sup>

Examining Hume's quest to find an impression from which our idea of causation is derived thus illustrates that an attentive mind is not involved in perceiving the connexion between ideas in Humean causal inferences. Rather, reflecting upon the causal inferences we make is responsible for the impression from which our idea of causation is derived. These causal inferences are customs where the mind blindly yet

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<sup>22</sup> *Treatise*, 1, 3, 11, p 128.

<sup>23</sup> "From a second observation I conclude, that the belief, which attends the present impression, and is produc'd by a number of past impressions and conjunctions; that this belief, I say, arises immediately, without any new operation of the reason or imagination. Of this I can be certain, because I never am conscious of any operation, and find nothing in the subject, on which it can be founded." *Treatise*, 1, 3, 8, p 102.

<sup>24</sup> *Treatise*, 1, 3, 14, p 164.

consistently associates the ideas of objects constantly conjoined in experience.

### 3) **Inference defined.**

By extricating two similarities between Descartes' theory of inference and Hume's theory of inference I will now present two aspects of inference that I will incorporate into a definition of inference. The first similarity is that inference for both Descartes and Hume consists of and a connexion that relates the relata into a relation.<sup>25</sup> For Descartes the relata are always clear and distinct ideas, and the connexion is an intuition apprehended by the attentive mind. For Hume, the relata are objects and/or ideas. The connexion, which enables the mind to perceive one relatum and associate it with its effect or cause, is a habit that is embedded in the mind.

The second similarity between Descartes', and Hume's theories of inference, is that the connexion which relates the relata depends upon the mind. That is, without mind there is no connexion and no inference. With respect to Descartes I have shown that all intuition is carried out by the attentive mind. Since the connexion relating the relata in inference is intuition for Descartes, it follows that without mind there is no intuition, therefore there is no connexion relating the relata, and no inferences.

With respect to Hume, even though the attentive mind plays no role in perceiving the connexion between the relata in causal inferences the connexion still depends upon the mind. The constant conjunction of objects in experience is sensation. It is only when the mind appropriates the relation between constantly conjoining objects in the form of a habit, and uses that habit to form inferences, that causal inference differs from sensation.

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<sup>25</sup> It is uncontroversial that all relata when related form a relation.

Were there no mixture of any impression in our probable reasonings, the conclusion wou'd be entirely chimerical: And were there no mixture of ideas, the action of the mind, in observing the relation, wou'd, properly speaking, be sensation, not reasoning. 'Tis therefore necessary, that in all probable reasonings there be something present to the mind, either seen or remember'd; and that from this we infer something connected with it, which is not seen nor remember'd.<sup>26</sup>

Again, without the mind there are no causal inferences for Hume because the connexion relating the relata is a habit embedded in the mind.

I am now in a position to define how I will use the term 'inference' throughout this thesis. An inference consists of relata, and a connexion that relates the relata, where the connexion depends upon the mind such that were there no mind there would be no connexion and no inference. I will also state at this juncture that for the purpose of this thesis I take it to be beyond doubt that there are inferences, and by definition therefore, the mind performs inferences.

#### 4) **Two types of inference.**

In this section I will examine a difference between Descartes' and Hume's theories of inference and extricate a criterion with which we can distinguish two distinct types of inference. I have already introduced this difference when I introduced Hume's causal inference. The difference is that the attentive mind perceives the connexion between the relata in Descartes' theory of inference, whereas the attentive mind plays no role in perceiving the connexion between the relata in Hume's theory of inference.

Given that every inference consists of relata and a connexion that relates the relata, it is logically possible to distinguish two types of inference. In one type of inference, as instantiated by Descartes' inference,

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<sup>26</sup> *Treatise*, 1, 3, 6, p 89.

the attentive mind perceives the connexion that relates the relata. This type of inference I will term *Cartesian type inference*. In the other type of inference, instantiated by Hume's casual inference, the attentive mind is not involved in perceiving the connexion that relates the relata. This type of inference I will term *Humean type inference*. Humean type inference, to be clear about it, still requires that the mind cognizes the connexion that relates the relata, only, it is not the attentive mind that does the cognizing.

This distinction has universal applicability, as there is no inference which cannot be classed as either a Cartesian or a Humean type inference. That is, it is logically possible for an inference to be either a Cartesian or a Humean type inference. It is logically impossible for an inference to be both a Cartesian and a Humean type inference. It is also, given the above definition of inference, logically impossible for an inference to be neither a Cartesian or a Humean type inference.

#### 5) **Introducing Peirce.**

Now that I have defined inference and explicated the distinction between Cartesian and Humean type inference, I am in a position to comprehensively introduce Peirce. I have already shown that Peirce explicitly intended to reduce all operations of the mind to a single type of inference.<sup>27</sup> I have also stated that my aim in this thesis is to present a novel interpretation of Peirce's philosophy that explicates what this single type of inference is. I will now explain how I intend to accomplish this aim.

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<sup>27</sup> We find this intention restated in MS 339: "It is necessary to reduce all our actions to logical processes so that to do anything is but to take another step in the chain of inference. Thus only can we effect that complete reciprocity between Thought & its Object which it was Kant's Copernican step to announce." (MS 339) in Max H. Fisch, 'Chronical of Pragmatism, 1865 -1879', in Kenneth Laine Ketner, Christian J. W. Kloesel, ed, *Peirce, Semeiotic, and Pragmatism: Essays by Max H. Fisch* (Indiana University Press, 1986). Hereafter referred to as Ketner, p 116.

The interpretation of Peirce that I present in this thesis is dictated by the need to understand Peirce's theory of inference as either a Cartesian or a Humean type inference. For if Peirce is to succeed in reducing all operations of the mind to a single type of inference then this inference must be either a Cartesian or a Humean type inference. As I have already shown, every inference is classifiable as either a Cartesian type inference or a Humean type inference. I will argue that Peirce maintains that the mind performs only Humean type inference.

This is not to say that understanding what a Humean type inference is means that one understands the single type of inference that Peirce posits. Rather, it is to say that understanding what a Humean type inference is means that one understands an important aspect of Peirce's theory of inference. It is by substantiating the claim that Peirce reduces all operations of the mind to a Humean type inference that I will concurrently present a novel interpretation of Peirce that comprehensively explains what Peirce's inference is. Or to state the position in terms of analogies, by arguing that Peirce reduces all operations of the mind to Humean type inference I have a single thread running through this thesis, around which I can develop a comprehensive explanation of the single type of inference that Peirce posits.

The structure of the thesis from here on is as follows. In the second chapter I will introduce Peirce's philosophy by explaining semiosis.<sup>28</sup> I will thereby introduce the single type of inference that Peirce advocates. In the third chapter I will examine the elements of this single

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<sup>28</sup> With respect to terminology, Fisch has noted that: "For [Greek symbols]- the art or science or doctrine or general theory of semioses -he uses *semeiotic*; much less often, *semeiotics* or *semitic*." Max H. Fisch, *Peirce's General Theory of Signs*, in Ketner, p 322. Yet contemporary commentators on Peirce vary in their spelling of the terms 'semiosis', and 'semitic'. I will follow Hookway who uses the immediately preceding spelling. See Christopher Hookway, *Peirce* (Routledge & Kegan Paul, 1985).

type of inference, and thereby explicate what this single type of inference is. In the conclusion I will demonstrate that the single type of inference presented in the thesis is a Humean type inference.

## INTRODUCING PEIRCE'S INFERENCE.

In this chapter I will introduce Peirce's philosophy by explicating semiosis. Thereby I will also introduce the single type of inference that Peirce maintains that the mind performs. I will argue that Peirce's conception of semiosis, in relevant respects, is identical with his conception of deductive inference. In the first two sections I will extricate two concepts from Peirce's theory of deductive inference, the *iconic relation*, and the *index*. In the third and fourth sections I will demonstrate how these concepts explain semiosis.

Before I explicate the iconic relation I will explain how I will use the term 'semiosis' in this thesis. This explanation is required as there are two interpretations, both of which Peirce endorses. In the first interpretation, any triadic relation consisting of the three elements, sign, object, and interpretant, is classified as semiosis:

But by 'semiosis' I mean, [...], an action, or influence, which is, or involves, a cooperation of *three* subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs.<sup>29</sup>

In the second interpretation semiosis is a specific process performed with the three above elements, eventuating with an interpretant that is determined in a persons mind.

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<sup>29</sup> *The Essential Peirce: Selected Philosophical Writings. Vol. 2 (1893, 1913)*. Edited by the Peirce Edition Project, Nathan Houser, Jonathan R. Eller, Albert C. Lewis, Andre De Tienne, Cathy L. Clark, D. Bront Davis (Indiana University Press, 1998) hereafter referred to as EP. p 411, c. 1907.

Yet this does not quite tell us just what the nature is of the essential effect upon the interpreter, brought about by the semiosis of the sign, which constitutes the logical interpretant.<sup>30</sup>

I will use the term 'semiosis' strictly in this second sense where semiosis is a particular operation performed with sign, object, and interpretant, which eventuates in the determination of an interpretant in a persons mind. My reason for accepting this interpretation will become clear in the fourth section of this chapter.

### 1) **The iconic relation.**

My aim in this section is to explicate the concept 'iconic relation' by focusing on its role in Peirce's theory of deductive inference, this role being that the relation of reason between the major premise and the conclusion is an iconic relation. I will claim that the relation between the sign and the interpretant in semiosis is also an iconic relation.<sup>31</sup> I will not justify this claim in this section; rather, I will raise a question, the answer to which justifies the claim. I will present this answer in the third section.

Before extricating the concept 'iconic relation' from Peirce's theory of deductive inference, I must note that Peirce does not use the phrase 'iconic relation'. While Peirce does not use the phrase he does, I will now show, authorize its use. For Peirce uses the term 'icon' in a relational sense.

There are three kinds of signs. Firstly, there are *likenesses*, or icons; which serve to convey ideas of the things they represent simply by imitating them.<sup>32</sup>

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<sup>30</sup> EP, p 411, c. 1907. In the text Peirce places a horizontal line above the letters e, i in its first instance, and o in the word 'semiosis'. The expanded form of 'sem i o'sis' represents its occurrence in the text.

<sup>31</sup> "I use the word "*Sign*" in the widest sense for any medium for the communication or extension of a Form (or feature). Being medium, it is determined by something, called its Object, and determines something, called its Interpretant or Interpretand." EP, p 477, c. 1906.

<sup>32</sup> EP, p 5, c. 1894.

Here the icon is related to some other thing via a relation of imitation or resemblance.

Given this justification for using the phrase ‘iconic relation’ it might seem that I have already explained the concept ‘iconic relation’. I have, after all, shown that the relation between an icon and a thing that it is an icon of is a relation of resemblance, thus the iconic relation might be a thought to be a relation of resemblance. In a sense the iconic relation is a relation of resemblance, but it is necessary to note that Peirce reduces the relation of resemblance to the relation of reason:<sup>33</sup>

A relation of reason subsists in virtue of two facts, one only of which would disappear on the annihilation of either of the relates. Such are all resemblances.<sup>34</sup>

Now that I have explained the iconic relation as a relation of reason, it again may again appear that I have explained the concept ‘iconic relation’. But to claim that the iconic relation is a relation of reason is not terribly helpful. After all, the relation of reason is by definition an inference, and in the last chapter I presented two different types of inference, Descartes’ inference, and Hume’s inference. I will now present Peirce’s theory of deductive inference, as this will explain how Peirce conceives the relation of reason and thereby the iconic relation.

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<sup>33</sup> Exactly how Peirce reduces resemblance to reason will be explained in chapter three. My aim in this section is limited to introducing the concept ‘iconic relation’ and illustrating that the relation between the major premise and the conclusion in deductive inference is an iconic relation. As further evidence that Peirce reduces the relation of resemblance to reason consider the following: “There may be a mere relation of reason between the sign and the thing signified; in that case the sign is an *icon*.” *Collected Papers of Charles S. Peirce*, Volumes 1 –6 edited by C. Hartshorne and P. Weiss, 1931 –1935, volumes 7 & 8 edited by A. W. Burks, 1958. (Belknap Press). Hereafter referred to as CP, 1, 372, p 196, c. 1890.

<sup>34</sup> CP, 1, 365, p 190, c. 1890.

Peirce maintains that the conclusion of any deductive inference is wholly contained in the premises from which it is deducible.<sup>35</sup>

With the aid of the logic of relations it would be easy to show that the entire logical matter of a conclusion must in any mode of inference be contained, piecemeal, in the premises.<sup>36</sup>

Another way of stating this point is to say that a conclusion is only deducible from premises when that conclusion is represented in those premises as an icon.

An inference, then, may have but a single premise, or several premises may be united by colligation. In the latter case, they form, when colligated, one conjunctive proposition. But even if there be but one premise, the icon of that proposition is always more or less complex. The next step of inference to be considered consists in the contemplation of that complex icon, the fixation of attention upon a certain feature of it, and the obliteration of the rest of it, so as to produce a new icon.<sup>37</sup>

The inference in Peirce's theory of deductive inference, then, is a relation that has the conclusion as one relatum, and the icon of that conclusion represented in the premises as the other relatum, where the relation is cognized by the mind. This too, is how I define the concept of 'iconic relation': An iconic relation is a relation that has one relatum represented as an icon in the other relatum, where the relation is cognized by the mind.

There are two problems that I will now discuss. The first problem is that deductive inferences often fail to be valid because requisite premises, or hidden premises are not presented. Since the inference was

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<sup>35</sup> Christopher Hookway agrees with this reading of Peirce's theory of deductive inference: "It is of a piece with the view that mathematical reasoning is iconic that inference proceeds by substitution." Hookway, p 195. We can note also that "Peirce assigns a broad meaning to 'mathematics': it extends beyond the boundaries of academic disciplines to cover all deductive or 'necessary' reasoning." Hookway, p 103.

<sup>36</sup> EP, p 233, c. 1903.

<sup>37</sup> EP, p 22, c. 1895.

made yet the requisite premises were not presented it could not be the case that the conclusion was represented in the presented premises. Peirce, would not deny that arguments are made wherein not all of the requisite premises are explicated; but he would deny that a conclusion could be inferred if the mind, in some sense, did not already contain those requisite premises. This point will become clearer when I explain Peirce's inference in detail in the next chapter.

To comprehend the second problem I first need to note that that deductive inference, for Peirce, consists of three terms: The major premise, minor premise, and conclusion.

