Semiotics and Cybernetics: The relevance of C. S. Peirce

Terrence W. Deacon 1976[1]

> "Two things here are all-important to assure oneself of and to remember. The first is that a person is not absolutely an individual. His thoughts are what he is "saying to himself," that is, is saying to that other self that is just coming into life in the flow of time. When one reasons, it is that critical self that one is trying to persuade; and all thought whatsoever is a sign, and is mostly of the nature of language. The second thing to remember is that the man's circle of society (however widely or narrowly this phrase may be understood), is a sort of loosely compacted person, in some respects of higher rank than the person of an individual organism." (5.423)[2]

1. *Introduction*

Semiotics, the general theory of signs and signification, was first formally developed by the American philosopher Charles Sanders Peirce just before the turn of the last century. Although Peirce is probably best known for being the founder of Pragmatism, these two studies are for him completely interdependent. Unfortunately, they are often treated separately by his modern interpreters. This has been paralleled by a tendency, in modern interpretations of semiotics, to neglect the pragmatic issues involved in understanding signification, focusing instead on the relationships between the sign and the signified or between signs themselves independent of what is signified. Peirce on the other hand began his study of signs as a development from a broader philosophical problem. His studies of Kant and Hegel led him quite early in his career to the discovery of a powerful categorical system. Based on three fundamental concepts which he called a First, Second, and Third, it became the cornerstone for all his later philosophical work including the theory of signs. Modern philosophers have suggested that these concepts may be among the most important contributions to philosophy by any American philosopher.[3] This system has, however, all but vanished from current semiotic theories due to the difficulties of making these ideas clear (even though all aspects of his semiotic classification scheme depends on it). I will attempt here to reconstruct these ideas in the light of current advances in systems and information theories in order to reintroduce Peirce's semiotics. Without beginning from a clear understanding of these fundamental tools, with which the theory was fashioned, Peirce's semiotics must remain finally incomprehensible and arbitrary.

In contrast to many current semiotic studies, Peirce did not consider it necessary as a pioneer in this area to collect, classify, and describe a wide variety of natural and man made signs. This has left a paucity of exemplars to help decode his meanings in some cases. He recognized, however, that the initial steps in this study would necessarily involve a focus on a reformulation of the metaphysical sign relation itself, so he directed most of his efforts towards the construction of this philosophical foundation. Unfortunately this system has been ignored,

---

[1] Modified from a chapter that appeared in an edited collection of student papers "*Sanity and Signification*" edited by the 'System & Structure Study Group,' Fairhaven College Press, Bellingham, WA, 1976.

[2] In keeping with the convention of citing from The Collected Papers of Charles Sanders Peirce edited by C. Hartshorne and P. Weiss (Vol. 1-VI, Belknap Press, 1931) and A. Burks (Vol. VII-VIII, Harvard, 1958), the number to the left of the decimal point indicates the volume and that to the right indicates the paragraph.

[3] e.g. see Hartshorne, C. "Charles Peirce's One contribution to Philosophy and Most Serious Mistake," from Studies in the Philosophy of Charles Sanders Peirce edited by E. C. Moore & R. S. Robin (University of Massachusetts Press, 1964), pp. 455-476.

misunderstood, essentially abandoned by modern semioticians, even as they borrow heavily from the system of sign relations it defines.[4]

Peirce did not work backwards from examples to identifying the characteristics exhibited by different kinds of signs. Instead he began by systematically outlining all the possible varieties of signification from a general theory of the sign-function. He focused his investigation on the nature of the function itself rather than on any particular examples of signs because he recognized early on that this could be misleading. The particular quality, event or object that serves in the capacity of a signifier or sign vehicle[5] need exhibit no other connection to that which it signifies except the fact that in a particular interpretive context one represents the other. This is not to say that this signifier (representamen) need necessarily be otherwise disassociated from the signified (object),[6] but it does allow the possibility for anything to function as a sign so long as it occurs within an appropriate interpretive context. Thus, for Peirce the function or use was seen as the definitive characteristic in signification rather than the sign in itself. So most of his attention was directed toward the processes by which something can come to play this role, and not to cataloguing and analyzing examples of signs.

Though presently no more complete theory has come to rival Peirce's theory, numerous reinterpretations and criticisms have been directed at his system. Probably the most common and well justified criticism is that Peirce never set down a complete theory of semiotics in any one text, leaving to posterity only fragments of the theory scattered throughout his many writings and lectures. We find its categorical basis outlined generally in his Phaneroscopy; his outline of two taxonomies of signs in his works on logic, language, and mathematics; and the beginnings of a general interpretation of the theory of *cognition and* meaning in his lectures on Pragmatism. These later lectures on Pragmatism also show that his theory was in continual development; his later work placing more and more emphasis on the notion of the interpretant and the theory of *habits* which is its basis. This, of course, is a consequence of the fact that much of Peirce's work remained in the form of unpublished manuscripts, only slowly becoming available even today.

Murrey G. Murphey[7] in his biographical study of Peirce's philosophy demonstrates that Peirce's thought was also in continual development. This further complicates matters for his readers. Like all critical thinkers, Peirce often found it necessary to revise many of his ideas in later works, though often retaining the original terminology. For instance, in his early work he was strongly influenced by his critique of Kant and the views of logic and cognition that were influenced by it. And his conceptions of First, Second, and Third were originally based upon this critique. But later his work becomes driven by the internal dynamic of its own complex logic and phenomenology and by developments of the time. For example, De Morgan's introduction of the logic of relatives suggested to Peirce in 1885 a new logical perspective. Along with his interest in topology this produced a shift in emphasis from logic to the mathematics of relations. This led to a reformulation of the basis of his categorical scheme from a logical to a relational basis, i.e., monads, dyads and triads. Though for Peirce these must have been no more than continual improvements on what he considered to be a stable and sound architectonic basis, and thus did not require him to change his terminology, current studies of his work are often hampered by

---

[4] For example, two of the most prominent modem semioticians Umberto Eco and Thomas Sebeok, who make extensive reference to Peirce's semiotic system, have proposed semiotic theories that have no reference to Firstness, Secondness, and Thirdness as constructive principles.

[5] Peirce's technical term for this first aspect is *representamen,* but he also uses the term *sign* in both senses: the complete representational relationship and just the artifact or experience that initiates it.

[6] This special sense of the word 'object' will be explained in section 6.

[7] Murphey, Murray G., The Development of Peirce's Philosophy (Harvard University Press, 1961).

the fact that he may use the same word in very different ways in writings that were widely separated in time, and mostly in the form of unpublished notes. He probably also makes subtle changes from his earlier thinking to his later thinking, and because many of these were unpublished he may have implicitly assumed that redefinitions would be unnecessary. Presuming also that the reader of his later published works would not be acquainted with his earlier work, he also introduced modified variants of earlier ideas without comment or restatement. Without a historical perspective of these developments his work may often appear at least confusing and periodically even contradictory — a feature that will keep Peirce scholars busy for generations.

In the following brief overview of Peirce's Semiotic theory I have made an effort to make use of examples and explanations drawn from all stages of this development, though this sometimes involves an interpretive effort to force internal consistency. Since writings from many phases of his life are in different ways valuable clues to the interpretation of these ideas, I feel it important both to consider their development and also to attempt to trace the unbroken thread that holds throughout. It is out of a recognition that these ideas are still unclear in present day studies that I have also tried to suggest retrospective parallels in modern theories that in hindsight support Peirce's approach to these issues. From this perspective the work Peirce was engaged in includes a number of simultaneous lines of thought that are still open to development by current research and encroach on some of the most contentious issues in contemporary science and philosophy of mind. What is presented then is not an explicit restatement of any specific arguments that Peirce himself settled upon, but in the absence of any such final synthesis, I have paraphrased and interpreted a careful selection of his arguments and those of a few of his interpreters arranged so as to give the reader an understanding of the logic beneath Peirce's semiotic theory so that it can be placed in a proper context with current scientific work.