Barbara is, in fact, nothing but the application of a rule. The so-called major premise lays down this rule; as, for example, *All men are mortal*. The other or minor premise states a case under the rule; as, *Enoch was a man*. The conclusion applies the rule to the case and states the result: *Enoch is mortal*. All deduction is of this character; it is merely the application of general rules to particular cases.<sup>38</sup>

The problem is: Since deduction contains three terms, why have I claimed that the iconic relation holds between only the major premise and the conclusion?

I have claimed that the iconic relation holds between the major premise and the conclusion, because the conclusion is represented in the major premise alone. As is illustrated in the preceding quote, application of the major premise 'all men are mortal' to the particular case of 'Enoch' results in the conclusion 'Enoch is mortal'. Yet, if we isolate the major premise 'all men are mortal' from the above syllogism, then 'Enoch is mortal' is not the only conclusion that we can infer from it. For example, we can conclude from this major premise that Socrates the man is mortal,

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<sup>38</sup> CP, 2, 620, p 373, c. 1878. 'Barbara' is a mnemonic for a syllogistic argument form.

for all men, including Socrates, are iconically represented in the major premise 'all men are mortal'.

The iconic relation, then, is a relation that has one relatum represented as an icon in the other relatum, where the relation is cognized by the mind. I argue that the relation between the sign and the interpretant in semiosis is also an iconic relation. That is, in any semiosis relation the interpretant is represented as an icon in the sign, and the relation is cognized by the mind.<sup>39</sup> It is not my intention to justify this claim here. Rather, I want to raise a question that needs to be answered if this interpretation of the relation between the sign and the interpretant is to be viable. Namely, how can a sign have interpretants that belong in an iconic relation to the sign? In the third section I will answer this question.

## 2) **The index.**

Peirce's uses the concept 'index'.<sup>40</sup> In this chapter I will illustrate that, and explain how, the minor premise in deductive inference functions as an index. I will then suggest that the object plays an analogous indexical role in semiosis, and raise a question, which I will answer in the fourth section.

The concept 'index' is open to interpretation. Menno Hulswit, for example, expounds an interpretation of the index that differs from mine. Hulswit maintains that indexes are identified by the fact that they partake in causal relationships.

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<sup>39</sup> "Even a future event can only be determinate in so far as it is a consequent. Now the concept of a consequent is a logical concept. It is derived from the concept of the conclusion of an argument. But an argument is a sign of the truth of its conclusion; its conclusion is the rational *interpretation* of the sign." EP, p 392, c. 1906.

<sup>40</sup> "An *index* is a sign which would, at once, lose the character which makes it a sign if its object were removed." CP, 2, 304, p 170, c. 1902.

From a causal perspective, the relationship between sign and object is characterized by (1) the absence of a causal relationship in icons, (2) an efficient causal relationship in indices [indexes], and (3) a final causal relationship in symbols.<sup>41</sup>

The problem with Hulswit's claim, as he acknowledges, is that Peirce offers examples of indexes that are not causally related to their objects.

It is easy to give examples of indices in which the object is literally the *efficient cause* of the sign: [...], a weather-vane as a sign of wind-direction [...]. But, the causal relationship between sign and object is less obvious when, for instance, the index is a pointing finger or a demonstrative adverb such as 'here' or 'there'.<sup>42</sup>

The interpretation of the index that I will present does not maintain that indexes partake in causal relations. Rather, it maintains that indexes function to resolve a logical problem. I will term this problem the problem of *iconic possibility*.

To understand the interpretation of indexes that I will present I first need to explicate the problem of iconic possibility. Suppose I give you the major premise 'all humans are mortal'. Now I ask you to deduce the correct conclusion. Given the analysis of the iconic relation presented in the last section, we know that there are as many correct conclusions iconically represented in the major premise 'all men are mortal' as there are humans, for every human is iconically represented in this major premise as being mortal. That is, I can correctly conclude from the major premise 'all men are mortal' that Enoch the man is mortal, that Socrates the man is mortal, that Parmenides the man is mortal, etc. Without some indication of which icon represented in the major premise is the wanted

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<sup>41</sup> Menno Hulswit. "A Guess at the Riddle of Semiotic Causation", in *Transactions of the Charles S. Peirce Society*. Vol. 34: 641 -688. 1998, p 666.

<sup>42</sup> Hulswit, p 668.

conclusion one is confounded with possibilities. The problem of iconic possibility is the problem of being presented with information that has more than one interpretation without being presented with a means of indexing which interpretation is required.

It is impossible to find a proposition so simple as not to have reference to two signs. Take, for instance, "it rains." Here the icon is the mental composite photograph of all the rainy days the thinker has experienced. The index is all whereby he distinguishes *that day*, as it is placed in his experience.<sup>43</sup>

Peirce explains the function of indexes as resolving the problem of iconic possibility. To substantiate this claim I will now examine three texts where Peirce expounds the concept of indexes. The first text concerns the location of a house.

Suppose two men meet upon a country road and one of them says to the other, "The chimney of that house is on fire." The other looks about him and descries a house with green blinds and a verandah having a smoking chimney. He walks on a few miles and meets a second traveler. Like a Simple Simon he says, "The chimney of that house is on fire." "What house?" asks the other. "Oh, a house with green blinds and a verandah," replies the simpleton. "Where is the house?" asks the stranger. He desires some *index* which shall connect his apprehension with the house meant."<sup>44</sup>

The problem facing the stranger is not that of understanding what a house is, nor what it means for a house to have fire in its chimney. The problem is that the information given refers to any house with green blinds and a veranda that may possibly have fire in its chimney. What is crucially missing is an indication of which icon represented in the information given obtains. This is the problem of iconic possibility. Given that an

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<sup>43</sup> EP, p 20, c. 1895.

<sup>44</sup> EP, p 14, c. 1895.

index, such as pointing to the house, revealing the name of the owner (if the owner is known to the stranger), etc., identifies which possibility is referred to, the index functions to resolve the problem of iconic possibility.<sup>45</sup>

The second discussion concerns the location of a map. In *What is a Sign*,<sup>46</sup> Peirce discusses indexes with respect to maps. He argues that scale, compass references, and, minimally, the shape of the mapped area in relation to surrounding shapes, etc., index which area the map maps. Again, the problem is that of iconic possibility. The mapable world contains a plethora of possibilities and without indicating marks on the map the map could apply to any number of these possibilities.<sup>47</sup> As an illuminating example, we can consider that a lone dot on a piece of paper said to be a map, could signify any place. A dot on a piece of paper bisected by a specific longitude and latitude, where these lines are scaled, indexes which specific area the dot is supposed to map.

The last discussion of indexes I will consider is the hygrometer.

For instance, an old-fashioned hygrometer is an *index*. For it is so contrived as to have a physical reaction with dryness and moisture in the air, so that the little man will come out if it is wet, and this would happen just the same if the use of the instrument should be entirely forgotten, so that it ceased actually to convey any information.<sup>48</sup>

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<sup>45</sup> It is interesting to note that Peirce is guilty of not providing an index with respect to the sign 'the chimney of that house is on fire'. For the sign informs us of two possibilities: 'there is a fire lit in that house and the chimney is smoking', and 'that house is on fire as you can see from the fact that the chimney is in flames'. Which icon represented in the information, then, obtains?

<sup>46</sup> EP, p 8, c. 1894.

<sup>47</sup> Hookway also understands Peirce's indexes as playing this logical function: "When we use something as a map of an area, we interpret each point on the map as an index of some point on the area mapped." Hookway, p 189.

<sup>48</sup> CP, 5, 73, p 51, c. 1903.

The hygrometer is not considered an index because moisture causes the little man to behave as he does, but because the hygrometer has been *contrived* so that the little man behaves as it does.<sup>49</sup> To be a sign of moisture content, not only must the hygrometer be correctly contrived, but also importantly, the little man's behavior must index knowledge that there is a relation between the little man's behavior and moisture content. For if this knowledge is forgotten, then even though the hygrometer remains, the little man's behavior will not indicate moisture content. The problem of iconic possibility obtains because we have other knowledge. It is obviated because the hygrometer indexes from all of our knowledge the relation between moisture and the little man's behavior. The hygrometer, for instance, does not index our knowledge of wind direction or temperature as some other contrivances do.

Indexes for Peirce, then, function to obviate the problem of iconic possibility. The minor premise in deductive inference, I will now argue, functions as an index in Peirce's theory of deductive inference. It solves the problem of iconic possibility that would, as I have illustrated, obtain between a major premise and the conclusion were we presented with only the major premise and asked to draw the correct conclusion.

To verify that the minor premise functions as an index for Peirce, first note that Peirce himself all but states that the conclusion of a deductive inference is indexed.<sup>50</sup>

The *Symbol*, or relatively genuine form of Representamen, divides by Trichotomy into the Term, the Proposition, and the Argument.

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<sup>49</sup> We also find Peirce focusing on an index being contrived when explaining photographs. EP, p 380.

<sup>50</sup> Christopher Hookway has stated of the term 'representamen': "Peirce sometimes proposes replacing 'sign' with the technical term 'representamen'; but he is not consistent in this, and we shall not follow him here." Hookway, p 121.

[...] The argument is a representamen which does not leave the interpretant to be determined as it may by the person to whom the symbol is addressed, but separately represents what is the interpreting representation that it is intended to determine.<sup>51</sup>

The argument does not leave the interpretant or conclusion to be determined as it may because it is indexed from the major premise by the minor premise.

Secondly, the problem of iconic possibility needs to be resolved by Peirce, for deductive inference, as an iconic relation, suffers the problem of iconic possibility. For whenever we are presented with a major premise that iconically represents more than one possible conclusion, iconic possibility obtains unless we find some means of indexing which icon represented in the major premise is required. Thus it is reasonable to conclude that Peirce conceives of the minor premise as an index, because the problem of iconic possibility never eventuates if the minor premise is so conceived. By way of illustration reconsider the problem of iconic possibility confronting us when given only the major premise 'all humans are mortal' and asked to deduce the correct conclusion. The minor premise does not allow the problem of iconic possibility to eventuate, because the minor premise 'Enoch is human' indicates which of all humans represented in the major premise is to be indexed. It is Enoch we are concerned with, and Enoch is represented in the major premise as being mortal.

Upon the strength of these arguments I conclude that the minor premise functions as an index in Peirce's theory of deductive inference. I argue that the object in semiosis also functions as an index. It indexes required interpretants from among all interpretants that are iconically represented in a sign. Again, I will not justify this claim here. Rather I will

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<sup>51</sup> CP, 5, 76, p 52, c. 1903.

pose this question: How can the object function as an index in semiosis? I will answer this question in section four.

### 3) **Abductive inference.**

In this section I will answer the question I raised in the first section: How can a sign have interpretants that belong in an iconic relation to the sign? I will argue that abductive inference, like deductive inference, is an iconic relation, and explicate how interpretants are related to signs via abductive inference.

That abductive inference is an iconic relation follows from two facts. First, deductive inference is explained in terms of iconic relations, wherein the conclusion is represented in the major premise, and the mind cognizes the relation. Second, Peirce maintains that the inference that explains deductive inference also explains abductive inference.<sup>52</sup>

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<sup>52</sup> It is worth examining, here, Jaacko Hintikka's claim that the validity of abductive inference for Peirce is its ability to ensure truth in the long run. (see Jaacko Hintikka, "What is Abduction? The Fundamental Problem of Contemporary Epistemology", *Transactions of the Charles S. Peirce Society* vol. 34, 1998, 503–33, p 512.) While not denying that Peirce does make this claim (see CP, 2, 779–81), he also, argues for tychism, which as Karl-Otto Apel notes is to say: "As laws that have always existed [if they did], they would absolutely determine everything that happens. Peirce had already thrown out this assumption in 1891 in his metaphysics of Tychism and had interpreted natural laws themselves as habits that take shape from the continuum of real possibilities." (Trans. John Michael Krois. Karl-Otto Apel, *Charles S. Peirce: From Pragmatism to Pragmaticism*, (University of Massachusetts Press, 1981) p 187.) Given the pluralism implicit in tychism, any abductive inference that enables a possibility is ensuring the truth in the long run. That truth, after all, has come about in part because that abductive inference was made. The validity of abductive inference, then, cannot be explained in terms of ensuring some one absolute truth, but must be conceived in terms of the operation of reasoning.

I can make this point clearer by examining validity with respect to Descartes. Traditionally, validity is a classification: Any syllogism where the truth of the propositions would necessitate the truth of the conclusion is classified as valid. Descartes' introduction of indubitable intuition entailed that any Cartesian inference is valid, and no non-Cartesian inference is valid. Valid reasoning becomes an operation that the mind

Among these opinions which I have constantly maintained is this, that while abductive and inductive reasoning are utterly irreducible, either to the other or to deduction, or deduction to either of them, yet the only *rationale* of these methods is essentially deductive or necessary. If then we can state wherein the validity of deductive reasoning lies, we shall have defined the foundation of logical goodness of whatever kind.<sup>53</sup>

There is a *prima facie* inconsistency in the above position, however, that needs to be resolved. Namely, it is *prima facie* inconsistent to posit that there are two sorts of inference, deduction and abduction, yet the mind performs only one type of inference, the iconic relation. The inconsistency disappears when we understand Peirce's position in terms of a type/class distinction. By a type/class distinction I mean that a type may be subdivided into classes, but a class may not be subdivided into types, that is, a class is a classification of a type.

The *prima facie* inconsistency disappears, because the iconic relation is a single type of inference, which Peirce classifies in three distinct ways. The criterion for the classifications is which element the mind must infer, from which other two elements the mind has access to. In deductive inference, the mind has access to the rule, and the case.<sup>54</sup> The mind does not have access to the result; rather it must infer the result from the rule and the case. In inductive inference the mind has access to

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performs, and not a means of classifying operations that the mind performs. Peirce disagrees with Descartes that the reasoning process humans perform is indubitable. Yet he agrees that the only process the human mind performs is that of valid reasoning. By conceiving validity as an operation rather than a classification, Peirce is able to extend the notion of validity to abductive inference and inductive inference. An extension that is impossible given the traditional conception of validity.

<sup>53</sup> EP, p 206, c. 1903. It is worth noting that "all necessary reasoning without exception is diagrammatic. That is, we construct an icon out of our hypothetical state of things and proceed to observe it." EP, p 212, c. 1903.

<sup>54</sup> We already know that Peirce alternatively terms the major premise a rule, the minor premise the case, and the conclusion a result.

the case and the result and infers the rule. In abductive inference the mind has access to the result and some rules. The abductive inference consists in inferring a case. Evidence that this is Peirce's position is found in *Deduction, Induction, and Hypothesis*,<sup>55</sup> and is re-presented below:

#### DEDUCTION

*Rule.* – All the beans from this bag are white.