Recent studies in information theory, automata theory, game theory, and cybernetics appear to be still working along similar lines, and in directions that Peirce would likely have highly praised (as he did the work of Josiah Gibbs in thermodynamics, which forms part of the analytical basis for the mathematical theory of information). For example, in all likelihood, Peirce would have found nothing problematic in the concept of machine intelligence, as is exemplified in such comments as the following:

> "Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world; and one can no more deny that it is really there, than the colors, the shapes, etc., of objects are really there. . . Not only is thought in the organic world, it develops there. But as there cannot be a General without Instances embodying it, so there cannot be thought without Signs." (4.551)

It is through the notion of signification that all the facets of Peirce's work fit together into a single unified but unfinished puzzle. It is hoped that by clearly recognizing that many of these ideas are currently implicit in the work in cybernetics, communications theory, and artificial intelligence that some of the broader implications of Peirce's views can eventually be clarified and this puzzle completed. However, the particular ideological blocks that Peirce was trying to overcome are still the major obstacles to a semiotic interpretation of modern research, and include a failure to even recognize what Peirce believed to be the most critical insight: that signification cannot be understood without a comprehensive theory of triadic relations. Without understanding the logic of Peirce's overarching metaphysics, no amount of research will be able to fully unravel his conception of semiosis. Even today his approach confronts many confusions

inherent in fields as broad as cognitive psychology and mathematical communications theory. As Peirce's repeatedly argues, an attempt to analyze semiotic relations with a dyadic model of causality appropriate to the description of physical (e.g. mechanical or computational) processes, inevitably leads to some version of solipsism. His triadic metaphysical system attempts to carve a third path beyond both idealism and empiricism.

Granted, there are many studies and restatements of this material currently available. Many of these have served as valuable references for this work. But none to my knowledge have clearly taken it out of the realm of philosophy and pointed out its necessary association with the information sciences or its close parallels with current systems theories. Moreover, few of these sources agree in their interpretations of Peirce's writings and intentions. This makes it all the more disconcerting for anyone not steeped in the study of his writings. To assist in confronting this confusion, I mention some of the more prominent parallels in modern work and criticize what I consider to be a few of the more misleading reinterpretations of Peirce's concepts.

I have taken the liberty to present Peirce's conception of the sign relation in a sort of theoretically motivated order, to exemplify what I consider to be its middle position: i.e. its dependence on a larger cosmology and its implications and consequences for a broader theory of the grounding of knowledge. I begin with his phenomenology, then consider his reflections on the nature and forms of inference, in order to be able to introduce the basic logic that motivates his semiotic theory, even though this does not follow any obvious historical sequence. I follow the presentation of his semiotic systems with an extended discussion of the relationship of the semiotics to Peirce's conception of pragmatism.

The insertion of Peirce's ideas about the classification and basis of inference before a discussion of semiotic theory more generally, is somewhat the reverse of the way Peirce wrote it. This is also for pedagogical purposes and to follow what I interpret to be the logic of how he came to conceive of semiosis in general. According to Peirce, a logical argument or inference is the most thoroughly developed form of sign relation, and is built from of all the simpler forms of signs and sign relations. So on these grounds the discussion of semiotic relationships should analytically precede a discussion of the forms of argument (for example, Peirce's own effort to produce a text on logic begins first by introducing "semiotic"). There is, on the other hand, evidence in the chronology of Peirce's writings that his analysis of the trichotomy of argument forms preceded this more specific elaboration of the more basic divisions of the sign. The pedagogical reason for treating this general trichotomy of argument forms first and then working backwards from this insight to reconstruct the component forms of signs, is that the essential components of an inference are all marked with symbols and so are explicitly available for analysis, while the components of more basic semiotic relationships are largely implicit and condensed. Though these various components of an entire system of analysis were almost certainly in simultaneous development in his mind, it is not unreasonable to assume that it was the discovery of the trichotomy of arguments that led to the coalescence of the many threads into a single integrated whole. At the very least, this presentation is not inconsistent with the overall architectonic logic of Peirce's system.

Finally, Peirce did not develop his ideas in a vacuum, even if he was a social and intellectual loner. Peirce's semiotic theory can also be understood in the context of his early intense study of Kant's philosophy, and his reaction to Kant's (and obliquely to Hegel's) proposal for a theory of knowledge. Whether or not his reaction to these philosophical predecessors provided the impetus that led him to formulate his theory of signs, his semiotics can be understood as a generalization from a contrary theory of logical inference and knowledge, and the familiarity of this better known philosophical debate of that period can

provide a jumping off point for entering Peirce's rather different philosophical world view. What follows, then, is not so much a historical treatment of the development of his thought as it is the use of his logical and phenomenological investigations as explanatory aids in presenting his semiotic theory. If it accomplishes nothing else, it should at least help to foreground the uniqueness of the "world system" that formed the backdrop for all of Peirce's thought. I suspect that many confusions and controversies of modern semiotics stem from a tendency to take Peirce's taxonomic categorizations and claims out of this broader philosophical context and merely import them into theories based on otherwise incompatible metaphysical paradigms.

2. Phaneroscopy

> "the possibility of science depends upon the fact that human thought necessarily partakes of whatever character is diffused through the whole universe, and its natural modes have some tendency to be the modes of action of the universe." (1.351)

The underlying basis of Peirce's semiotics can be traced to his unique phenomenological theory, a single thread that tied together nearly all of his philosophical and mathematical work as it developed over the course of his lifetime. To attempt even a superficial understanding of the theory of signs without this context is likely to be confusing since it is almost entirely based upon it. As a consequence of its being left out of consideration by most modern linguists and semioticians, much of the original power and coherence of Peirce's theory of signs has been missed. Characteristic of Peirce's meticulous care to avoid misinterpretation he coined a specific name for the designation of this phenomenological approach, since it differed in some striking ways form other works under that name. Even so, within his own lifetime he found himself having to continually distinguish his own work form interpretations of it by others. In hindsight, his "world system" defies characterization as "practicalism," "nominalism," "phenomenology," or "positivism." It was an attempt to undercut some of the fundamental dichotomous assumptions that have come to define these traditions. He called this study *Phaneroscopy,* and although it is in many ways akin to phenomenology it differs in other ways so fundamental that Peirce himself often characterized it as a new version of scholastic realism. In his Phaneroscopy Peirce addressed the broadest interpretation of what might be called *forms of experience.* To outline the fundamental explanatory principles necessary to a unified understanding of both the physical and experiential world, he coined the term *phaneron* to refer to this more inclusive ground of empirical experience.[8] Peirce noted that he was using the word "phaneron" in much the same way as William James used the phrase "pure experience." James, in an essay titled "Does Consciousness Exist," explained his meaning this way:

> "we start with the supposition that there is only one primal stuff or material in the world, a stuff of which everything is composed and if we call that stuff "pure experience" then knowing can be explained as a particular sort of relation toward one another into which portions of pure experience may enter."[9]

Peirce's endeavor was to describe all the general forms that such relations could manifest, and felt that it was much broader than mere experience, so his version of this "stuff"

---

[8] as he termed his special sense of the linked notion of "phenomenon" and "idea" as the latter had been used by the English philosophers in its broadest sense.

[9] James, William, Essays in Radical Empiricism (New York, Longmans, Green and Co., 1912), p.4. 8 cf. 6.101

was distinguished from the way James used "pure experience" in two ways: 1) materiality, temporality, and even “raw” experience were treated as derived relations—in the sense that these forms or modes could not be presumed as givens, but themselves would require relational explanation to distinguish their aspects—and 2) in the particular sense that Peirce wished to use this notion there could be only one phaneron. Plurality itself was relational and so could not be understood as intrinsic to the notion of phaneron. In this way he took care from the start not to imply any distinctions, limits, or borders, no beginning or end, nor any distinction between "whose phaneron" or "which phaneron" is referred to. The entire universe of experience should, he thought, be understood singly as an undifferentiated whole before any distinctions are recognized or applied to it. With this move he hoped to avoid interjecting the seeds of both solipsism and, as Alfred North Whitehead called it, "misplaced concreteness" into the context of his investigation. Thus when Peirce speaks of the Phaneron as that which is "in any way or in any sense present to the mind" he is also using the term mind in a very broad sense that could (as the quote above suggests) apply equally well to the work of a bee community, the growth of a crystal, or any number of "purely physical" events besides the sort of activity that we commonly only attribute to the brains of higher organisms. In this respect what we experience as mind cannot ever clearly be bound within any particular body or even only particular kinds of substances or organisms. Mind, for Peirce, becomes a completely ubiquitous phenomenon that only appears localized because of the proximity, frequency, and flexibility of the semiotic activity there. Its ultimate substrate is a kind of relational activity that in some form or other is operative in all things.[10]

This reflects Peirce's strong anti-Cartesian perspective. Peirce continually guarded himself against the assumption that what we experience as thought is a completely unique activity so unusual in nature as to only have arisen in the very special conditions that exist in the human brain. He felt that by characterizing thought as semiosis he might be able to transcend the confusions of dualist arguments because they simply would not arise when this more general character of thought was taken into account.

There remained within this context for Peirce to find some way to classify the various forms that relation within the phaneron could take in order to characterize all the distinct aspects, i.e., temporality, spatiality, color, feeling, etc., of which we normally are aware. He believed that all such aspects were complexes of a few basic "building blocks." He called these "indecomposable elements" comparing them in a way to the material atomic elements out of which all the more complex forms of matter could be composed. He further carried this analogy into the way he classified these elements, grouping relations solely according to their valence-that is, according to the number of correlates joined together by that relation. In this way he was able to demonstrate that from three indecomposable modes of relationship alone all other more complex relations could be composed. These he called Firstness, Secondness and Thirdness according to the number of valences that were exhibited.[11] Although these three explanatory principles are each interdependently necessary for any distinction made within the Phaneron, such that no single object or experience exhibits only a single one of the categories, one may still find phenomena in which one category stands out as predominant to our attention.

---

[10] cf. 6.101

[11] Peirce mentions (1.288) that he spent two years of his life attempting to demonstrate his triadic theory of indecomposability as applied to chemistry and atomic valence but abandoned this attempt in favor of applying it to the realm of abstract relations rather than those exhibited by matter alone. In hindsight we can observe that his earlier endeavor was doomed to failure by the fact that atoms were not after all indecomposable but rather turned out to be highly complex systems. (cf. 4.309)

3. Firstness, Secondness and Thirdness

> "Generality is, indeed, an indispensable ingredient of reality; for mere individual existence or actuality without any regularity whatever is a nullity. Chaos is pure nothing." (5.431)

These three indecomposable elements, though they are in one sense perhaps the simplest ideas that we can entertain about the world, have proven to be notoriously difficult to explain. Since these are proposed as the most basic elements of the Phaneron, we cannot expect to explain them in terms of some other more elementary notions. We can only check them by inspecting the observations that led Peirce to this proposal. This is the spirit in which Peirce presents this system, repeating example after example, hoping that the reader like a patient mathematician, will work repeatedly through each until the common underlying pattern eventually becomes conscious.

These three can initially be described in terms of the forms of relationship they characterize. *Firstness is* exhibited by a thing's relation to itself independent of any other; a relationship exhibiting only possibility and simple *resemblance. Secondness is* exhibited by the relationship that exists between a thing and that which it is not; a relationship exhibiting simple opposition and otherness. And *Thirdness* is exhibited by the relating of two things by a third which links them and in some way mediates the relationship of the two; a relationship that exhibits mediation and generality. To state it more generally: Firstness is a relation involving a single "relate"—a monad, Secondness is a relation involving two correlates—a dyad, and Thirdness is a relation involving three correlates—a triad. There need be no more than these three forms since all the more complex relations can be decomposed into triads. This last point, which is not obvious at first glance, can be demonstrated with the aid of a diagram:

Figure 1.

Each line in Figure 1 represents a valence for linking one correlate into the relationship with others, and each triple-joint depicts the joining of three correlates into relation with one another. The compounds in Figure 2 demonstrate that relations with four and five or any number of correlations can be composed from triadic relations, but not with diads.[12]

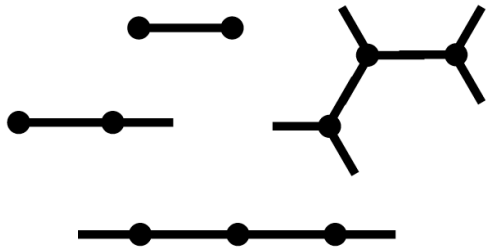

Figure 2.

[12] Like chemical isomers and polymers, compound relations of more than five correlates can have more than one possible configuration, including circularities. It is not clear whether they are interchangeable. (Cf. 4.309)

In one sense the endpoints of the diagrams are somewhat misleading since each relational form must ultimately be understood as an artificially highlighted local configuration abstracted from a vast continuous relational net. This analogy led Peirce to think of triadic relations as primary and all others as either analytical reductions or constructive elaborations of triadic relationships, as is implied in the following quotes.

> "Every triadic relation involves three dyadic relationships and three monadic characters; just as every dyadic action involves two monadic characters. A monadic character involves nothing dyadic or triadic; nor does a dyadic action involve anything triadic." (6.331)

> "But a triadic relationship is of an essentially higher nature than a dyadic relationship, in the sense that while it involves three dyadic relationships, it is not constituted by them." (6.323)

The simple diagrams cannot clearly depict this fact, but as such diagrams become more and more complex it becomes more obvious, since at the extremities of each triadic connection there is another triple joint. So each endpoint of a triad intersects the relation between two other endpoints (in the following two section [s. 4 & 5] discussing the forms of inference this idea will be made much clearer).

Using this conception of relationship Peirce was able to categorize various concepts that exhibit these modes. As John Fitzgerald points out, however:

> “There is no possibility of merely pointing to some object or experience as an instance of one or the other of the categories. To overcome this difficulty Peirce cites cases where one or the other of the categories is predominant. Our conception of the categories are not derived from "pure" cases of them, but rather from focusing our attention on one or the other aspect of what is present.” (Fitzgerald, pp. 28-29)

In other words the knowledge that we can have of these underlying forms is the result of our abstracting certain characteristics from our experience while ignoring others. Peirce called this form of abstraction prescission. Since all our experience is represented to us (according to Peirce) by signs, which are Thirds, it is from these that we prescind the characteristics of Seconds and Firsts by focusing on the relative roles played by these concepts in relation to the whole. For this reason (and probably in rough analogy to the notion of syllogistic "moods") Peirce often referred to these ideas as "moods of thought." Below I list a few concepts that characterize these moods to offer some idea of the generality and subtly that is behind them.

FIRSTNESS:

Potentiality, similarity, quality, independence, possibility, freshness, origination, identity, feeling, etc.

SECONDNESS:

Actuality, otherness, struggle, surprise, disruption, fact, reaction, resistance, opposition, difference, contiguity, instance, coincidence, cause-effect, etc.

THIRDNESS:

Mediation, signification, habit, pattern, generality, law, intention, system, process, thought, representation, exchange, continuity, etc.

Thirdness, which incorporates within it both Secondness and Firstness, is the most commonly misunderstood of the three, and the most fundamental concept in Peirce's world system. Peirce attributes many of the confusions that have developed between the concepts we entertain about the physical world and those we entertain concerning our conscious experience to a classical tendency to dichotomize and thus reduce what are ultimately triadic notions to dyadic simplifications. The classical rational methodology thus systematically eliminates from consideration the very triadic mediation relationship that is basis from which these dichotomous relationships were prescinded and so hides their fundamentally incomplete nature. He continually stresses that triadic relations cannot be reduced to complexes of dyadic relations and that dyadic relationships are incapable of being compounded to explain triadic relationships. Only other more extended dyadic relations can be produced by linking dyads to dyads. By implication, this suggests that no explanatory system based on phenomena limited to the realm of Secondness (e.g. determinate mechanical analysis) can ever hope to include relationships of significance, representation, meaning, function, purpose, value, or experience (phenomena of Thirdness). This is a profoundly anti-reductionist implication. However, Peirce's special brand of holism has born little fruit to the present time. The main reasons for this seem to be both a deep rooted ideological preference for dichotomy and a myriad of difficulties that arise in attempting an explanation of the concept of Thirdness. In the following two quotes Peirce elaborates on this idea of Thirdness and considers some exemplary Thirds:

> "By the third, I mean the medium or connecting bond between the absolute first and last. The beginning is first, the end second, the middle third. The end is second, the means third. The thread of life is a third; the fate that snips it, its second. A fork in a road is a third, it supposes three ways; a straight road, considered merely as a connection between two places is a second, but so far as it implies passing through intermediate places it is a third. Position is first, velocity or the relation of two successive positions second, acceleration or the relation of three successive positions third. But velocity in so far as it is continuous also involves a third. Continuity represents Thirdness almost to perfection. Every process comes under that head." (1.337)

> "A rule to which future events have a tendency to conform is ipso facto an important thing, an important element in the happening of those events. This mode of being which consists, mind my word if you please, the mode of being which consists in the fact that future facts of Secondness will take on a determinate general character, I call a Thirdness." (1.26)

The second quote is particularly instructive in that it clearly introduces the systemic sense of that notion. By "determinate general character" he is introducing the idea of some sort of regularity manifested in events, some general character of coherence and pattern, some sort of constraint on the possible variety recognizable in the behavior of things. And it is precisely on this character of events, Peirce suggests, that the entire possibility of signification and intention is based. However, Peirce does not leave the analysis at this point but insists that we recognize the triadic character of this relation. This can be expressed quite obviously by two facts: First, that the recognition of any regularity requires the observation of at least three instances of a

process (this can be visualized by trying to distinguish between constant velocity and acceleration when given only two instants of a movement), and second that such general patterns or habits are not an intrinsic quality of two relata but rather arise from the relation that their dyadic relations have to each other and thus to some systematicity characteristic of an ensemble of relations. That is, a regularity or general form exhibited by some dyadic relation is only recognized to be an instance of this general form as this relation is also in relation to some third point of reference. It is in a sense like saying that a regularity of relationships is an intrinsically relativistic kind of relationship**.** As Peirce reiterates again and again this is not two distinct relations, one between relata and one to a context or observer, but a single fundamentally inseparable triadic relation. That this Thirdness is not illusory can be shown by the fact that the particular events, or relationships, that define the relata are themselves as much defined by the system they are a part of as they themselves are necessary to define that system. The interrelationship is “indecomposable," to use Peirce’s terminology.