*Case.* – These beans are from this bag.

∴ *Result.* – These beans are white.

#### INDUCTION.

*Case.* – These beans are from this bag.

*Result.* – These beans are white.

∴ *Rule.* – All the beans from this bag are white.

#### HYPOTHESIS.

*Rule.* – All the beans from this bag are white.

*Result.* – These beans are white.

∴ *Case.* – These beans are from this bag.

Thus there is no inconsistency in maintaining that both deductive and abductive inference be iconic relations.<sup>56</sup>

Before I explain how abductive inference is an iconic relation, there is a further point I want to note that will become important in the next section. Namely, given that the criterion for classifying the iconic relation is which element must be inferred from which element the mind has access to, it follows from the fact that inference contains only three

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<sup>55</sup> CP, 2, 623, p 374, c. 1893.

<sup>56</sup> Word limits prohibit exploring inductive inference in any depth. Inductive inference is where the mind presented with a result and a case perceives an iconic relation, thereby inferring a rule that it holds to be true. "Induction is where we generalize from a number of cases of which something is true, and infer that the same thing is true of a whole class." CP, 2, 624, p 375, c 1893.

terms that deduction, induction, and abduction are the only classifications of the iconic relation possible. That is, they exhaust the possible permutations.

To explicate how abductive inference is an iconic relation, and because it facilitates understanding how signs gain interpretants, I will now briefly describe the operation of abductive inference.<sup>57</sup> I will explain the operation of abductive inference in more detail in the next section, and in minute detail in the next chapter.

The purpose of abductive inference is to explain a surprising result.

The whole operation of reasoning begins with *Abduction*, [...]. Its occasion is a *surprise*. That is, some belief, active or passive, formulated or unformulated, has just been broken up.<sup>58</sup>

Abductive inference provides an explanation for the surprising result by discovering a known rule that iconically represents the surprising result.

The abductive inference is an iconic relation in the two requisite senses, that is, one relatum is represented as an icon in the other relatum, and the connexion between the relata is cognized by the mind. First, the surprising result is represented as an icon in the explanatory rule. Second,

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<sup>57</sup> Douglas Anderson states of abduction: "Insofar as Peirce identifies retroduction [abduction] as reasoning from consequent to antecedent, it is possible to think of it as resembling the deductive fallacy of affirming the consequent." (Douglas R. Anderson, *Strands of System: The Philosophy of Charles Peirce* (Purdue University Press, 1995) p 157.) While I agree that abductive inference is to be explained in terms of a process that is found also in deductive inference, I do not believe abductive inference can be explained in terms of affirming the consequent. For as Anderson notes, affirming the consequent is a form of deductive inference, only it is not a valid form. As I will explain, all deductive inferences for Peirce depend on abductive inference to produce iconic relations wherein conclusions may be reasoned from signs. Without abductive inference then, no deductive inferences, including invalid deductive inferences, can be performed.

<sup>58</sup> EP, p 287, c. 1903.

only when the mind cognizes that there is such a relation does it hypothesize that the surprising result would be explained if it were a case that fell under the rule.

Hypothesis is where we find some very curious circumstance, which would be explained by the supposition that it was a case of a certain general rule.<sup>59</sup>

Consider, for example, the following. My front door normally opens when I act on it in the manner that I normally do. If it were not to open upon my acting as I normally do, this would be a surprising result. To explain this surprising result I have to perform an abductive inference. In this instance, I have to conceive of a rule that iconically represents the door not opening given my actions. I can hypothesize that if it were the case that the door was stuck, then given the rule that 'stuck doors do not open when acted on in a normal manner', the door not opening would be explained. The surprising result would be explained because the surprising result (the door not opening) would be iconically represented in the rule (stuck doors do not open when acted on in a normal manner).

I will turn now to explain how the sign has interpretants that belong in an iconic relation to the sign. First, I need to translate the terms involved in deductive inference into the terms used in semiotic. I presented the three terms involved in semiotic in the introduction to this chapter; they are the sign, object, and interpretant. I translate the terms as follows: The major premise/rule becomes the sign, the minor premise/case becomes the object, and the conclusion/result becomes the interpretant.<sup>60</sup> I have already presented evidence in the preceding section

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<sup>59</sup> CP, 2, 624, p 375, c. 1893.

<sup>60</sup> From this point forward I will often use the terms 'sign', 'object' and 'interpretant' generically to include 'major premise', 'minor premise', and 'conclusion' respectively. In these instances context will indicate

that corroborates this translation. Further evidence will be presented in the next section, where I will argue that surprising results only obtain within the realm of semiosis and deductive inference. Insofar as the terms used in semiosis are those of semiotic rather than those of deductive inference, the operation of abductive inference is better discussed in semiotic terms, because abductive inference is a response to surprising results.

Signs, as rules, then, have interpretants that belong in an iconic relation to the sign via abductive inference. The surprising result that initiates abductive inference becomes an interpretant of the sign that explains it. That is, the surprising result gains the status of interpretant when it is explained. This requires that the surprising result be represented as an icon in the sign that explains it, and that this relation is cognized by the mind.

However, it must also be noted that the surprising result gains interpretants when abducted hypotheses are tested, which they always are for Peirce. For testing requires that consequences be deduced from the surprising result, as it is hypothetically understood, which is to say, consequences must be deduced from the new interpretant.

Abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea; [...] Deduction proves that something *must* be, Induction shows that something *actually* is operative, Abduction merely suggests that something *may be*. Its only justification is that from its suggestion deduction can draw a prediction which can be tested by induction and that, if we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about.<sup>61</sup>

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whether I am referring to semiosis, or both semiosis and deductive inference.

<sup>61</sup> EP, p 216, c. 1903.

For example, given my hypothesis that my front door will not open because it is stuck, I can deduce from my knowledge of stuck doors that giving the door a good shove will budge it. Essentially, I hypothesize that the surprising result (the door not opening) is a certain type of sign (a stuck door), and I deduce consequences from that sign and test them.

Since the conclusion in deductive inference is represented as an icon in the major premise, testing the hypothesis requires that we conceive the new interpretant as a sign that iconically represents interpretants. It is only thereby that we are able to deduce consequences from the new interpretant.<sup>62</sup> Note also that when the new interpretant is conceived as a sign with interpretants, the interpretants that it has were themselves the products of earlier abductive inference.

Thus, via abductive inference interpretants are related to signs. The relation between the interpretant and the sign is an iconic relation wherein one relatum, the interpretant, is represented as an icon in the other relatum, the sign. The abductive inference is the mind's cognition that the surprising result is represented in a known sign, thereby explaining the surprising result and giving it the status of interpretant.<sup>63</sup>

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<sup>62</sup> I have argued that deductive inference, for Peirce, involves three elements, major premise, conclusion, and minor premise. This does not always hold, for Peirce distinguishes corollarial from theorematic reasoning. "Peirce frequently distinguishes corollarial from theorematic reasoning. Corollarial reasoning employs only the general principles of logic, whereas theorematic reasoning involves constructive imagination as well; in geometry, for instance, it involves constructing and experimenting with diagrams." (Max H. Fisch, *Genealogy of Pragmatism* in Ketner, p 94.) The two types of reasoning need to be distinguished as the play of imagination in theorematic reasoning is negated by the minor premise found in corollarial reasoning. That is, the minor premise by determining which conclusion is to be inferred from the major premise denies the mind free range over the logical possibilities iconically represented in the major premise. Deducing consequences from surprising results conceived as signs is theorematic reasoning.

<sup>63</sup> Note that the surprising result becomes an interpretant as soon as it is explained, and irrespective of whether the explanation is accepted.

#### 4) **Pragmatism.**

In this section, I will answer the question I raised at the end of Section Two: How can the object function as an index in semiosis? First, I will argue that the object is the connexion that relates the relata in iconic relations.<sup>64</sup> So conceived, I will explain, the object is responsible for the problem of iconic possibility. However, the object also provides a possible way of indexing signs thereby resolving the problem of iconic possibility. Pragmatism, I will explicate, enables objects to function as indexes thereby resolving the problem of iconic possibility.

Given that semiotic contains only three elements, sign, object, and interpretant, the object, I will now argue, must be the connexion that relates the relata into iconic relations. In the preceding section I demonstrated that interpretants are iconically related to signs. Thus, the interpretant and the sign are the relata of the iconic relation wherein they are related. Since the interpretant and the sign are the relata of the iconic relation, neither can be the connexion that relates the relata.<sup>65</sup> Since the object is the only other element of the semiotic relation, the object must be the connexion that relates the relata in iconic relations.<sup>66</sup>

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<sup>64</sup> I introduced the term 'connexion' in the first chapter. There I noted that term 'relation' was used univocally to mean both the relation that related the relata and the relata-relation-relata construct. I stated my intent to use the term 'connexion' to refer to the relation that relates the relata.

<sup>65</sup> I believe this proposition is uncontroversial.

<sup>66</sup> Carl Hausman would disagree with my interpretation of the triadic relation as involving only two relata and one connexion. "One example that Peirce found particularly helpful in explaining the nature of a genuine, mediated, triadic relation is that of the activity of giving. In such an activity, there are three relata, the giver, the thing given, and the receiver. The relation of giving cannot be reduced to any pair in this relation, because giving does not consist in an agent surrendering something and then another agent taking that thing." Carl R. Hausman, *Charles S. Peirce's Evolutionary Philosophy* (Cambridge University Press, 1993), p 12.

There are two problems with Hausman's interpretation of the triadic relation, the first of which can be seen by examining giving. Let us

The claim that the object is the connexion that relates the sign and interpretant in iconic relations is further substantiated by re-examining abductive inference. When the mind performs abductive inference it has access to the surprising result and some signs, from which it infers a case. Abductive inference is, then, the mind's search for something that will provide a connexion between the surprising result/interpretant and some already known sign. Insofar as the object is the only element left, abductive inference is actually the mind's search for an object that relates the surprising result to some known sign that iconically represents it. Again, the object is the connexion that relates relata into iconic relations.

The object as the connexion that relates the relata in iconic relations, I will now explain, is responsible for the problem of iconic possibility. For objects that are replaced when new objects are abducted, I will argue, still relate interpretants to signs. This leads to the situation where a sign can iconically represent more than one interpretant, thus requiring some means of indexing which interpretant is required. This, as I explained in section Two, is the problem of iconic possibility.

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say that at Christmas time a man puts a box under a tree covered in lights. This act is comprised of two relata: box in hand, and box under tree; it also consists of a relation: the 'placing' the box under the tree. Hausman presupposes that the act of placing the box under the tree is unexceptional, and the third relata (the person to whom the box was intended) is required to convert the unexceptional relation of 'placing' into the exceptional relation of 'giving'. Peirce, however, maintains that all relations are exceptional in the sense that all relations are interpreted: "The very idea of a combination involves that of category the Third, for a combination is something which is what it is owing to the parts which it brings into mutual relationship." CP, 1, 363, p 187, c. 1890. Also: "*Agent and patient* as they are by themselves in their duality are not distinguished as agent and patient. The distinction lies in the mode of representing them in my mind, which is a Third." EP, p 170, c. 1903.

The second problem is that Hausman necessarily increases the entities involved in triadic relations beyond three. At the minimum he is proposing there be four entities involved in triadic relations: three relata and one inclusive connexion relating the relata (if this is at all sensible, and if not, Hausman requires five entities: three relata and two connexions).

To demonstrate that objects are able to relate interpretants to signs even when newly abducted objects replace them, I will examine the two operations involved when new objects are discovered which replace old objects. Namely, the advent of surprising results, and the abductive inference performed upon the advent of surprising results. I will argue that in neither case is the object rendered unable to relate interpretants to signs.

To argue that the object is not rendered unable to relate interpretants to signs upon the advent of surprising results, I first need to explain how surprising results occur. To do this I will explicate and resolve an inconsistency in my thesis to date.

I have argued that the inference in deduction, induction, and abduction is the iconic relation wherein one relatum is represented as an icon in the other relatum, and where the mind cognizes the relation. The criterion for classifying these inferences as different is which element the mind must infer from which elements the mind has access to. I have also noted that, given the criterion, and the three elements involved in inference, permutation possibilities entail that the iconic relation can only be classified as deductive, inductive, or abductive inference. Thus, if the operation of semiosis is to be an iconic relation, which is required if Peirce is to successfully maintain that the mind performs only one type of inference, I need to explain what class of inference it belongs to. I will explain that the operations of semiosis and deductive inference are identical, by arguing that surprising results are inexplicable unless Peirce allows for this further subdivision of deductive inference.<sup>67</sup>

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<sup>67</sup> This is the reason that I interpreted semiosis as an operation performed with sign, object, and interpretant, which issued in an interpretant in a person's mind. Unless semiosis is so interpreted Peirce has no term for distinguishing the two classifications of deductive inference.

Surprising results occur when an expected idea does not eventuate, but a surprising result does instead.

I ask you whether at that instant of surprise there is not a double consciousness, on the one hand of an Ego, which is simply the expected idea broken off, on the other hand of the Non-Ego, which is the strange intruder, in his abrupt entrance.<sup>68</sup>

Abductive inference and inductive inference cannot eventuate in surprising results, for they are provisional inferences; abductive inference suggest that something may be the case, and inductive inference tests to see whether the abductive inference is acceptable.

Abduction merely suggests that something *may be*. Its only justification is that from its suggestion deduction can draw a prediction which can be tested by induction and that, if we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about.<sup>69</sup>

Since abductive inference and inductive inference are provisional no expectation is involved when making the inference, and therefore they cannot eventuate in surprising results.

Because there are only three classes of inference, surprising results must be explicable in terms of deductive inference. But, as I will now argue, deductive inference cannot lead to surprising results either. In all deductive inference, according to Peirce, the conclusion is represented as an icon in the major premise. Therefore, if the inference is to be made at all, the conclusion represented in the major premise, must eventuate. Not only must the conclusion eventuate, but also the conclusion is judged against nothing other than its representation in the major premise.<sup>70</sup>

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<sup>68</sup> CP, 5, 53, p 38, c. 1903.

<sup>69</sup> EP, p 216, c. 1903.

<sup>70</sup> Apel also notes that this is Peirce's position. "Deduction has nothing to do with the experience of reality." Apel, p 104.

Pure mathematics, however, is no science of existing things. It is a mere science of hypotheses. It is consistent with itself; and if there is nothing else to which it professes to conform, it perfectly fulfills its promise and its purpose.<sup>71</sup>

Since the conclusion of a deductive inference necessarily conforms to its representation in the major premise, and need not conform to any other thing, it is not possible for a surprising result to obtain rather than the conclusion.

While deductive inference does not lead to surprising results, I will now argue that the operation of deductive inference can explain how surprising results are possible. The operation of deductive inference only requires that the conclusion be represented in the major premise, and that the relation be cognized by the mind. Thus, the requirement that the conclusion be compared against nothing other than its representation in the major premise can be negated without denying the operation of deduction. Surprising results can thus be explained by conceiving of semiosis as the operation of deductive inference, placed in a milieu where the deduced and thereby expected interpretant be compared against what really eventuates. Exactly how the comparison is achieved I will explain in the next chapter.

Essentially, deductive inference operates in a milieu where the conclusion iconically represented in the major premise cannot be falsified. Which is to say, both, that the conclusion conforms to its representation in the major premise; and that the conclusion is not judged against any other thing. Whereas semiosis operates in a milieu where the interpretant represented in the sign may not eventuate, instead, a surprising result may obtain. Which is to say, both, that the interpretant necessarily conforms to its representation in the sign like deductive inference; and that the interpretant is also compared with what 'really' eventuates. Whenever the

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<sup>71</sup> EP, p 51, c. 1898.

interpretant does not conform to what really eventuates, an expectation is denied, and a surprising result obtains.

Given this explanation of surprising results, I conclude both, that the operation of semiosis is identical to the operation of deductive inference; and that the criterion for differentiating between deduction and semiosis is the milieu in which they operate. As such, semiosis is an iconic relation, and the problem of explaining semiosis given that the iconic relation can only be classified into three classes is solved.

Since the surprising result is only surprising insofar as it is compared against an expected interpretant, the object's ability to relate interpretants to signs is not undermined with the advent of surprising results. Indeed, if the object did not relate the interpretant to its sign, then there would be no expected interpretant that may compare unfavorably with what eventuates. Thus the object's ability to relate interpretants to signs is not undermined with the advent of surprising results.

But nor, I will now show, is the object's ability to relate interpretants to signs undermined in the process of abductive inference. The surprising result is a 'strange intruder'; the strange intruder that compared unfavorably against the expected interpretant. Abductive inference discovers an object that will relate this surprising result to some known sign. This is not to say, however, that some object is discovered that relates the surprising result back to the original sign, i.e., the sign that iconically represented the expected interpretant. Rather, the two criteria for a sign being an explanation for the surprising result is that the sign iconically represents that surprising result, and that the sign be known. Thus the explanatory sign may or may not be the original sign. Regardless of whether the explanatory sign is or is not the original sign, the discovered object does not delete or overwrite the original object, i.e., the object that related the expected interpretant to the original sign. Rather, the discovered object independently describes a connexion between the

surprising result and an explanatory sign that heretofore was un-noted, leaving the original object untouched. This must be the case, for the only way the new object would overwrite the old object is if it were the same object, otherwise they occupy different logical spaces.

Thus the aspects involved in abductive inference (the advent of surprising results, and the abductive inference itself) do not entail that the object lose its ability to relate interpretants to signs. Indeed, Peirce would be wrong if the situation were otherwise. For as a matter of fact we do make inferences that involve objects that have been replaced. Consider, for example, the relation between rust and phlogiston. The object that relates rust to phlogiston has been replaced, as we no longer expect the escape of phlogiston when we see rust. But without the object to relate rust and phlogiston there would be no connexion between rust and phlogiston, which there must be, otherwise this paragraph would not be possible.

Since the discovery of new objects does not undermine the ability of old objects to relate interpretants to signs in iconic relations, it is possible for a sign to have more than one interpretant related to it. Thus, without some means of indexing which interpretant is to be expected when such a sign is confronted, the problem of iconic possibility obtains.

While the object is responsible for the problem of iconic possibility, it also plays a role in solving the problem. Since every object relates only one interpretant to its sign, the object can act as an index. That is, if we index a sign using one object we will isolate the specific interpretant that it relates to the sign, and if we index the same sign using a different object we will isolate a different interpretant. Thus if objects can be discriminated into those which are to be used, and those which are not to be used, then providing there are not two useable objects that pertain to a given sign at a given time, the problem of iconic possibility is solved.

Pragmatism, for Peirce, discriminates objects and thereby solves the problem of iconic possibility. Pragmatism discriminates objects because the point of pragmatism is to find objects which when used do not lead to surprising results, and, according to Peirce, this aim is accomplished via abductive inference.

Admitting, then, that the question of pragmatism is the question of Abduction, let us consider it under that form. What is good Abduction? [...] The question of the goodness of anything is whether that thing fulfills its end. [...] Its end is, through subjection to the test of experiment, to lead to the avoidance of all surprise and to the establishment of a habit of positive expectation that shall not be disappointed.<sup>72</sup>

I will now answer the question raised at the end of section Two: How can the object function as an index in semiosis? Objects which, when used, lead us to expect interpretants that do not eventuate, and thus lead to surprising results, become unused.<sup>73</sup> The surprising result, furthermore, impels the mind to abduct new objects. These new objects become possibilities, which if they pass the testing phase, are established as the habitual ways that we index signs.<sup>74</sup> Since an object will index only one interpretant of any sign, indexing signs via habitually used non-falsified objects solves the problem of iconic possibility.<sup>75</sup>

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<sup>72</sup> EP, p 235, c. 1903.

<sup>73</sup> Note that use of an object can lead to surprising results in certain situations but not in others. Newton's theory of gravity, as it relates a stone's descent from point A to point B when it falls on earth is not falsified in everyday experience. Yet when it comes to plotting the relation between a space ship on earth and a space ship on the moon, Newton's theory of gravity is falsified. The object only necessarily becomes redundant in those situations where it is falsified.

<sup>74</sup> Max Fisch claims of Peirce's pragmatism: "We have the analysis of the cyclic belief-doubt-inquiry-belief continuum which is Peirce's restatement of Bain's doctrine of belief, and it is out of this analysis that the pragmatic maxim is drawn." Max H. Fisch, *Chronical of Pragmatism, 1865-1879*, in Ketner, p 98.

<sup>75</sup> There is a further consideration, which I do not wish to place in the text because it complicates matters without clarifying matters. Namely,

### 5) **The single type of inference.**

In this section I will demonstrate that the iconic relation is the only operation that the mind performs according to Peirce. I will provide two arguments. First I will extricate this conclusion from points made in the thesis so far. Second I will argue that it follows from Peirce's theory of categories.

That Peirce maintains the iconic relation is the only operation that the mind performs, follows from two conclusions already made in my thesis. The first is that Peirce maintains that the mind performs only one type of operation. The second is that Peirce explains deductive inference/semiosis,<sup>76</sup> inductive inference, and abductive inference in terms of the iconic relation. Given the definition of the iconic relation as a relation wherein one relatum is represented as an icon in the other relatum, where the mind cognizes the relation, the iconic relation is, according to the definition of inference presented in the first chapter, an inference. As an inference, the iconic relation is an operation that the mind performs. Since the mind performs only one type of operation, and the iconic relation is an operation the mind performs, the iconic relation must be the only operation that the mind performs.

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abductive inference does not necessarily re-connect the surprising result back to the original sign. Rather, abductive inference infers an object that may relate the surprising result to some other known sign. This other sign, then, can come to iconically represent more than one acceptable interpretant and thus cause the problem of iconic possibility. Note that this does not contradict any propositions contained in my text. For when such misunderstandings do occur they lead to surprising results, which are rectified by establishing new habits of indexing signs.

<sup>76</sup> I will use the term 'deductive inference/semiosis' when I refer to the operation that is shared by both deductive inference and semiosis.

Before I explain how this conclusion is also entailed in Peirce's theory of categories,<sup>77</sup> a remark on terminology is in order. Peirce uses the terms 'Firstness', 'Secondness', and 'Thirdness' when referring to the categories: "The ideas of Firstness, Secondness, and Thirdness, the three elements, or *Universal Categories* [...]"<sup>78</sup> Yet he also uses the terms 'category the First', 'category the Second', and 'category the Third':

Category the First is the Idea of that which is such as it is regardless of anything else. That is to say, it is a *Quality* of feeling. Category the Second is the Idea of that which is such as it is as being Second to some First, regardless of anything else and in particular regardless of any *law*, although it may conform to a law. That is to say, it is *Reaction* as an element of the Phenomenon. Category the Third is the Idea of that which is such as it is as being a Third, or Medium, between a Second and its First. That is to say, it is *Representation* as an element of the phenomenon.<sup>79</sup>

He even uses the terms 'First', 'Second', and 'Third':

First and second, agent and patient, yes and no, are categories which enable us roughly to describe the facts of experience, and they satisfy the mind for a very long time. But at last they are found inadequate, and the third is the conception which is then called for. The third is that which bridges over the chasm between the absolute first and last, and brings them into relationship.<sup>80</sup>

I will use the terms 'Firstness', 'Secondness', and 'Thirdness'.

I will now explicate that Peirce's categories entail that the only operation that the mind performs is the iconic relation. Peirce maintains that the categories explain all that is present to the mind.

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<sup>77</sup> Peter Schouls has indicated that the word 'by' normally follows the word 'entailed'. I will use the word 'in' to follow the word 'entailed' for it is correct given Peirce's theory of deductive inference. For Peirce, as I have argued, a conclusion is represented as an icon 'in' the major premise from which it is deduced. It does not stand 'by' the major premise and then be linked to the major premise 'by' an autonomous relation.

<sup>78</sup> EP, p 272, c. 1903.

<sup>79</sup> EP, p 160, c. 1903.

<sup>80</sup> CP, 1, 259, p 185, c. 1890.

Phaneroscopy [the study of categories] 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.<sup>81</sup>

He also holds that the three categories correspond to the three elements of inference:

A *Sign*, or *Representamen*, is a First which stands in such a genuine triadic relation to a Second, called its *Object*, as to be capable of determining a Third, called its *Interpretant*, to assume the same triadic relation to its Object in which it stands itself to the same Object.<sup>82</sup>

Since everything present to the mind is explicable in terms of the categories, and the categories correspond to the sign, object, and interpretant, the only elements that the mind has any access to are signs, objects, and interpretants. I have already noted that deductive inference/semiosis, inductive inference, and abductive inference exhaust the possible ways of relating signs, objects, and interpretants. Insofar as Peirce explains deductive inference/semiosis, inductive inference, and abductive inference in terms of iconic relations, the only operation that the mind performs is the iconic relation.

Thus the only operation that the mind performs according to Peirce is the iconic relation. To avoid any confusion it is worth noting that all operations of the mind, including memory, sensation, imagination, and thought, whenever they are operations that the mind performs, must be, according to Peirce, iconic relations. How exactly memory, for example, is

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<sup>81</sup> CP, 1, 284, p 141, c. 1905. To clear any confusion between phaneroscopy and the categories we can consider the Peirce Edition Project editors' preface to another text of Peirce's: "He [Peirce] goes on to clarify the nature of phenomenology (later called phaneroscopy), whose goal is to isolate the universal categories of experience." EP, p 145, c. 1903.

<sup>82</sup> EP, p 272, c. 1903.

explained in terms of iconic relations I do not intend to answer in this thesis. That is, the aims of this thesis do not extend to empirical verification that the iconic relation explains, as a matter of fact, the operations that the mind performs. Rather, my aim is limited to extrication of the single type of inference that Peirce maintains the mind performs, and to explication of what this inference is.

That we do not as yet know what this inference is follows from the fact that we do not know whether the iconic relation is a Cartesian type or a Humean type inference. That is, we do not know whether the attentive mind perceives the object that relates the relata in the iconic relation, or not. In the next chapter I will explicate the iconic relation in detail. In the conclusion I will use this information and explain that the iconic relation is, for Peirce, a Humean type inference.

### PEIRCE'S INFERENCE IN DETAIL.

In this chapter I will explicate the iconic relation in detail by examining the elements of the iconic relation. I will do this by explicating Peirce's categories. As I explained in the preceding chapter, Peirce equates the sign with Firstness, the object with Secondness, and the interpretant with Thirdness. The categories are pertinent because, as I will show, Peirce explains consciousness in terms of Firstness; relations, and thereby the elements of semiotic in terms of Secondness; and the iconic relation in terms of the co-ordination of these elements in Thirdness.

But I am prepared to show in detail, and indeed virtually have shown, that all the forms of logic can be reduced to combinations of the conception of inference, the conception of otherness, and the conception of character. These are obviously simply forms of Thirdness, Secondness, and Firstness of which the last two are unquestionably given in perception. Consequently the whole logical form of thought is so given in its elements.<sup>83</sup>

#### 1) **Firstness.**

In this section I will explain that Firstness is consciousness. I will further demonstrate that Firstness, in itself, contains no relations, but that relations can be imposed upon it. I will explain how relations are imposed on Firstness in the next section when I explicate Secondness.

To substantiate the claim that Peirce identifies Firstness as consciousness I will examine Peirce's introduction of the categories as

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<sup>83</sup> EP, p 233, c. 1903.

found in the Harvard lectures of 1903. He begins by extricating the categories from phenomenon.<sup>84</sup>

Although I am going to confine myself to these three categories, yet you will understand that in an hour's lecture, in what remains of the hour, it will be quite beyond my power either to treat them at all exhaustively, [...]. What I should like to do would be to take up each category in turn and firstly, point it out to you clearly in the phenomenon."<sup>85</sup>

Peirce then introduces Firstness by discussing presentness.

When anything is presented to the mind, what is the very first and simplest character to be noted in it [...]? Certainly it is *presentness*. [...] The present, being such as it is while utterly ignoring everything else, is positively such as it is. Imagine, if you please, a consciousness in which there is no comparison, no relation, no recognized multiplicity (since parts would be other than the whole), no change, no imagination of any modification of what is positively there, no reflexion, -nothing but a simple positive character. [italics removed]<sup>86</sup>

Essentially, Peirce is claiming that presentness instantiates Firstness, thus the proposition 'presentness is Firstness' accurately portrays Peirce's position.<sup>87</sup> In which case the phrase 'such as it is' is synonymous with the term 'Firstness'. Indeed this point is made in the following lecture when Peirce claims that: "Category the First is the Idea of that which is such as it is regardless of anything else."<sup>88</sup> However, Peirce is only predicating one

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<sup>84</sup> The singular is appropriate insofar as every phenomenon exhibits the categories.

<sup>85</sup> EP, p 148, c. 1903.

<sup>86</sup> EP, p 149, c. 1903.

<sup>87</sup> The proposition 'Firstness is presentness' is not entailed in this claim.