By defining Thirdness on the basis of triadic relation itself rather thanon a more restricted sense of this relation, such as constraint, Peirce was both able to clarify its logical basis and be assured of sufficient generality to be able to use the concept in the widest possible contexts. It also makes possible a resolution of many of the confusions surrounding the distinction and interdependence of "energetic" and "informational" explanations. In short, energetic explanations focus on thosebehaviors of things that are expressible in terms of Secondness alone while informational explanations, necessarily incorporating the Secondness of energetic explanation, focus on those behaviors that are based on Thirdness. Where purely energetic descriptions are essentially context independent, informational descriptions are ultimately context dependent.

In general the logical distinctions between Firstness, Secondness, and Thirdness make it possible to clearly organize a complete and consistent theory of signification, and thus also a theory of theory construction itself.

One further comment should be made concerning the way the categories are logically separated. Since the three categories are ultimately interdependent the means for dividing each from the others is not by simple distinction or exclusion. Peirce suggests that there are three basic ways in which we can differentiate things from one another. He calls these discrimination, dissociation, and prescission (noted above). He writes:

> "Thus I can discriminate red from blue, space from color, and color from space, but not red from color. I can prescind red from blue, and space from color (as is manifest from the fact that I actually believe there is an uncolored space between my face and the wall); but I cannot prescind color from space, nor red from color. I can dissociate red from blue, but not space from color, color from space, nor red from color." (1.549)

It is by prescission that Firstness can be considered separately from Secondness and Thirdness, that Secondness can be separated from Thirdness but not from Firstness, and that Thirdness cannot be considered without the other two. This hierarchic constructive logic forms the fabric of every aspect of his many taxonomic systems.

4. Mediation

> “the association of ideas consists in this, that a judgment occasions another judgment of which it is the sign. Now this is nothing less or more than inference." (5.307)

Peirce argued that no judgment of truth or fact or even logical consistency could be understood as self-sufficient. There could be no property of judgment alone that is capable of assuring the link between objects and intellect, and no special property of intuition that could make it an unmediated given. Although thoughts may appear to us as a succession of judgments about something other than judgments—something more basic—it is always judgments mediating between other judgments according to Peirce. The supposed fundamental operation of judgment to determine a dichotomous distinction (i.e. true/false, included/excluded, real/imagined, etc.) was not something inherent in them. It was a property assigned to propositions *by their relationships to enveloping inferences*. Peirce's view on this was credited to his interpretation of scholastic logic, especially the work of Duns Scotus. In this interpretation the ultimate discerning power of rationality rests in inference rather than being some essential property of propositions, ideas, or experiences. Thus acts of the understanding could not be reduced to a collection of judgments of truth or falsity since these are in some sense mere artifacts of inference. Judgments based on other judgments might appear to lead to vicious regress, but only when conceived as self-sufficient. The power of inference to discern truth and falsity, according to Peirce, derives from treating judgments as representations that can be juxtaposed so that their differences and similarities of form might be used to dissect or project other relationships between them, and so that these in turn could be taken as representations of judgments about them, and so forth. According to Peirce the relationship of judgment to inference is not merely an *ad hoc* serial chaining of progressively higher-order judgments, as in Kantian or Hegelian dialectic logic, but an intrinsic dependency in which the fabric of the whole progressive inferential process was the guarantor of some improvable degree of representational appropriateness in the present moment, if not always of truth.

Convinced that judgment and truth were both derived abstractions, subsidiary to inference, Peirce was led to more closely examine the structure of inference itself for hints of its determinative power. He specifically focused on the modes by which a concluding proposition could be projected or suggested (even if erroneously) from relationships among antecedent propositions. Beginning by analyzing the possible alternative organizations of the general syllogistic form[13] he made an interesting discovery. He observed that the component propositions of a syllogism could be rearranged in three distinct antecedent - consequence patterns. He gives the following example to exhibit the way that the three propositions of an inference arranged differently, embody three distinct modes of inference:

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 (ABDUCTION)
Rule -- All the beans from this bag are white.
Result -- These beans are white.

[13] Peirce assumed, following his general architectonic logic, that ultimately any inferential form no matter how complex could be reduced to a number of triadic inferences. To my knowledge this hypothesis has not been tested or proved.

Case -- These beans are from this bag. (2.623)[14]

The first inferential form is the common syllogistic *deduction* from general rule to specific case as found in traditional sentential logic. In it the similar terms ('beans from this bag'), one in the subject and one in the predicate of the respective premises, allow the concatenation of the sentences at this locus and licenses the cancellation of the mediating term, leading to the condensation of the conjoined propositions such that the distinct subject and predicate from each proposition are now directly linked. The specific content is essentially irrelevant, only the correspondences of form matter and how this allows a kind of inattention to (cancellation of) redundancies. This form of inference is the basis for the strict logical validity of any argument and is capable of determining the truth of falsity of a conclusion from its premises.

Both of the other two forms of inference that Peirce identifies are not, strictly speaking, logically valid, even though they turn out to be of potentially far greater importance.

The second inferential form that he presents is identified with induction. In it the similar terms ('these beans') in the subjects of the two premises lead to the suggestion (generalization) that the predicates of each may be linked. The conclusion is not determined necessarily but the premises do supply *evidence* in support of it. The conclusion of an inductive inference differs from the conclusions of the other two forms of inference in its level of generality. It is the only form of inference that leads from particular instances to a general assertion about all similar types of instances.

The third inferential form that he presents is identified with the process of forming *hypotheses, or* as he calls it elsewhere *abduction.* In it the similar terms ('white') in the predicates of the two premises lead to the suggestion *(hypothesis) that* the subjects of each may be linked. Of the three forms of inference abduction is the only form capable of generating a proposition in the absence of direct evidence or logical necessity, and as such is intimately connected with the acquisition of new information. Notice also that to introduce any new particular proposition into an inference of any form implies a prior abduction because the new element must be identified and classified by virtue of some set of predicates.

However, abduction remains, of the three, the most neglected and misunderstood form of inference, seldom recognized to be of value in discussions of philosophical and scientific method, much less as a foundation for these methods. Much of this misunderstanding appears to be the result of a tendency to presume that induction and deduction are opposite complements in some way, and as such exhaustively subsume as special cases all other inferential forms. The grounds for presuming such a dichotomy of inferential forms is largely based on another dichotomy; that inductions infer general or universal propositions from given particular cases while, on the other hand, deductions infer particular cases from general or universal rules. In this sense it might appear that abduction could be classified merely as an invalid form of deduction. This is an oversimplification that is not even fully overcome by Peirce himself at times, as he often appears to mix these ideas in later discussions of hypotheses and scientific knowledge. Some of this may come from the use of iterative expansion to strengthen these forms of inference. For example, deductions can be chained transitively, to allow intermediate propositions to be cancelled; inductions can be made with greater confidence if there are more incidences to consider; and abductions seem more compelling when there are

[14] The ordering of these according to his categorical scheme is as follows:
Abduction = First; Deduction = Second; Induction = Third. The order of presentation above is merely to take advange of the familiarity of the syllogistic deductive form to set up the comparison.

multiple predicates involved. The iterative strengthening of each form can be exhibited as follows:

ABDUCTION +
All the beans from this bag are white and wrinkled.
This bean is white and wrinkled.
This bean is [could be] from this bag.

DEDUCTION +
All the beans from this bag are white.
All white beans are sterile.
These beans are from this bag.
These beans are [necessarily] sterile.