<sup>88</sup> EP, p 160, c. 1903. One might like to argue that this is problematic, for it requires that Peirce claims 'Firstness is such as it is', whereas Peirce's claim is that Firstness is the 'Idea' of that which is such as it is. A more representative sample of the text, however, finds that the proposition 'Firstness is such as it is' is how we ought to understand that text. "Category the First is the Idea of that which is such as it is regardless

thing of the 'present' in the above text. Thus when consciousness is introduced in the second sentence it is not a new predicate of the present, but rather a clarification of 'such as it is'. The propositions, 'present is such as it is', 'present is Firstness', and 'present is consciousness (as it is described)', are, then, synonymous. As such I conclude that Peirce identifies Firstness as consciousness.

There is a further point of clarification needed. Namely, not only does Peirce identify Firstness as consciousness, but also he identifies Firstness with feeling.

Category the First is the Idea of that which is such as it is regardless of anything else. That is to say, it is a *Quality* of feeling.<sup>89</sup>

I will present further evidence that this is Peirce's position presently. It is my understanding that the terms Firstness, consciousness, and feeling, are synonymous for Peirce, and in the remainder of this thesis I will use them accordingly.

Not only does the text identifying presentness afford an identification of Firstness as consciousness, but also it presents a list of attributes that pertain to consciousness and therefore pertain to Firstness. That Firstness contains no relations is the most important of these, because all other attributes follow once it is noted that Firstness contains no relations. For example, if Firstness contains no relations then it is not possible that Firstness contains change, because change presupposes

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of anything else. That is to say, it is a *Quality* of feeling. Category the Second is the Idea of that which is such as it is as being Second to some First, regardless of anything else and in particular regardless of any *law*, although it may conform to a law" (EP, p 160, c. 1903.) Essentially Peirce is saying that both Firstness and Secondness are such as they are, which is to say they are different categories. But he also wants to say that Firstness is such as it is, period. Whereas Secondness is such as it is, as a second to some first. In which case 'Firstness is such as it is' is how we ought to understand the text.

<sup>89</sup> EP, p 160, c. 1903.

relations. That Firstness contains no relations is a position we find repeated in a disagreement Peirce has with Kant's philosophy.<sup>90</sup>

Kant gives the erroneous view that ideas are presented separated and then thought together by the mind. [...] What really happens is that something is presented which in itself has no parts, but which nevertheless is analyzed by the mind, that is to say, its having parts consists in this, that the mind afterwards recognizes those parts in it. Those partial ideas are really not in the first idea, in itself, though they are separated out from it. [...] When, having thus separated them, we think over them, we are carried in spite of ourselves from one thought to another, and therein lies the first real synthesis.<sup>91</sup>

While Firstness contains no relations, this does not entail that relations cannot be imposed upon Firstness. To substantiate this claim I will examine the following.

What I have described as elements of the feeling are not really parts of the feeling as it is in the very moment when it is present; they are what appears to have been in it, when we reflect upon it, after it is past. [...] It [feeling] is the consciousness of a moment as it is in its singleness, without regard to its relations whether to its own elements or to anything else.<sup>92</sup>

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<sup>90</sup> The non-relational aspect of Firstness has an analogy, if indeed it is not a direct copy of (and I am unsure which is the original here), Peirce's conception of continuity. Robert Lane argues that Peirce's final conception of continuity was that: "A line does not consist in any number of individual points, however numerous; rather, it 'contains no points until the continuity is broken by marking the points. In accordance with this it seems necessary to say that a continuum, where it is continuous and unbroken, contains no definite parts; that its parts are created in the act of defining them and the precise definition of them breaks the continuity. ([CP] 6.168, 1903)'" (Robert Lane, Peirce's Triadic Logic Revisited" *Transactions of the Charles S. Peirce Society* vol. 35, 1999, 284–311, p 299.) Or as Sandra Rosenthal puts it: "Perhaps it can be said, somewhat metaphorically, that while reality is the infinity of a continuum or ongoing process, the world is the logical fixation of an infinite number of possible cuts within it." Sandra B. Rosenthal, *Charles Peirce's Pragmatic Pluralism* (State University of New York Press, 1994), p 8.

<sup>91</sup> CP, 1, 384, p 204, c. 1890.

<sup>92</sup> CP, 7, 540, p 326, c. undated. Editor presumes about 1900.

Since feelings, as Firstness, contain no relations, then since relations are required if a Firstness is to have elements, relations must be imposed upon Firstness.

I will explain how relations are imposed upon Firstness in the next section, when I examine Secondness. To avoid confusion, however, I will note that whenever Firstness has a relation imposed upon it Secondness is involved. Therefore it is correct to maintain that Firstness contains no relations even when relations are imposed upon it. For whenever relations are imposed upon Firstness, Secondness is involved, and the result is a combination of Firstness and Secondness. That is, Firstness alone contains no relations.

For the remainder of this section I will clarify Peirce's position by extricating a ramification of the position that Firstness, as consciousness, contains no relations. Namely, Firstness alone does not explain the contents of consciousness. First I need to explicate 'contents of consciousness'. A content of consciousness is either a content of which the mind is conscious, or a content that is in consciousness irrespective of whether the mind is conscious of it. In neither case, I will argue, does Firstness alone explain contents of consciousness.

That Firstness alone explains neither interpretation of 'contents of consciousness' follows from the fact that Firstness alone contains no relations. As I have just argued, all relations found in Firstness are imposed upon it. Insofar as there are no relations in Firstness alone, there can be no contents of consciousness, for any content of consciousness is, given the identification of consciousness as Firstness, a content of Firstness. Therefore, any content of consciousness must be related to Firstness, and this is impossible for there are no relations in Firstness alone.

Nor can we gain knowledge of any feeling by introspection, the feeling being completely veiled from introspection, for the very

reason that it is our immediate consciousness. [...] Although a feeling is immediate consciousness, that is, is whatever of consciousness there may be that is immediately present, yet there is not consciousness *in* it because it is instantaneous [*italics mine*].<sup>93</sup>

I will further note that it must be Peirce's position that Firstness is consciousness, and not only a content of consciousness, i.e., Firstness is not a content given to a mind, where the mind is by its own nature conscious. As will become apparent in the following two sections, Firstness is the only category that explains consciousness; Secondness explains relations, and Thirdness explains the coordination of Firstness and Secondness. Yet consciousness is in some way present to the mind. Limiting the explanatory power of Firstness to explicating only contents of consciousness, then, would contradict Peirce's claim that the categories describe "the collective total of all that is in any way present to the mind."<sup>94</sup> That is, none of the categories would, if the explanatory power of Firstness were limited to explaining only the contents of consciousness, explain the mind's native consciousness, and therefore Peirce's categories would not explain all that is present to the mind.

## 2) **Secondness.**

In this section I will argue that Secondness provides relations, which it does by differentiating Firstness, and thereby Secondness explains the elements of semiotic: Sign, object, and interpretant. I will first extricate two separate but complimentary aspects of Secondness, both of which Peirce uses to explain how Secondness differentiates Firstness. Then I will explicate how relations are generated when Secondness differentiates Firstness, thereby illustrating how the mind comes to be presented with the elements of semiotic.

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<sup>93</sup> CP, 1, 310, p 153, c. 1907.

<sup>94</sup> CP, 1, 284, p 141, c. 1905.

To introduce Secondness, and the two aspects of Secondness that Peirce posits, I will first explain Secondness as *reaction*. Peirce describes Secondness in terms of reaction.

Category the Second is the Idea of that which is such as it is as being Second to some First, regardless of anything else and in particular regardless of any *law*, although it may conform to a law. That is to say, it is *Reaction* as an element of the Phenomenon.<sup>95</sup>

Reaction is found when one feeling breaks up another.

This sense of acting and of being acted upon, which is our sense of the reality of things, -both of outward things and of ourselves, - may be called the sense of Reaction. It does not reside in any one Feeling; it comes upon the breaking of one feeling by another feeling.<sup>96</sup>

Insofar as feeling as Firstness is in itself non-relational, and the break up of Firstness entails relations, the break up of feeling occurs only when a relation is imposed upon Firstness. Since reaction occurs whenever feelings are broken up, reaction occurs whenever a relation is imposed upon Firstness. As a terminological point, whenever the term 'reaction' appears from here forward, it refers to Secondness as reaction.

By way of providing examples and thereby contexts wherein reaction occurs according to Peirce, I will now examine wakeful consciousness and perception. Both, I will illustrate, entail the imposition of relations upon Firstness and are accompanied by reaction.

With respect to wakeful consciousness Peirce claims: "[...], all being awake, consists in a sense of reaction between *ego* and *non-ego*."<sup>97</sup> *Ego* and *non-ego* must be feelings, for we know that reaction 'comes upon the breaking of one feeling by another feeling'. Insofar as the break up of feeling entails the imposition of a relation upon Firstness, all wakeful

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<sup>95</sup> EP, P 160, c. 1903.

<sup>96</sup> EP, p 4, c. 1894.

<sup>97</sup> EP, p 268, c. 1903.

consciousness entails the imposition of a relation upon Firstness. In wakeful consciousness, then, we find the imposition of a relation upon Firstness accompanied by reaction. Note, however, that ‘wakeful consciousness’ is not to be confused with ‘consciousness’, for consciousness is, as I have shown, Firstness, and therefore non-relational.

With respect to perception Peirce notes:<sup>98</sup>

We merely ask, what is the content of the *Percept*? Everybody should be competent to answer that of himself. Examine the percept in the particularly marked case in which it comes as a surprise. Your mind was filled [with] an imaginary object that was expected. At the moment when it was expected the vividness of the representation is exalted, and suddenly, when it should come, something quite different comes instead. I ask you whether at that instant of surprise there is not a double consciousness, on the one hand of an Ego, which is simply the expected idea suddenly broken off, on the other hand of the Non-Ego, which is the strange intruder, in his abrupt entrance.<sup>99</sup>

We already know that *ego* and *non-ego* are feelings that have broken up and are characterized by reaction, and therefore entail the imposition of a relation upon Firstness. Thus, if all perception is surprising then reaction, and the imposition of a relation upon Firstness, accompanies all perception. Peirce states, “Low grades of this shock [surprise] accompany all unexpected perceptions; and every perception is more or less unexpected.”<sup>100</sup>

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<sup>98</sup> Sensation, it can be noted, involves abduction and therefore requires Thirdness. “What I call the inkstand is a generalized percept, a quasi-inference from percepts, perhaps I might say a composite photograph of percepts. In this psychical product is involved an element of resistance to me, which I am obscurely conscious of from the first. Subsequently, when I accept the hypothesis of an inward subject for my thoughts, I yield to that consciousness of resistance and admit the inkstand to the standing of an external object.” EP, p 62, c. 1901.

<sup>99</sup> CP, 5, 53, p 38, c. 1903. I will use italicized square brackets when the additions to the text were made by the editor, not myself.

<sup>100</sup> CP, 1, 332, 167, c. 1905.

Thus reaction occurs when Firstness has relations imposed upon it thereby breaking up Firstness. Yet reaction is insufficient to explain the imposition of a relation upon Firstness. For reaction occurs only when Firstness breaks up: "it [reaction] comes upon the breaking of one feeling by another feeling."<sup>101</sup> Since Firstness itself contains no relations it never breaks up until a relation is imposed upon it. Thus, reaction depends on some thing else to break up Firstness. Nor is it sufficient to claim that a previous reaction is responsible for the current reaction, for there must be an original reaction.

Peirce does not speak of Category the Second only in terms of reaction. He also speaks of Category the Second as *opposition of the will*.

To be conscious is nothing else than to feel. What room, then, is there for *secundans* and *tertians*? [...] The phaneron does contain genuine *secundans*. [...] You put your shoulder against the door and, gathering your forces, put forth a tremendous effort. [...] Where there is no effort there is no resistance, where there is no resistance there is no effort either in this world or any of the worlds of possibility. It follows that an effort is not a feeling nor anything *priman* or protoidal. There are feelings connected with it: they are the sum of consciousness during the effort. But it is conceivable that a man should have it in his power directly to summon up all those feelings, or any feelings. He could not, in any world, be endowed with the power of summoning up an effort to which there did not happen to be a resistance all ready to exist. For it is an absurdity to suppose that a man could directly will to oppose that very will.<sup>102</sup>

Peirce's justification for distinguishing 'effort' from the feelings that accompany effort is that effort entails opposition of the will, whereas the

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<sup>101</sup> EP, p 4, c. 1894.

<sup>102</sup> CP, 1, 317 –320, p 159, c. 1910. It is unfortunate that Peirce uses esoteric terminology. We have already encountered 'phaneron'. And there can be little doubt that 'secundans' and 'tertians' refer to Secondness, and Thirdness respectively, nor 'priman' and 'protoidal' to Firstness. Indeed, the text wherein this quote is found is titled: *Transition to Category the Second*, and the editors of CP have seen fit to include this text under the chapter heading of: *The Categories in Detail*.

feelings accompanying effort do not. To clarify Peirce's argument, consider two people, Sam and Jem. Peirce is arguing that it is conceivable that Sam might will her conscious state to be identical to the state of consciousness of Jem, where Jem is experiencing effort. But it is not possible that Sam might thereby experience her will to be opposed as Jem does. For this would be to claim that Sam could will (construct her own conscious state) in such a way as to oppose her own will. Insofar as the conscious states of both Sam and Jem are wakeful conscious states, both entail, as I have shown, reaction. Insofar as both Sam and Jem experience reaction, but only Jem's will is opposed, reaction and opposition of the will cannot be the same aspect of Secondness.

Thus Peirce propounds two different aspects of Secondness, Secondness as reaction, and Secondness as opposition of the will. Both aspects of Secondness, I will now explicate, are required to explain the imposition of relations upon Firstness.

A clear explanation of how the co-ordination of the two aspects of Secondness impose relations upon Firstness is afforded by switching modes, as it were, from the categories to semiotic. I have already explained that Peirce identifies each category with an element of semiotic, identifying the sign as Firstness, the object as Secondness, and the interpretant as Thirdness. Insofar as Peirce distinguishes the object into two, the *dynamical object* and the *immediate object*, we find Secondness as opposition of the will, and Secondness as reaction identified in semiotic.

It seems to me that one of the first useful steps toward a science of *semeiotic* [...], must be the accurate definition, or logical analysis, of the concepts of the science. I define a *Sign* as anything which on the one hand is so determined by an Object and on the other hand so determines an idea in a person's mind, that this latter determination, which I term the *Interpretant* of the Sign, is thereby mediately determined by that Object. A Sign, therefore, has a triadic relation to its Object and to its Interpretant. But it is

necessary to distinguish the *Immediate Object*, or the Object as the Sign represents it, from the *Dynamical Object*, or really efficient but not immediately present Object.<sup>103</sup>

The dynamical object is Secondness as the opposed will, because the opposed will is the only aspect of Secondness that includes more than perception reveals. Secondness as reaction, after all, is only given when relations are imposed upon Firstness, and this, as I have shown, is what perception is.

By the way, the dynamical object does not mean something out of the mind. It means something forced upon the mind in perception, but including more than perception reveals.<sup>104</sup>

If the dynamical object is Secondness as opposition of the will, then the immediate object must be Secondness as reaction.

I am now in a position to explicate how Secondness imposes relations on Firstness. Firstness, as I argued in the preceding section, is consciousness without relations, or undifferentiated consciousness. Without Secondness any such state of consciousness would be eternally unchanging. Secondness as opposition of the will is the dynamical object, characterized by Peirce as the “really efficient but not immediately present Object.”<sup>105</sup> The dynamical object is the really efficient object because it instigates change, that is, it instigates the differentiation of consciousness. It is not immediately present because, as independent of consciousness, the dynamical object is not the relation that relates the relata created when consciousness differentiates.

The differentiation of consciousness, instigated by the dynamical object, creates reaction, which, as we know, occurs at the break up of

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<sup>103</sup> EP, p 482, c. 1908.

<sup>104</sup> EP, p 478, c. 1906.

<sup>105</sup> “But it is necessary to distinguish the *Immediate Object*, or the Object as the Sign represents it, from the *Dynamical Object*, or really efficient but not immediately present Object.” EP, p 482, c. 1908.

feelings or consciousness. That is, consciousness differentiates into two parts, the sign and interpretant. And since these two parts are necessarily related, the immediate object is also created, which I have argued is Secondness as reaction.

The entirety of consciousness prior to, and after it is divided, is the sign, although it is not termed a sign until consciousness is divided when it then belongs in a triadic relation (sign, object, interpretant). The division in this consciousness, i.e., the relation that divides the differentiated parts of consciousness is the immediate object, or reaction. The immediate object delineates a portion of the sign, which is the interpretant. The interpretant was already, albeit heretofore unnoticed, iconically represented in undifferentiated consciousness, and is now delineated in the sign.<sup>106</sup>

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<sup>106</sup> It is worth noting a similarity between Peirce's philosophy and Kant's on this point. Namely, both differentiate something that is undifferentiated by introducing relations into it. Kant maintains that all phenomena are known in terms of the mind perceiving relations. "In confirmation of this theory of the ideality of both outer [intuition of space] and inner [intuition of time] sense, and therefore of all objects of the senses, as mere appearances, it is especially relevant to observe that everything in our knowledge which belongs to intuition -feeling of pleasure and pain, and the will, not being knowledge, are excluded - contains nothing but mere relations; namely, of locations in an intuition (extension), of change of location (motion), and of laws according to which this change is determined (moving forces). [...] Now a thing in itself cannot be known through mere relations; and we may therefore conclude that since outer sense gives us nothing but mere relations, this sense can contain in its representation only the relation of an object to a subject, and not the inner properties of the object in itself." Norman Kemp Smith trans. *Immanuel Kant's Critique of Pure Reason* (Macmillan and Co. Limited, 1950) b 67, p 87.

I suggest, although this is not the forum to be arguing the point, that these relations are schemata as they are that whereby phenomena are differentiated. It is also worth noting, then, that Sandra Rosenthal conceives the object in Peirce's semiotic as habit: "In this way habit creates the immediate object under the constraints of the dynamical object that is its ultimate referent, and it provides the vital, living link between signs and the universe." (Rosenthal, p 48). Furthermore, she conceives habit as schemata. "Thus, the series of possible schemata for the application of a concept to experience is 'fixed' prior to the imposition of linguistic structure. Yet, it is 'fixed' not by any eternal ontological order but by the concrete, biologically based disposition or habit as the rule of

The two aspects of Secondness coordinate to impose relations on Firstness in this sense. Opposition of the will instigates the differentiation of consciousness but is not the relation that relates the relata (the sign and the interpretant). Reaction, while it is the relation relating the sign and the interpretant, does not instigate the differentiation of consciousness, or its own existence. Rather, it is given concomitantly with the sign and interpretant when consciousness differentiates. The imposition of relations on Firstness, we can also comprehend, provides the mind with the elements of semiotic. For until Firstness is divided there can be no signs, immediate objects, or interpretants.

Before I turn to the next section and explain how the three elements created when consciousness differentiates are used to create iconic relations, there are two points of possible confusion that I will extricate and clarify. The first is, why should the differentiation of consciousness lead to a portion of consciousness becoming delineated as an interpretant?

From one perspective, it follows from the fact that consciousness is differentiated, that any part of consciousness is a portion of the consciousness that it was differentiated from. That is, the consciousness prior to differentiation is the same consciousness after the differentiation, only now a certain aspect of that consciousness is focused on. Peirce's position is not to be confused with Hume's position. Hume explains

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generation of explicit schemata." (Rosenthal, p 40). Essentially then, Rosenthal and I agree insofar as we both maintain that the object differentiates something undifferentiated thereby producing phenomena. We disagree, in that I maintain that the object is given when Firstness differentiates, and may become habitually used to index the sign, whereas she maintains that the object is a habit. And here I believe her position to be problematic. Specifically, as I argued in the preceding chapter, we make inferences that involve objects that are replaced, phlogiston for example. But the replacement of a habit is its extinction, and thus it is difficult to understand how such inferences are explicable given Rosenthal's position.

experience in terms of the perception of objects, where these objects exist in relations of contiguity. Peirce, as I have argued, maintains that the primal state of consciousness is undifferentiated until the dynamical object instigates differentiation. Peirce further maintains, as I will explicate in the next section, that the isolated percepts given when consciousness differentiates are synthesized into a logically coherent stream of experience via abductive inference.

From another perspective, however, we want to know why the interpretant becomes the division that is focused on rather than the remainder of consciousness. Part of the answer is that the interpretant, as the interpretation of the sign, is by the definition of 'interpretation', that aspect of the sign on which we focus. Thus, whichever aspect of the division of consciousness is focused on is, by definition the interpretant. But even so, we still want to know why one side of consciousness, as it were, becomes the interpretant, rather than the other.

I can best explain this by resolving the second point of possible confusion. Namely, what is the relation between the dynamical object and the immediate object? I do not believe that Peirce is able to specify this relation. For the process that ends in perception, which necessarily involves the relation between the dynamical object and the immediate object, is an abductive inference.

On its side, the perceptive judgment is the result of a process, although of a process not sufficiently conscious to be controlled, or, to state it more truly, not controllable and therefore not fully conscious. If we were to subject this subconscious process to logical analysis, we should find that it terminated in what that analysis would represent as an abductive inference, resting on the result of a similar process which a similar logical analysis would represent to be terminated by a similar abductive inference, and so on *ad infinitum*.<sup>107</sup>

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<sup>107</sup> CP, 5, 181, p 113, c. 1903.

Furthermore, it is an abductive inference that is performed by something other than our minds, that is, 'nature' performs the inference and forcibly presents our minds with sign, immediate object, and interpretant as the result.

If this is Peirce's position, and I will argue it is, then since our comprehension is unable to descend below the level of perception to cognize the connexion involved in any such abductive inference, the relation between the dynamical object and the immediate object remains unspecifiable. Note how unlike a computer this position is. For whereas a computer only relates relata according to three logical functions instantiated by the 'not gate', the 'and gate', and the 'or gate',<sup>108</sup> Peirce is claiming that every perception provides the mind with a novel relation, and therefore a new way of relating relata. The relation between the dynamical object and the immediate object is unspecifiable, not only because it operates below the level of human perception and comprehension, but also because it is not limited to only a selection of logical operations. While the relation is unspecifiable, it is reasonable to suppose that the 'natural' process responsible for forcibly presenting the mind with sign, immediate object, and interpretant, is also responsible for determining which aspect of the divided consciousness is the interpretant.

I will now substantiate the claim that Peirce maintains that perception is the product of an abductive inference performed by some agency other than our own minds. Insofar as the preceding quote of Peirce's explains perception as the product of an abductive inference, and then explains that abductive inference in terms of another abductive inference, ad infinitum, it follows that at some point abductive inference is carried out by 'nature', that is, by some agency other than our own

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<sup>108</sup> See Collin Schaffer, *Principles of Computer Science* (Prentice-Hall, 1988) p 9.

minds.<sup>109</sup> Indeed, Peirce claims that: “The creation of the universe, which did not take place during a certain busy week, in the year of 4004 B.C., but is going on today and never will be done, is this very development of Reason.”<sup>110</sup>

Thus Peirce maintains that some abductive inferences are performed by ‘nature’, but, as I will now argue, Peirce also maintains that perception is an abductive performed by nature.<sup>111</sup> Peirce maintains that there is no logical explanation for the products of perception.

Such is the percept. Now what is its logical bearing upon knowledge and belief. [sic] This may be summed up in three items, as follows:

1<sup>st</sup>, it contributes something positive. (Thus, the chair has its four legs, seat, and back, its yellow color, its green cushion, etc. To learn this is a contribution to knowledge.)

2<sup>nd</sup>, it *compels* the perceiver to acknowledge it.

3<sup>rd</sup>, it neither offers any reason for such acknowledgment nor makes any pretensions to reasonableness.<sup>112</sup>

Insofar as percepts are not reasonable, the abductive inference responsible for percepts cannot be an abductive inference that we perform. For in the preceding chapter I explained that the iconic relation is the relation of reason, and that the abductive inferences we perform are iconic relations. The product of any abductive inference that we perform must therefore be reasonable.

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<sup>109</sup> It is also worth noting that Peirce conceives the processes that nature performs as amenable to chance: “Now, according to tychism, law determines some things (excludes some future contingencies) and leaves others indeterminate. In that case the possible different courses of the future have an abnumerable multitude.” Peirce, in a draft letter to E. H. Moore. Dec. 29, 1903, in Carolyn Eisele, ‘Peirce’s Mathematics’, in Richard M. Martin, ed. *Studies in the Scientific and Mathematical Philosophy of Charles S. Peirce: Essays by Carolyn Eisele* (Mouton Publishers, 1979), p 226.

<sup>110</sup> EP, p 255, c. 1903.

<sup>111</sup> Apel, it can be noted, comes to the same conclusion. “Nature’s unconscious inferential process ends in human perception.” Apel, p 166.

<sup>112</sup> CP, 7, 622, p 370. c. 1903.

### 3) **Thirdness.**

In this chapter I have argued that Firstness is undifferentiated consciousness, which has relations imposed upon it when the dynamical object instigates the differentiation of consciousness. The differentiation of consciousness, I also demonstrated, provided the elements of semiotic. In this chapter I will illustrate how these elements are used in Thirdness, and explain why they are used.

First, however, I need to explain that while differentiation of Firstness by Secondness explains the elements of semiotic, it cannot explain the inferences we make. This follows from the fact that reaction is transient.

A reaction is something which occurs *hic et nunc*. It happens but once. If it is repeated, that makes two reactions. If it is continued for some time, that, as will be shown below, involves the third category.<sup>113</sup>

As such, the elements out of which inferences can be made, i.e., signs, immediate objects, and interpretants, although present when Secondness differentiates Firstness, do not last. Therefore, no inference can be made out of the elements of semiotic as they are given when Firstness differentiates.

I will argue that the elements of semiotic produced when Firstness differentiates are stored in Thirdness. First I will demonstrate that Thirdness must store something produced when Firstness differentiates, by examining how, according to Peirce, we understand anything. Peirce explains all knowledge in terms of past experiences.

Pragmaticism consists in holding that the purport of any concept is its conceived bearing upon our conduct. How, then, does the Past bear upon conduct? The answer is self-evident: whenever we set out to do anything, we “go upon,” we base our conduct on

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<sup>113</sup> CP, 7, 532, p 317, c. undated.

facts already known, and for these we can only draw upon our memory. [...] In short, the Past is the storehouse of all our knowledge.<sup>114</sup>

That which was past, and is now stored in memory, was once wakeful experience,<sup>115</sup> and therefore the product of Secondness differentiating Firstness. Insofar as the differentiation of Firstness by Secondness is transient, if knowledge is to be explained in terms of past wakeful experiences, then wakeful experiences must be stored. Furthermore, they must be stored in a third category. Firstness cannot store experiences, because experience entails relations and Firstness is non-relational. Secondness cannot store experiences, because it is characterized by transience.

To verify that all three elements of semiotic are stored in Thirdness, I will focus on substantiating the claim that the immediate object is stored in Thirdness. Examination of abductive inference assures us that the immediate object is stored in Thirdness.

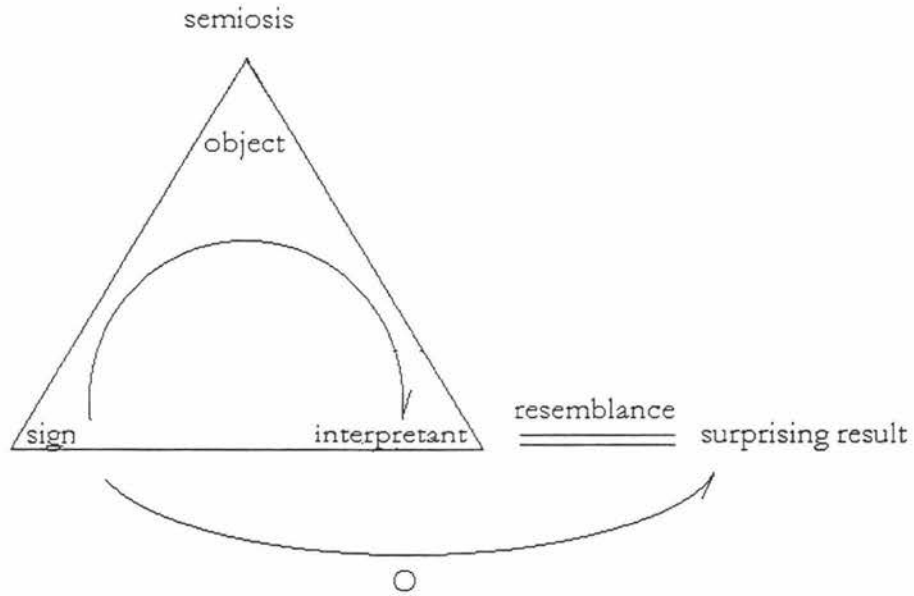
To facilitate comprehending the argument, I will illustrate abductive inference diagrammatically.