INDUCTION +
This bean is from this bag.
This bean is white.
This other bean is from this bag.
This other bean is white.
All the beans from this bag are [probably] white.

Of course, most reasoning involves complex mixes of these forms and their iterative elaborations. What is important and revolutionary about Peirce's inclusion of all three forms, even though two are traditionally considered fallacious, is that it expands the conception of logic to all modes by which ideas can lead to other ideas. Thus, formally valid inferential processes are a special small subset within a more general class of modes of cognition.

The recognition of this tri-symmetrical interdependence was a major clue for Peirce that the appropriate basis for logic, and ultimately for the nature of thought itself, could not be a dichotomous distinction but rather an irreducible trichotomy, and that its primary function was projection or inference rather than judgment. In this inferential taxonomy none are mere syntheses based on a dichotomy between two more primary forms but each was a genuine equally fundamental member of an irreducible triad. Peirce nevertheless saw that the differences and complementarities among these forms could be used to develop a quite different logic of extended inferential development and amplification as might be a more suitable basis for a theory of scientific knowledge than that derived from Kantian or Hegelian systems (more on this below).

It seems likely that Peirce was struck by the fact that the structural comparisons and manipulation of similar representational elements (signs) in an inference were what determined the differences in projective power of the three forms. Perhaps this was a first recognition that inference was itself a reflection of some deeper logic of representation. The projective power of these inferential forms was a *systemic* feature, embodied not merely in any single syllogistic arrangement, but in the set of options embodied in the system of propositions as a whole. The power to project conclusions and the strength and mode of the judgments that could be so generated was a general property of their being taken together as a triad. In other words, the power to assess truth or falsity is in part vested a proposition's relation with other propositions, and so on for the larger web of inferences in which it is connected. The "indecomposability" of any such triad of propositions in an inference is related to the fact that if one of the propositions is removed it can be regenerated by either abduction, deduction, or

induction from the two that remain. I believe that the abstraction and generalization of this idea of the triadic generative power of inference was to become the insight behind all Peirce's later work in semiotics, though these ideas were almost certainly developing in parallel. It is the generative capacity of such triadic relations, not merely isolated correspondence relationships between signs and the world, which contributes the fundamental projective property of thought, and by virtue of which logic, mathematics, art, music and language are capable of expressing it.

5. Representation

> "Logic, in its general sense, is . . . only another name for semiotic (σημειωτικη´), the quasinecessary, or formal, doctrine of signs." (2.227)

The discovery that there were not two but three fundamental forms of inference embedded in the syllogistic form, led Peirce to a parallel insight concerning the mystery of how thoughts mediate the generation of other thoughts in general. The projection of an unrepresented relationship from antecedent predicates is accomplished by virtue of their containing this latent possibility, so the conclusion is literally a re-presentation. Even in the weakest of the three modes, abduction, there is a principled means for generating hypotheses that are likely, given the antecedent information. In other words, the conclusions are never "simply given" as immediate intuition, but the results of a structured process of generative reason. Isn't this simply a more formalized version of thoughts giving rise to thoughts? Could this logic of re-presentation via inference be related to representation in general? For Peirce this was not just an analogy. All thoughts and perceptions were representations—signs—and they alone had the power to generate new representations.

This notion inverted antecedent notions that ideas are immediately apprehended whereas signs are parasitic on ideas. Some unmediated source of new knowledge, either in the form of Lockean sense data or in the form of Kantian intuition, seemed to be required if ideas were taken as primitive givens. Without any direct and unmediated link with the world it seemed that ideas would be impotent and random and without a priori intuitions; it seemed that there was nothing to guarantee that the association of ideas had any rudder. So for Kant and his predecessors only direct immediate links with experiences and intuitions keeps reason from being vacuous and unconnected with reality. But Peirce rejected the assumption that non-mediated experience was the only way to "ground" knowledge. The interlocking logic of the three forms of inference suggested that their could be a sort of representational "force" behind the way signs gave rise to new signs, *and assuming that signs of whatever form were also physical constructions* their linkage to the world was implicit, even if this link was neither immediate nor guaranteed to provide veridical truth or perfect correspondence. New hypotheses and fresh perceptions could be just as mediately produced as deductive conclusions and yet still be susceptible of being grounded in worldly verification because they were the operations of signs which were physically embodied habits (see discussion of habit below). The appearance of more direct experiential vividness of intuitions and sensory experiences could be explained as a consequence of the specific form of the inferential mediation (abduction) rather than because they were somehow unmediated. In other words, the experiential "freshness" of intuition may have more to do with differences in the ways these forms of inference depend on one another, and the relative freedom of abduction, rather than being mediated versus unmediated.

So the apparent directness of new ideas and fresh perceptions could be seen as a kind of greater inferential self-sufficiency and not a result of immediacy. It reflected the Firstness characteristic of abductions. The apparent source of the "merely dialectic" (in Kant's words) character of deductive reason appears to be its Secondness (no iteration of dyadic connections can ever produce more than a dyadic relationship, and may just as well produce a closed circle). This is also its determinative power. It guarantees validity with this same closedness. The power of induction is of course its ability to produce new generals from which both new abductions and deductions can develop in such a way that these are based on previous evidence. This "combinatorial" ability is an expression of its relative Thirdness. It is induction's combinatorial nature that would eventually be recruited as support for Peirce claim that reasoning about the world should tend to be self-rectifying over the long haul. In an indefinitely protracted scientific reasoning process the sign system that develops should become increasingly interlinked and interdependent. This is because the relative fit between propositions and the state of affairs they refer to should consequently exert greater collective influence via the increasingly dense net of inferences linked to signs about facts of the world. Thus, Peirce reasoned, each proposition of a developed science should approach closer and closer to a correspondence with fact as it becomes more integrated (these ideas will be developed in the last sections of this paper).

This line of reasoning suggested a kind of developmental or constructional concept of "truth." This was in sharp contrast to static notions characteristic of classic theories. For example, Kant's critique that reasoning alone is entirely mediated and thereby fundamentally limited in its truth discerning capacity, becomes a strength for Peirce. For Kant reason "asserts something not about 'the object' *in* itself but only about 'the object *as* it appears: that is, only about the outcome of certain investigative procedures."[15] In this theory the object of reason is treated as something separate and distinct from the reason that considers it. Sign and reality have no necessary connection. In contrast, for Peirce the only things capable of representation are themselves of a sign nature: Thirds. In other words, it is the Thirdness of things that renders them capable of being signified, and the Thirdness of the sign relation that can capture this. There is, thus, for Peirce no *intrinsic difference* between the 'object in appearance' and the 'object in itself' since this Thirdness is a real character that constitutes the actual coherence of the object. This Thirdness can be captured to a greater or lesser degree in the structure of the sign relationships.

Peirce argued against the claim that if all reasoning is ultimately based on representations (ideas) then reasoning in itself can never get beyond the bounds of 'mere appearance.' Reasoning by itself becomes, from this perspective, susceptible to an endless series of judgments based on judgments without foundation. For Peirce, although there is still a possibility for endless mediation, it does not isolate reason from what it represents, because the very substance of these representations ultimately involves what is represented. There is nothing that can be represented that is not of a representative nature and through their involvement in a sign both physical qualities and brute facts can become substantial and informational constraints that bias and shape reasoning.

The open-endedness implied by this conception of representation—the fact that everything represented is itself a representation in some way—has long been considered a serious difficulty of the theory by many of Peirce's critics. However, it was for Peirce perfectly natural and obvious that representative processes should involve something like the possibility of an infinite development. This notion undermines any attempt to ascribe meaning intrinsically

---

[15] Cf. Bennett, Jonathan, Kant's Dialectic (Cambridge University Press, 1974). p.140.

to the sign vehicle or *representation in itself*. Meaning is not static, but a feature of a living growing process. The sign is no more than a handy buoy marking the *passage* of the evolution of meaning. That this process should be intimately tied in with the whole of the processes of nature is implicit in the very notion of 'process' itself, since 'process' is an archetypal third.

Because of the combinatorial nature of this process of semiosis representation is both unboundable and necessarily open to information and growth. The linking of the unknown to the known in some new experience in order to gain some new information is always based on a similar experience in the past. It is by virtue of this previous acquaintance with the thirdness of the object of a sign that new information can be conveyed by the occurrence of that sign in new contexts.

> "Thus every reasoning involves another reasoning, which in its turn involves another, and so on ad *infinitum.* Every reasoning connects something that has just been learned with knowledge already acquired so that we thereby learn what has been unknown. It is thus that the present is so welded to what is just past as to render what is just coming about inevitable. The consciousness of the present, as the boundary between past and future, involves them both. Reasoning is a new experience which involves something old and something hitherto unknown." (7.536)

For Peirce, then, all reasoning becomes some form of semiosis, and all our thoughts, signs. It is by representation that we are capable of thinking about and acting upon the world. However, so far we have only discussed the most overtly representative form of representation-relation: the inference. In order to include the more common and elementary sign relationships we must first demonstrate that all forms of representation are based on essentially the same underlying logic. The analogy between the significance of arguments and a general theory of signification is made with little intervening discussion in Peirce's writing. Perhaps he felt it was already implicit and didn't require outlining step by step, or perhaps it was one of many tasks left unfinished, and it is possible that I see an analogy that he didn't. But the subsequent development of his ideas on inference and the way he later places argument forms within his semiotic systems seems to be pretty strong evidence for this speculation. I believe it is implicit in all his semiotic work. In the interest of making this connection from inference to sign as unambiguous as possible, then, I will attempt to reconstruct this transition step by step in a way that I think Peirce himself might plausibly have conceived of it.

It is important at this stage to recognize the details of the representative relationship as expressed in inferential forms because in the more and more reduced forms of signs, such as gestures and words, these details become more and more obscured and subtle. In the more complete forms of sign such as the argument the internal structure of the triad is clearly observable. To determine specifically what it is about the structure of the triadic inferential forms that is responsible for their capacity to "regenerate" the third proposition given any two, it is simply necessary to notice the internal redundancy within the triad. Within each of the three propositions there are two terms, however, within the whole inference there are only three terms in all. In other words, within the inference each term is repeated in two propositions. Thus within any two of the propositions are contained the terms of the third proposition and one term that is repeated in each. It is by virtue of the redundant terms in any two propositions, as we have seen, that the distinct terms can be linked. The two terms are brought together by a third which stands between and joins them together. The relative roles played by the redundant terms in each of the two propositions determines the means by which

the linking of the two distinct terms into a new proposition could be brought about: possibility, necessity, generality.

In this simple form lies the basis for a general model of all representative processes. This can be demonstrated by treating each proposition as a kind of sign. Taking Peirce's names for the three propositions, rule, case and result; suppose that the case is presented as a sign. By bringing to mind the rule one takes the case as a sign representing the result. or by bringing to mind the result one takes the case as a sign representing the inductive inference. It is obvious that the sign alone is not sufficient to represent the other proposition but requires that another sign be brought to mind as well. This sign Peirce calls the *interpretant* since it is necessary in order to interpret what the *object* of the sign is. The triadic relation requires at least two *relata* to represent the third. Since a single proposition can only represent another by virtue of its dependence upon some third proposition taken as the interpretant, any of the three may act as a sign representing either of the other two. The relative compulsion and confidence motivated by the sign reflects its basis either in abduction, deduction, or induction.

A proposition represents a dyadic relation and a term represents a monadic relation to the triad. To generalize from this, the sign relation can be treated as the triadic relation between three dyadic facts, two present and one absent. The interrelation of the two represents the third in its absence. The fact perceived and the fact created are, however, both representations in themselves. As much as we are aware of these events it is because of their participation in a representation. And we are only aware of particular signs as these are involved in other signs. This is because the effect of the sign is always through mediation, by virtue of thirdness. So that if a sign is to lead to any significant behaviour regarding its object it must be acting through the coordinated effects of many interrelated signs. This coordination of effects might be referred to as a *habit,* and, since it involves many interrelated signs, is in reference to many interrelated objects. In short, a sign's purport can never be an isolated fact or effect.

6. Representamen, Object, Interpretant

> "A sign . . . is something that stands to somebody for something in some respect or capacity." (2.228)[16]

The three correlates of the sign relation, hinted at in this opening quote, are termed the sign, or representamen, its object, and its interpretant. No one of these correlates is the *meaning* of the sign, proper, rather the relation of all three is in some sense the vehicle of the meaning. The three correlates are, then, defined according to the respective functional role each plays within a triadic relation. Peirce is careful not to require the presence of a human being in the concept of the sign relation. Often the interpretant is confused with the idea or concept in the mind of an interpreting person in such out of context quotes as the one above, but this is an oversimplification, often a misleading one, of a more subtle and less psychological notion. As will become increasingly apparent, Peirce's larger purpose is to ultimately eliminate all appeals to unanalyzed mentalism from his theory of mind and knowledge. In the following quotes Peirce gives a more formal definition of these functions that begins to hint at his more abstract and general conception:

---

[16] For example, William Alston in his book Philosophy of Language uses this quote to suggest that Peirce's theory requires a personal user. Peirce merely does not exclude this possibility. It is not an essential condition, but rather a convenient explanatory simplification to refer to human sign use in a context where his more abstract and developed notion was unlikely to be understood.

> "A sign stands for something to the idea which it produces, or modifies. Or, it is a vehicle conveying into the mind something from without. That for which it stands is called its object; that which it conveys, its meaning; and the idea to which it gives rise, its interpretant." (1.339)
>
> "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." (2.294)
>
> "A sign is anything which is related to a Second thing, its object, . . in such a way as to bring a Third thing, its interpretant, into relation with the same Object, and that in such a way as to bring a Fourth into relation with that Object in the same form, ad infinitum." (2.92)

The "Representamen" is that artifact or event which we commonly identify as the physical “sign” or whatever it is we interpret to represent something other than itself. Peirce distinguishes between sign and representamen because the artifact itself if taken independent of either of the other two correlates is not a sign. When it is called a sign it is implicitly assumed that we are referring to it within the context of the rest of the relationship. The "Object" is that for which the representamen stands, or directs attention toward. As Peirce uses the term he does not wish to restrict its meaning to material or existent things but rather is using the term in the sense of its Scholastic Latin use, literally meaning that which is "thrown before" the mind, and even including the sense in which it means "that toward which action, thought, or feeling is directed." This latter meaning coincides with this suggestion that "meaning" and "intention" are interdependent. In general, this allows him to avoid the confusions that arise with signs that serve only auxiliary roles or those that refer to mythical objects. The "Interpretant" is another sign to which the represented object is addressed and by which its representation is interpreted. More generally it is the locus of interpretation and that by which a sign is linked to its context. It thus represents a representation to yet another interpretant and in this way can be seen to be a sign for the same object to some other idea.

Comparing these general definitions with what we have discovered about the triad of propositions in an argument we can see that a sign only represents an object which is absent insofar as there exists an interpretant to which it is addressed. Without an interpretant there is nothing to which the sign is capable of presenting information. The representation is a result of both the sign and the interpretant that it calls into being. Only when an interpretant is created can the sign mean something, and its meaning can be entirely different if different interpretants are produced.

This interdependence can be exhibited in phenomena in which a triadic generative character is more evident. A striking demonstration of this can be exhibited by moiré patterns.

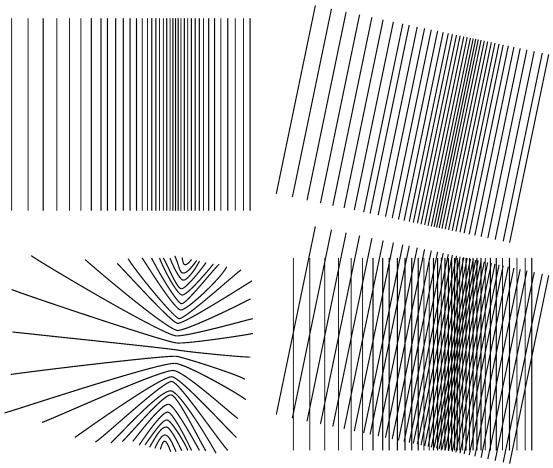

Figure 3. Moiré pattern (bottom right) formed by the superimposition of two identical but rotated grids (top) whose rulings are spaced according to a Gaussian distribution. The virtual third pattern generated by the moiré effect is shown at the bottom left. Superimposed on any one of the top grids this third pattern would produce a moiré pattern corresponding to the remaining pattern (redrawn from Scientific American May, 1963, p. 57).