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<sup>114</sup> CP, 5, 460, p 312, c. 1905. Of the term 'pragmaticism' we can note: "So then, the writer [Peirce], finding his bantling 'pragmatism' so promoted, feels that it is time to kiss his child good-bye 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 kidnappers." CP, 5, 414, p 276, c. 1905.

<sup>115</sup> I assume this is uncontroversial, as it is difficult to make sense of the memory storing anything other than experiences that have been. This is not to deny the possibility of non-veridical memory. Rather it is to maintain that even false memories are reducible to past experiences.

Figure 1.



The purpose of abductive inference is to explain the surprising result, which, we know from the preceding chapter, is to say that the surprising result will become an interpretant of the sign that explains it. However, there are two possible interpretations of how the mind discovers the sign (remembering that the mind is initially presented with only the surprising result.)<sup>116</sup>

The first interpretation is to the effect that the mind finds an existing interpretant that resembles, in whole or part, the surprising result. Given this resemblance, the mind hypothesizes that the relation between the sign and the interpretant extends to include the surprising result. But this is a misinterpretation of abductive inference. For it entails that the 'O' in Figure 1 consists of two different types of relations: The relation between the sign and the interpretant, and the relation of resemblance

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<sup>116</sup> Both interpretations, it can be noted, are compatible with the explanation of abductive inference I gave in the preceding chapter.

between the interpretant and the surprising result. That these relations are different types of relation can be demonstrated by conceiving the 'object' in the triangle as the product of differentiated Firstness, rather than the product of an earlier abductive inference that we have performed. For the interpretant, while it resembles the representation of itself in the sign, contrasts the sign as a whole. Indeed, reaction is the break up of feelings. Yet any relation 'O' must contain this initial immediate object of contrast, and its extension via a relation of resemblance.

This misinterpretation of abductive inference would thus require that the mind perform two different types of processes. It must relate interpretants to signs as instructed by experience when the sign was differentiated. And it must also relate interpretants to signs as instructed by an innate ability to perceive resemblances. This contradicts Peirce's claim that the mind performs only a single type of process.

Furthermore, on this misinterpretation, relations of resemblance must be explained entirely in terms of Thirdness. For the categories explain all contents of the mind, and the only relation found in the first two categories is the relation between the sign and the interpretant given when Firstness differentiates. Peirce denies that the relation of reason is given in Thirdness, and maintains instead that the relation of reason is given in perception, and thus when Secondness differentiates Firstness.

If you object that there can be no immediate consciousness of generality, I grant that. If you add that one can have no direct experience of the general, I grant that as well. Generality, Category the Third, pours in upon us in our very perceptual judgments, and all reasoning, so far as it depends on necessary reasoning, that is to say, mathematical reasoning, turns upon the perception of generality and continuity at every step.<sup>117</sup>

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<sup>117</sup> CP, 5, 150, p 93, c. 1903.

This leaves only one other interpretation of abductive inference. There is only one other interpretation because in abductive inference we only have immediate access to the surprising result, and the sign can only be discovered mediated via a relation. And the only other relation possible is the immediate object produced when the dynamical object differentiates Firstness.

In this interpretation 'O' is the immediate object. Confronted with the surprising result, the mind searches for an existing relation or immediate object that will fit the surprising result, or part thereof. It is uncontroversial that all relations must fit their relata. Any immediate object that fits the surprising result or part thereof is also related to a sign, if for no other reason than that the immediate object is manifest concomitant with sign and interpretant when Firstness differentiates. Thereby a sign is found that represents, in whole or part, the surprising result.

Examining Peirce's doctrine of resemblance further supports my interpretation of Peirce's conception of abductive inference. This explanation, it can be noted, is required irrespective of its explanatory value, because Figure 1 correctly identifies the fact that the interpretant will resemble the surprising result if that surprising result shares the same immediate object. Peirce explains resemblance in terms of the mind unifying ideas under a single idea.

Resemblance is an identity of characters; and this is the same as to say that the mind gathers the resembling ideas together into one conception.<sup>118</sup>

Whenever an immediate object is found to fit a surprising result in abduction, that immediate object will necessarily already be fitted to

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<sup>118</sup> CP, 1, 365, p 190, c. 1890.

another interpretant. Interpretants that fall under, or are denoted by the same sign will exactly resemble each other at the interface where they fit the same immediate object. Thus, when we maintain that two things resemble each other, it is not the case that we directly perceive the resemblance. Rather, we cognize an immediate object that these two things share, which relates them to a common sign, and this cognition is manifest as the two things resembling each other.

Since abductive inference operates by the mind perceiving an immediate object that fits the surprising result in whole or part, Thirdness must store immediate objects. For the immediate object produced when Firstness is differentiated is transient, and abductive inference requires access to a store of immediate objects to operate. Since abductive inference also requires access to a store of signs, it being signs that explain the surprising result, signs too, must be stored. Interpretants are stored insofar as the distinction between signs and interpretants is relative. The surprising result when explained becomes an interpretant of the explanatory sign, yet testing the hypothesis requires that the same surprising result be conceived as a sign with interpretants.

I have still to explain in this section how the categories explain the mind's ability to infer. For simply providing the elements out of which inferences can be constructed does not explain why the elements would be used to formulate inferences.

At one level I have already explained why the elements of semiotic are used to formulate inferences. In the preceding chapter I argued that the problem of iconic possibility was resolved for Peirce by his theory of pragmatism. Essentially, whenever the use of an immediate object to index a sign results in a surprising result, that immediate object becomes un-used in that situation. Via abductive inference a new immediate object is supplied that, if it passes testing, becomes the habitual way that we

index the sign. Insofar as semiosis is the realm of everyday experience, and our reasons for using deductive and inductive inference are explained in terms of this everyday experience, pragmatism explains why we are motivated to perform deductive inference, inductive inference, and semiosis. Essentially, we perform these inferences habitually.

At another level, however, we want to know why we are motivated to perform abductive inference. In the preceding chapter I also explained that we were motivated to perform abductive inference whenever an expectation is broken. Semiosis and deductive inference, I argued, are an identical operation. In both operations the mind cognizes an immediate object and thereby infers an interpretant from a sign. The difference between semiosis and deductive inference is the milieu in which they operate. Only semiosis operates in a milieu where the interpretant is compared, not only against its representation in the sign, but also against what really eventuates. Whenever the comparison is one of contrast, that is, the expected interpretant does not eventuate but a surprising result does, an expectation is broken and we are motivated to perform an abductive inference.

Thus it is that all knowledge begins by the discovery that there has been an erroneous expectation of which we had before hardly been conscious.<sup>119</sup>

Still, we want to know why a broken expectation motivates us to perform abductive inference. I will argue that Peirce maintains that broken expectations are confrontations with something that is unreasonable to the mind. It is because we are reasonable beings confronted with something unreasonable that we are motivated to perform abductive inference.

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<sup>119</sup> CP, 7, 188, p 111, c. 1901.

I will demonstrate that broken expectation is confrontation with something that is unreasonable to the mind by examining broken expectation found in semiosis. As I have explained, the surprising result in semiosis obtains when the surprising result contrasts the expected interpretant. But this is the same as saying that surprising results obtain, when what does obtain, does not resemble the expected interpretant. I have already discussed Peirce's theory of resemblance, and that analysis is pertinent here.

Resemblance, for Peirce, I argued, occurs when the mind is cognizant of an immediate object that relates more than one thing to a sign. That is, these several things that are related to the same sign resemble each other at the junction where they fit the immediate object. Broken expectation, is to be explained as the mind being cognizant of the immediate object that relates the expected interpretant to its sign, and also being confronted with a something that does not fit this immediate object. Indeed, if it did fit the immediate object it would not be a surprising result; rather, because it resembled the expected interpretant it would be what was expected. Surprising results are thus unreasonable to the mind, because the mind is not cognizant of an immediate object that relates the surprising result to the sign as the sign was conceived. Which is to say that there is no iconic relation, which we know is the relation of reason, between the surprising result and the sign as it was conceived.

To explain why our reasonable nature compels us to rectify confrontations with surprising results, I first want to clarify that I am not claiming that surprise involves a 'nasty' feeling component that explains motivation.<sup>120</sup> While Peirce accepts that there is an accompanying emotive

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<sup>120</sup> David Savan claims that situations of doubt are first understood in terms of emotion: "Emotion begins with a situation of unexpected confusion and disorder. [...] Into this chaotic situation the immediate interpretant introduces the emotion as a simplifying hypothesis." (David

component to surprise, he maintains that it is the logical situation that explains why we are motivated to overcome surprise.

Let me not, however, be understood to make the strength of an emotion of surprise the measure of the need for explanation. The emotion is merely the instinctive indication of the logical situation.<sup>121</sup>

The logical situation I have just described. It is that there is no iconic relation between the surprising result and the sign as it was conceived. But this logical situation exists only insofar as our minds reflect that situation, for it is our minds that notice that there is no iconic relation. As such, the

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Savan, "Peirce's Semiotic Theory of Emotion", in Kenneth L. Ketner, Joseph M. Ransdell, Carolyn Eisele, Max H. Fisch, and Charles S. Hardwick, eds. *Graduate Studies Texas Tech University: Proceeding of the C. S. Peirce Bicentennial International Congress. No. 23* (Texas Tech Press, 1981) p 325.) He then notes a distinction between these initial emotional feelings accompanying doubt, and the more satisfactory emotional feelings accompanying scientific belief (Savan, p 327). Essentially, motivation becomes explained in terms of distancing oneself from certain emotional feelings, and attaining others.

Peter Schouls, also explains Peirce's motivation in terms of avoiding doubt, where doubt is conceived of as a feeling state. "Since doubt comes from the outside it disturbs the inner state of belief, which is the 'calm and satisfactory state which we do not wish to avoid' (CP 5.372). Once this calm has been disturbed it cannot be regained by simply rejecting the doubt; mere rejection of genuine irritation precludes the attainment of genuine calm and satisfaction. One might as well attempt to feel well fed by rejecting the feeling of the irritation of hunger." (Peter A. Schouls, "Peirce and Descartes: Doubt and the Logic of Discovery", in L. W. Sumner, John G. Slater, Fred Wilson, *Pragmatism and Purpose: Essays Presented to Thomas A. Goudge* (University of Toronto Press, 1981), p 89.)

While I agree with Savan and Schouls that Peirce explains motivation in terms of avoiding doubt, it is problematic to propose that doubt explains motivation because it is a feeling. For two options seem possible. First, motivation is explained as an inference where we infer that a better feeling can be had and so we are motivated to gain this better feeling. Since abductive inference is the first inference the mind performs, and this 'doubt inference' explains the motivation to use abductive inference, this possibility contradicts Peirce's claim that the mind performs only one type of inference. Second, motivation is explained in terms of causation where doubt causes us to behave in a motivated way. In which case the feeling quotient is epiphenomenal, for it is the doubt obtaining in certain situations that causes us to so behave not the feeling.

<sup>121</sup> CP, 7, 190, p 112, c. 1901.

surprising result is not that which motivates us to resolve it; rather it is an indication that we are attempting to resolve something. For it would be strange to claim that the mind specifically noticed that something was odd, yet this oddness took on some alien form so that the mind would be compelled to do anything about it. If the mind specifically notices that something is odd, then it is more economical to suppose that this notification compels the mind to rectify the situation. Thus, noticing that a result is surprising, the very reasonableness of the mind required to note this fact, compels the mind to perform abductive inference.<sup>122</sup>

At yet another level, we want to know how we ever managed to have any expectations. For if all abductive inference is motivated by

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<sup>122</sup> Some commentators interpret Peirce as if 'hope' be necessary to perform abductive inference. There are two different interpretations of the role that hope plays.

Firstly, as instanced by Hookway, hope is the motivation, without which there would be no point in performing abductive inference. As Hookway claims: "First, if our investigations are grounded in the hope that some proposition will turn out to be true, then the loose ends of our philosophical inquiries will not all be tied up until we have shown that that proposition is, in fact, true. So long as that has not been done, we risk our efforts crumbling and coming to naught." Hookway, p 282. If the mind, as logical, is impelled to perform abductive inference whenever confronted with doubt as I suggest, then the possibility that abductive inference may not lead to the truth is inconsequential to the operations that the mind must perform.

Secondly, as instanced by Apel, hope plays a necessary role in determining the operation of abduction. Apel posits that: "Abduction is therefore the first stage of all inquiry and, since it is man's spontaneous, divinatory answer to the way his surroundings confront him, it is the human equivalent to animal instinct." Apel, p 105. An instinct, divinely guided in the sense that: "faced with an infinite future, human praxis depends upon an aesthetic vision for orientation to some final meaning." Apel, p 96. Essentially, the truth, as it will be known divinely inspires hypothesis: "For Pragmatism the relationship to the future is constitutive even for meaning." Apel, p 109. The problem with this interpretation is specifying how the future, or future state of affairs can influence and 'teleologically' determine the present. Nor do I believe, and I can only indicate here that I am aware of the controversy, that Joseph Ransdell (see Joseph Ransdell, "Some Leading Ideas of Peirce's Semiotic" *Semiotica*, vol. 19, 1977, pp 157 -78) or Menno Hulswit (see Menno Hulswit, "A Guess at the Riddle of Semiotic Causation" *Transactions of the Charles S. Peirce Society*, vol 34, 1998, pp 641 -88) resolve this problem.

broken expectations, yet expectations are the habitual use of immediate objects given in abduction, then we are facing a circle. Peirce does not limit broken expectations to the realm of semiosis. He also claims that perception involves broken expectation.

Moreover, there is active volition and passive volition, or inertia, the volition of reform and the volition of conservatism. That shock which we experience when anything particularly unexpected forces itself upon our recognition (which has cognitive utility as being a call for explanation of the presentment), is simply the sense of the volitional inertia of expectation, [...]. Low grades of this shock doubtless accompany all unexpected perceptions; and every perception is more or less unexpected.<sup>123</sup>

How are we to understand the expectation found in perception? The question is especially pertinent given that comparison is not an option. Comparison is not an option, because the percept obtains when Firstness is differentiated, and there can be no expected interpretant in Firstness prior to differentiation, because Firstness contains no relations. Basically, there is nothing in Firstness to compare the percept against.