Using this as a metaphor for sign interpretation, bringing a sign (one pattern) into relationship with an interpretant (another pattern or habit) is what generates representation of the missing third member of the triad, the object (a third pattern or habit). A sign must "call forth" an interpretant in order to make itself meaningful, and this interpretant itself can only act to interpret the prior sign if it is itself taken as a new sign that in turn is capable of calling forth yet another interpretant, thus representing a further elaboration of the object, and so on. As the series is continued the represented object is further and further elaborated and evolved into a more comprehensive object of signification. So in Peirce's conception, the interpretant is in some sense an ever expanding and growing sign. Moreover, whole sequences of signs produced in this way can as a whole be seen as a single sign initiating a yet higher-order interpretant series, and so forth. It is the ability of signs to call new signs into being (from a spontaneously active system), thus passing on information via inducing action (interpretant sign generation), that is their ultimate defining characteristic. Of course it is not the physical object which the sign is used to produce but rather some particular feeling, action or habit *in relation to that object*. These are nothing other than the form of the specific interpretant series that is thereby created. The object is, so to speak, represented *to* these immediate interpretants for the sake of bringing further new subsequent interpretants into being. The whole pattern of sign-interpretant production may thus have considerable extent in time, may be much larger than an individual's scope of activity, and by this growth of a physical activity may ultimately have physical involvement with respect to that object.

In this sense it can be said that any sign must have two interrelated functions. A sign must in some way elicit the creation of an interpretant as well as convey some information to that interpretant. Warren S. McCulloch[17] calls these two the "command" and "report" functions of a sign. These can easily be observed in a sign such as a pointing finger since it implicitly commands (if only by habit) that we direct attention to something from which we may gain some information. The direction of attention is in this case an immediate interpretant, that

[17] McCulloch, W. S., Embodiments of Mind (M.I.T. Press, 1965).

which it is directed towards will be another sign which the pointing finger is "reporting" about to a subsequent interpretant. However, this is a special example (index; see below) in which the interpretant is in some sense "instructed" or "commanded" in a sense that may be far more implicit in other cases. For example, in cases of signs of likeness (icons, see below) the “calling into being” of an interpretant need not be of a determinate form, and may be quite passive and even amorphous. To gain some sense of the possible forms of elicitation it is useful to make a brief digression into the distinctions between constraints, instructions, and rules or laws.[18]

Constraints are limitations on variety; a defining of the possibilities available. It is probably more appropriate to say that a sign may constrain or bias the possible responses of an interpreter and thus, in a sense, suggest a possible variety of interpretants that are appropriate. The variety of interpretants that could be produced would exhibit a certain amount of redundancy if a large enough sampling was considered (though this does not necessarily mean outright repetition), and this habit, not any momentary interpretant, is where ultimately turns for an understanding of meaning. For instance, a word may be used in a variety of different contexts each of which brings out distinct senses of its meaning. The "definitions" listed in a dictionary are attempts to provide some suggestion of these many possibilities. However, new uses and connotations are continually being "discovered" because the word seldom can command a particular interpretant, only prescribe constraints upon the possibilities of interpretants. All signs must in some way constrain the variety of possible interpretants, though this can be quite minimal.

Instructions are much more specific than constraints though they are ultimately based on constraint too. In kits of various sorts, instructions are included regarding assembly. If the instructions aren't followed the kit may not be properly assembled. If instructions about how to locate a particular place are not followed one will likely be unable to reach that destination, If operating instructions for a particular machine are not followed the machine will likely remain unusable if not break down. In short, instructions do not offer possibilities so much as they select or are directed towards some quite specific possibilities or activity. To act other than as instructed will tend to preclude the attainment of desired results. Instructions are imperatives or injunctions given within a context that implicitly assumes a goal-seeking subject of some sort. For this reason instructions or commands need not be explicitly addressed to some responder but are usually presented directly to the implicit other, as for instance in the command to "ground arms" in a military parade, a computer instruction in a program code, a pointing finger in a discussion of some object, or the implicit injunction to fill in the blank in "5 + 3 = _." Clearly instructions do not speak to a general unspecified audience nor do they refer to some general type of action.

In contrast to instructions, rules or laws are general. We conventionally distinguish between them by saying that one follows instructions but obeys laws. As a result of this general nature we often find cases where particular rules simply don't apply. However, instructions are always given in reference to particular cases and so although they may be dangerous or ineffective they implicitly do apply. Laws are, however, based both on constraint and on instruction. As a result they involve characteristics of both and are often confused with them. They are distinct in that laws are always conditional, applying to a general type of subject in a generally defined context. For instance, in a game of chess the players are

---

[18] These distinctions are not Peirce’s, though the distinctions between rules and instructions seems consistent with that between Seconds and Thirds and (as discussed below) between what Peirce calls dicent signs and delomes. The elaboration on these ideas pursued in these few paragraphs was, however, suggested to me by an essay titled Obeying Rules and Following Instructions by D. B. Burrell , in Philosophy and Cybernetics (Ed.) Crossan & Sayre, (University of Notre Dame Press, 1967, pp. 203-232), and are not from Peirce.

constrained to move their pieces only from square to square on the game board; the pieces are each constrained to move only in particular patterns; an avid student of the game may follow particular instructions as to developing a particular opening series of moves; and it is a rule that when no single move can remove one's king form "check" the game ends. Inasmuch as any constraint or instruction is directed toward any chess game in general they are rules in some sense.

In summary then, interpretants can be elicited in three ways corresponding to suggestions, instructions, and rules.[19] It is notable in this regard to notice that machines such as computers, for instance, require instructions. That is, a computer could make no sense out of something like music unless given some instruction about what to do with that particular data. In contrast to computers, living organisms are continually interpreting ambiguous and instructionless signs; they are also continually needing to determine the usefulness and applicability of information relative to a variety of ecosystemic and social contexts.

It is, however, not entirely sufficient to say that the sign in itself elicits or commands the production of an interpretant. Even in a computer the instructions about what to do with the data (signs) that are presented in the program are not intrinsically capable of eliciting any response. The capacity for producing interpretants ultimately determines what sorts of signs can conceivably be interpreted. But this capacity cannot be separated from the sign process itself since the interpretant is necessarily a sign that must eventually link back into the communication circuit from which the sign was initially received or else it cannot be understood as conveying any information within that system. Ultimately the potential to produce an interpretant must be seen to be a property of an entire communication process. The potential to produce complex or highly abstract and general interpretants can only evolve form simpler and less abstract interpretants. That is, as we have said in other ways, there is no way outside of a sign process to produce signs. It is thus clearer to say that signs themselves don't determine or cause the production of interpretants, nor do interpreters in themselves produce interpretants in order to see something as a sign. Rather a sign habitually gives rise to a particular interpretant by virtue of its relation to other signs; in other words, by virtue of its role within the context of some larger, more complex sign process. [20]

An interesting example of this is a kitten playing with a ball of yarn. As we observe the kitten's behavior (stalking, pouncing, tearing and biting) it appears as though the kitten is responding as if the yarn were its prey. This may be in spite of the fact that the kitten has never encountered real prey. The kitten's responses to the movements of the ball of yarn can certainly be interpreted to mean that to the kitten it is a sign representing prey (it is iconic of the prey. . . cf. section 8). We are able to make this interpretation because we are aware of the general type of behaviors involved in the hunting activity of cats. The kitten, however, may not in any way make the same connection. If the ball of yarn is to represent prey the kitten must have had some previous experience with that object. Nonetheless the coordination of the kitten is probably developed by this play in a way that will become useful later. It may very likely be that when the kitten sees a small rodent for the first time it may represent to the kitten the undifferentiated 'object of play' that the kitten is familiar with, thus calling the interpretant into being by virtue of its similarity. In this way what began as a sign for the simple potential of interacting (a ball of yarn or pebble for instance) may thus become more and more specified and elaborated. Peirce points out that all signs are ultimately based on signs of potentiality and

---

[19] See also chart 9.2, Division VII.

[20] Keeping in mind the fact that the interpretant is a sign, it can be said that the interpretation of signs and the production of signs are indistinguishable except for analytic purposes. That is, the interpretation of a sign is the production of a sign and vice versa.

likeness in just this way.[21] To trace this sign process back even further will of course ultimately lead into the co-evolutionary interactions within which the potential for this behavior was forged. Thus it is as much the generally quick and unpredictable movements exhibited by rodents (and coincidentally by balls of yarn) as it is the momentary need or whimsy of the kitten that is the ultimate determiner of such behavior. To say that the hunting behaviors have co-evolved in adaptation to just such characteristic behaviors as those exhibited by small rodents (and coincidentally by balls of yarn), and that these behaviors have themselves co-evolved in adaptation to the predatory behavior of cats, is another way to frame the total interdependence of the sign and interpretant. Each produces the other.