There is, however, a peculiar feature of perception that makes it unreasonable. I have already argued that the percept is the interpretant given when Secondness differentiates Firstness into sign, immediate object, and interpretant. Insofar as the three elements are given simultaneously, the percept would be unreasonable if its sign was not stored in Thirdness. The percept would be unreasonable because, as I have argued, Peirce explains all knowledge in terms of past experiences stored in Thirdness. If the sign were not stored in Thirdness, then no iconic relation would hold between what the mind knew and the percept. Essentially, the percept would be given in isolation from the mind's store of knowledge.

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<sup>123</sup> CP, 1, 332, p 166, c. 1905.

That the sign given when Firstness differentiates is not stored in Thirdness can be verified. For at the time Firstness differentiates, irrespective of whether a sign of its type was already stored in Thirdness, the sign is not stored in Thirdness. For, experience itself, which perception is, cannot simultaneously be memory, which all signs stored in Thirdness are. Experiences can be stored in memory, and one can have experiences of memories, but the experience itself happens in the present, and by the definition of memory, cannot therefore be memory.

Given that the mind is not able to cognize an immediate object that relates the percept to a known sign at the instant of perception, expectation must always be broken. That is, nothing that the mind knows allows it the correct expectation: If the mind expects nothing, that expectation is broken; if the mind expects something, that expectation is broken.<sup>124</sup> And whenever the expectation is broken as the percept confronts the mind, the mind is motivated to perform abductive inference. Only thereby are the percepts given in isolation synthesized into a coherent stream of consciousness, and only then does the mind gain the ability to infer an interpretant from a sign.

There is a problem with Peirce's theory of surprise that I need to explicate and address. To extricate the problem I first need to note that in semiosis, both the surprising result, and the result that corroborates the expected interpretant are percepts.

Examination of Peirce's claim that the mind performs only one type of process, a process that I have identified as the iconic relation, verifies that the surprising result of semiosis is a percept. For apart from performing iconic relations, the only way that the mind becomes aware of

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<sup>124</sup> I will deal with the tension between this claim, and the claim that some results corroborate the expected interpretant in semiosis, next.

anything is via perception.<sup>125</sup> The surprising result cannot be a product of an iconic relation, because every interpretant of an iconic relation is represented in a sign, and the mind cognizes the relation. Which is to say, the interpretant, because it is represented in the sign, cannot be a surprise. Since the surprising result cannot be a product of an iconic relation, then if the mind is to be a ware of it, it must be a percept. Given that the result, which corroborates the expected interpretant, only differs from the surprising result insofar as it compares favorably with the expected interpretant (whereas the surprising result compares unfavorably), then the corroborating result must also be a percept.

The problem with Peirce's theory of surprise is most acute with respect to semiosis when it is corroborated. The problem is that if the corroborating result is a percept, and all percepts are surprising, then why is the corroborating result not a surprising result? I am unaware that Peirce discusses this problem, but I will suggest what seems a plausible solution. Namely, even though the corroborating result is a percept, and is thus isolated from knowledge when it arrives, the mind is already cognizant of an immediate object that fits it, and the abductive inference is thereby greatly facilitated. The surprising result is not such a problem. For it is not unacceptable to maintain that the surprising result is doubly surprising: It is surprising because the mind is expecting a different result, and it is surprising because it is a percept.

Peirce, then, explains why the semiotic elements stored in Thirdness are used, by conceiving the mind as reasonable. Reason is defined as the iconic relation where the interpretant is represented, as an icon in the sign, and the immediate object is cognized by the mind. In every instance of broken expectation iconic relations are lacking between the surprising result and either, any known sign, as in perception; or the

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<sup>125</sup> Which I have noted, is performed by 'nature', not us.

sign as it was conceived, as in semiosis. The only means available to the mind to rectify these confrontations with unreasonable surprising results is abductive inference. Only after abductive inference has related surprising results to known signs are semiosis, deductive inference, and inductive inference possible. This follows from the fact that the first surprising results are percepts, which are given in isolation. The sole warrant for performing semiosis, deductive inference, and inductive inference, is that they facilitate the mind in avoiding confrontations with unreasonable surprising results.

## CONCLUSION.

In the first chapter I introduced Peirce's claim that the mind performs only a single type of operation, that of inference. I defined an inference as a relation between relata, where the mind cognized the relation. I also presented Descartes', and Hume's theories of inference, and extricated from them a criterion by which any inference could be classified. Any inference where the attentive mind cognizes the connexion between the relata is a Cartesian type inference, and any inference where the attentive mind does not cognize the connexion between the relata is a Humean type inference. I argued that if Peirce was to successfully defend the claim that the mind performs only a single type of inference, then the mind must perform either Cartesian or Humean type inference. The aim of this thesis has been to substantiate the claim that Peirce maintains that the mind performs only Humean type inference, and to explicate what this inference is.

In the second chapter I argued that, for Peirce, the only operation the mind performs is the iconic relation. The iconic relation is any relation where one relatum is represented as an icon in the other relatum, and where the mind cognizes the relation between the relata. The iconic relation is also, given the definition of inference presented in the first chapter, an inference.

In the third chapter I explained what this single type of inference is. I did this by, first, examining the constituent elements of the inference (sign, object, and interpretant) as they are found in Peirce's theory of the categories (Firstness, Secondness, and Thirdness). I explained that all

three elements of semiotic are given when Firstness is differentiated by Secondness. But that inference is not possible unless these elements are stored in Thirdness, which, I explained, they were.

I further argued that the mind is compelled to make inferences with the elements stored in Thirdness, because broken expectations, which are unreasonable, occur, and the mind is reasonable and must rectify broken expectations. Only by using immediate objects stored in Thirdness, and thereby performing abductive inference, can the mind rectify broken expectations. Once interpretants and signs are related via abductive inference, then semiosis, deductive inference, and inductive inference are possible. Pragmatism, I explained, is instrumental in formulating habits determining how we use objects to index signs. Again, pragmatism, like abductive inference, is motivated by the mind's abhorrence of that which is unreasonable, i.e., surprising results.

So far I have identified the single type of operation that Peirce maintains that the mind performs as the iconic relation. I have also specified what the iconic relation is: I defined it as any relation where one relatum is represented in the other relatum where the connexion is cognized by the mind; I also analyzed the constituent elements that comprise the iconic relation, namely, the sign, immediate object, and interpretant; and I further explained why these elements are used. I have yet to substantiate the claim that the iconic relation is a Humean type inference.

The evidence that the attentive mind does not cognize the immediate object that relates the interpretant to its sign, and therefore that the iconic relation is a Humean type inference, was presented when I explicated Secondness. There I noted that the immediate object is Secondness as reaction, and that Secondness as reaction is not a feeling.

This sense of acting and of being acted upon, which is our sense of the reality of things, -both of outward things and of ourselves, - may be called the sense of Reaction. It does not reside in any one Feeling; it comes upon the breaking of one feeling by another feeling.<sup>126</sup>

Insofar as Peirce, as I argued in the preceding chapter, identifies feeling with Firstness and consciousness, the immediate object not being a feeling, is not consciousness. Not being consciousness, the immediate object is not a thing we are conscious of, and therefore the iconic relation is a Humean type inference.

To illustrate how compelling Peirce's theory of inference is I will finish by contrasting his inference with that of Descartes', and Hume's. One of the problems with Descartes' theory of inference is the unexplained gaps that exist between the antecedent and the consequent relata in inference. For essentially Descartes is claiming that the attentive mind initially comprehends the antecedent relata, and then it intuits the connexion that synthesizes the relata,<sup>127</sup> lastly it comprehends the consequent relata. But if each of the three stages fully occupies the attentive mind whilst it occurs, then Descartes does not explain how the mind relates the antecedent relatum to the intuited connexion, or how the mind relates the connexion to the consequent relatum. Basically, Descartes explains inference in terms of three relata, one of which he calls a connexion.

Hume avoids this problem. Because the connexion that relates the antecedent and the consequent relata is not cognized by the attentive mind, the connexion can work behind the scenes, as it were. That is, the attentive mind can be wholly consumed with the antecedent relatum, and

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<sup>126</sup> EP, p 4, c. 1894.

<sup>127</sup> The same problem occurs if we were to discuss analysis rather than synthesis.

at the next moment be wholly consumed with the consequent relatum, while the mind at a non-conscious level relates the relata.

Hume, however, faces a different problem, one that he himself expressed.

To consider the matter aright, reason is nothing but a wonderful and unintelligible instinct in our souls, which carries us along a certain train of ideas, and endows them with particular qualities, according to their particular situations and relations. This instinct, 'tis true, arises from past observation and experience; but can anyone give the ultimate reason, why past experience and observation produces such an effect, any more than why nature alone shou'd produce it?<sup>128</sup>

Since any observation token is a particular, if the connexion between tokens wasn't worth noting the first time how would it ever be noted. Were memory involved in the formation of Hume's causal inferences, accretion of memory instances might suffice as an explanation. Since we have seen that memory plays no role in the formation of Hume's causal inferences, the accretion of disconnected particulars into habits is baffling. Essentially, the problem is that Hume does not explain how habits begin to be established in the mind, and thus he does not explain how the mind accrues connexions that relate relata in causal inferences.

Peirce avoids both problems. Because Peirce proposes a Humean type inference, he can allow that the attentive mind be consumed with, first the antecedent relatum, and then with the consequent relatum, while the immediate object still relates the relata. Since Peirce maintains that the three elements of semiotic are given in perception, and that perception is surprising, there is also no problem explaining why the mind cognizes relations. The problem that Peirce faces is that the perceptions are all given in isolation, thus there is no primitive stream of consciousness, only

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<sup>128</sup> *Treatise*, 1, 3, 16, p 179.

disparate percepts, thus how does Peirce explain experience? The solution to this problem is given along with the problem, for it is via the mind cognizing immediate objects given in perception that the stream of consciousness is abducted into being.

## BIBLIOGRAPHY.

### PRIMARY SOURCES.

Burks, A. W, edited Volumes 7 & 8, *Collected Papers of Charles S. Peirce*, Belknap Press, 1958.

Descartes, Rene, "Principles of Philosophy" in Cottingham, John, Robert Stoothoff, and Dugald Murdoch, trans. *The Philosophical Writings of DESCARTES: Volume One*. Cambridge University Press, 1985.

Descartes, Rene, "Rules for the Direction of the Mind" in Cottingham, John, Robert Stoothoff, and Dugald Murdoch, trans. *The Philosophical Writings of DESCARTES: Volume One*. Cambridge University Press, 1985.

Hartshorne, C, and P. Weiss, editors of Volumes 1 –6, *Collected Papers of Charles S. Peirce*, Belknap Press, 1931 –1935.

Moore, Edward C., ed. Max H. Fisch, consult. ed. Christian J. W. Kloesel, snr. assoc. ed. Don D. Roberts, assoc. ed. Lynn A. Zeigler, textual ed. *Writings of Charles S. Peirce: A Chronological Edition*. Bloomington: Indiana University Press, 1982 -.

Houser, Nathan, Jonathan R. Eller, Albert C. Lewis, Andre De Tienne, Cathy L. Clark, D. Bront Davis, eds. *The Essential Peirce: Selected Philosophical Writings. Vol. 2 (1893, 1913)*. Indiana University Press, 1998.

Peirce, Charles S, in a draft letter to E. H. Moore. Dec. 29, 1903, in Eisele, Carolyn, "Peirce's Mathematics", in Martin, Richard M, ed. *Studies in the Scientific and Mathematical Philosophy of Charles S. Peirce: Essays by Carolyn Eisele* (Mouton Publishers, 1979)

Selby-Bigge, L. A., ed, P. H. Nidditch, rev. second edition. *David Hume: A Treatise of Human Nature*. Clarendon Press. 1978.

Schaffer, Collin, *Principles of Computer Science*, Prentice-Hall, 1988

## SECONDARY SOURCES.

Anderson, Douglas R, *Strands of System: The Philosophy of Charles Peirce*, Purdue University Press, 1995.

Hausman, Carl R, *Charles S. Peirce's Evolutionary Philosophy*, Cambridge University Press, 1993.

Hulswit, Menno, "A Guess at the Riddle of Semiotic Causation", in *Transactions of the Charles S. Peirce Society*, vol. 43: 641 –688, 1998.

Hintikka, Jaacko, "What is Abduction? The Fundamental Problem of Contemporary Epistemology", in *Transactions of the Charles S. Peirce Society*, vol. 34: 503 –33, 1998.

Fisch, Max H, "Chronicle of Pragmatism, 1865 –1879", in Ketner, Kenneth Laine, Christian J. W. Kloesel, eds, *Peirce, Semeiotic, and Pragmatism: Essays by Max H. Fisch*, Indiana University Press, 1981.

Fisch, Max H, "Genealogy of Pragmatism" in Ketner, Kenneth Laine, Christian J. W. Kloesel, eds, *Peirce, Semeiotic, and Pragmatism: Essays by Max H. Fisch*, Indiana University Press, 1981.

Fisch, Max H, "Peirce's General Theory of Signs" in Ketner, Kenneth Laine, Christian J. W. Kloesel, eds, *Peirce, Semeiotic, and Pragmatism: Essays by Max H. Fisch*, Indiana University Press, 1981.

Krois, John Michael, trans. *Charles S. Peirce: From Pragmatism to Pragmaticism: By Karl-Otto Apel*, University of Massachusetts Press, 1981.

Lane, Robert, "Peirce's Triadic Logic Revisited" in *Transactions of the Charles S. Peirce Society*, vol. 35: 284 –311, 1999.

Onions, C T. ed, *The Shorter Oxford English Dictionary On Historical Principles*, Clarendon Press, 1950.

Pape, H, "Abduction and the Topology of Human Cognition", in *Transactions of the Charles S. Peirce Society*, vol. 35: 248 –69, 1999,

Ransdell, Joseph, "Some Leading Ideas of Peirce's Semiotic" in *Semiotica*, vol. 19: 157 –78, 1977.

Rosenthal, Sandra B. *Charles Peirce's Pragmatic Pluralism*, State University of New York Press, 1994.

Savan, David, "Peirce's Semiotic Theory of Emotion", in Ketner, Kenneth L, Joseph M. Ransdell, Carolyn Eisele, Max H. Fisch, and Charles S. Hardwick, eds. *Graduate Studies Texas Tech University: Proceeding of the C. S. Peirce Bicentennial International Congress. No. 23*, Texas Tech Press, 1981.

Schouls, Peter A, "Peirce and Descartes: Doubt and the Logic of Discovery", in Sumner, L. W, John G. Slater, Fred Wilson, *Pragmatism and Purpose: Essays Presented to Thomas A. Gouge*, University of Toronto Press, 1981.

Schouls, Peter A. *Reasoned Freedom: John Locke and Enlightenment*, Cornell University Press, 1992.