7. Two Taxonomies of Signs

Before returning for a more detailed look into the complexities and problems of interpretation, recognition, and meaning, it will be necessary to outline the further divisions of the three correlate functions. Just as the representamen, object, and interpretant are distinguished (prescinded) from one another by their roles as respective First, Second, and Third within the triadic relation, so also within each of these roles further categorical distinctions can be made.

There are two major systems according to which Peirce organized a taxonomy of signs. The differences between them emphasize the transition in his thinking from his earlier to his later work. The first system was closely tied to his work in logic and for the most part did not directly address itself to the underlying questions about cognition. The second system (after 1906), which addressed this more comprehensive question, was never published in a completed form. Though Peirce referred to this system in his later lectures on "pragmaticism" he did not discuss the system as a whole but only its relation to habit and belief in his pragmatism. The nearest we have to a complete presentation for this system occurs in a draft of a letter addressed to Lady Victoria Welby, an English semanticist and author of the book, What is Meaning? It apparently never reached her. Although in this letter he merely outlines the taxonomy and presents many of his own reservations about its divisions it can be correlated with his further comments on pragmatism and the theory of habits.

The first system I will call his *logical system* because of his application of it to the analysis of terms, propositions, and arguments. This taxonomy is the most widely known and discussed because it was fully explained and published in a number of articles that have been widely read. The logical system analyzes the sign relation according to the simple triadic division of representamen, object, and interpretant, as each relates to the sign, dividing each relation into three divisions, a first, second and third according to their character. Thus by two levels of trichotomies, nine divisions are generated, and tend signs by combination of these features.

The second system, which I will call his *cognitive system,* has been less well studied and its details are often debated. It remained unpublished, except for mention of its components in lectures and its only summarization is in letter form. It is interesting because appears to be an extensive elaboration of the logical system to integrate it with his development of a pragmatic theory of meaning. The logical system, though sufficient to analyze an argument in a logical context, confined the analysis to the sign relation itself independent of its wider context in thought and intellectual development. What I am calling the cognitive system, on the other hand, was intended to clearly locate the sign within the widest imaginable contexts. Where in the logical system Peirce presents the sign relation as a simple triad, in the cognitive system

[21] See section 8, Icon Index and Symbol.

these relata are shown to be more complex and subdividable. The sign, or representamen, being a first within the sign-relation remains simple, but the object and interpretant become complexes of relata whose aspects can be prescinded from one another. The object, since it is a second relative to the sign, can be prescinded into two aspects; a relative First called the *immediate object* and a relative Second called the *dynamical object* The interpretant, since it is a relative third relative to the sign and object, can be prescinded into three aspects; a relative First called the *immediate interpretant,* a relative Second called the *dynamical interpretant,* and a relative third called the *final interpretant.* These six divisions produce ten aspects of the sign relation[22] by considering each one alone, and by also considering the sign in relation to the dynamical object, dynamical interpretant, and final interpretant as well as considering the dynamical object in relation to the sign and final interpretant. Each of these ten divisions is again divided into three subcategories yielding a total of thirty divisions.

8. The Logical System

In his most well-known sign classification Peirce divides each correlate of the sign relation into three sub-categories according to the character of the relation that the sign shares with each correlate. The sign itself, being a relative First within the triad, can be prescinded in this analysis from the other two correlates. The categorization can in this way begin with the sign in itself, then by increasing the amount of information we consider relative to it[23] the corresponding relationships between the sign and object and the sign and interpretant can each be separately considered.

He first divides the representamen into three categories, according to whether it enters into the sign-relation as a quality, as a particular instance of fact, or as a conventionally prescribed replica or type. He terms the First a Qualisign, the Second a Sinsign,[24] and the Third a Legisign.[25]

As an example of a quality acting as a representamen "whiteness or cleanliness" may for instance signify purity in some circumstance. As soon as it is embodied in a particular artifact, however, it ceases to be a qualisign and becomes a sinsign such as, for instance, a white dress. But this too can cease to be simply a sinsign if the significance takes on generality as with the whiteness of wedding dresses, though each particular occurrence of a white wedding dress in the fact of its being a single instance still partakes of the character of a sinsign. Thus Peirce refers to individual sinsigns that are such instances as *tokens* of legisign *types.* For instance, a word is a type but a specific instance of it is a token of that type.

If an iconic sign and its object could be compared without regard to their significant relation it would be discovered that each, in and of itself, exhibits some character or quality that is also exhibited by the other. Some characteristic aspect of the object is literally re-presented in the representamen itself. In short, we may say that an iconic sign and its object must in some way resemble each other. The mere fact of this resemblance is not sufficient to

---

[22] This adds further confusion for the casual reader of Peirce's fragmentary writings. The logical system is based on 3 sign relata each applied to three levels of relationship and (via three part combination) produces 10 sign types in total. The cognitive system is based on 10 sign relata each applied to three levels of relationship that are used to generate as many as 66 sign types via combination. These are different ten part schemes.

[23] This is the reverse process of prescission that for example allowed a focus on the sign relationship in isolation, abstracted in this special sense from the semiotic process that forms its context. Peirce terms this amplification. 2.346

[24] " . .the syllable 'sin' is taken as meaning 'being only once,' as in single, simple, Latin semel, etc." (2.245)

[25] In the cognitive system he apparently renames these Potisign, Actisign and Famisign

constitute a sign relation, but is rather the criterion upon which the sign's informative capacity is founded. Sketches, diagrams, metaphors, and mimicry are common examples of iconic signs.

Iconic signs being relative firsts in the subdivision of the sign-object relation, are the underlying basis for all other forms of signification. All signs must ultimately involve an icon in their interpretation. For instance one assures oneself that someone else has *understood a* particular message by observing the habits that it brings about. That these habits *resemble* the habits associated with that sign in oneself, is taken as an icon of recognition that the other person has understood the intended meaning. In short, it is by virtue of common habits and the recognition of this fact via resemblance, that representation is at all possible.

However, we seldom are aware of this fundamental iconic basis, because it does not, strictly speaking, involve a conveyance of information. Rather an icon is based on the *re-cognition* of some familiarity in a message. There is only information conveyed when attention is (indexically) *dire*cted to the sign as a *distinct icon*. When recognition does not involve some unexpected redirection of attention we are not conscious of the icon as a distinct sign. No information is conveyed by an icon unless it appears in a distinctly unexpected context, in which case the disruption of expectancy is an index directing attention to the icon. The iconic basis for signification cannot be expressed in terms of information yet must be presumed by any theory of information and control. It is the non-informative basis for information.

This can be clearly illustrated by investigating some kinds of inter-species communication. In nature very often we find icons that have evolved so as to suppress conscious interpretation. Protective coloration and mimetic structures and behaviors are examples of this. We normally don't describe camouflage as communication which conveys information. Rather we commonly consider it a blockage or avoidance of communication. But to be more precise, what is exhibited in such cases is the suppression of indexical-sign possibilities by virtue of the nondistinguishability of an icon from its object. A corresponding example in human communication is mimicry or acting, abetted by an audience's willingness to ignore such indices. Alternatively, one is only able to recognize a "con artist" as an actor portraying a false role insofar as there is some flaw or inconsistency in the icon which *indicates* that it is in fact a disguise, and thus an icon rather than the "real thing." Of course, a copy of a famous painting might even more accurately represent the objects that the original painter had endeavored to portray and thus indicate that it is a forgery. Picture frames and theaters serve the same function for the icons they indicate.

Depending on the involvement of other sorts of signs in an icon its resemblance to its object can be relatively First, Second, or Third. It can be purely an image, a diagram, or a metaphor in Peirce's terms. An icon which is not distinguished from what it represents is an image. As much as protective coloration obscures an animal it presents an image-sign. Such coloration can also be understood as diagrammatic of the visual texture of its environment. An iconic sign is diagrammatic if its components are related to one another in a way that resembles the relation between components of its object. Sketches and maps are typical diagrammatic icons but so are mathematical equations. Though the components and their relationships may be represented by symbols in an equation, the equation as a whole is useful because of its isomorphic or homomorphic correspondence to the relationships composing its object. In Peirce's terminology, a metaphor involves both of the other two forms of icon as well as some conceptual correspondence, that is resemblance by virtue of a common general property. For instance the joining together of corresponding shards of a vessel or tablet may have metaphorically signified the membership of a worshiper in a mystic religious cult, thus acting as a "password." It is the general conception of the joining of fragments into a larger unity which is part of the metaphoric basis for its significance.

The power of icons can be traced to the fact that the representamen actually possesses qualities of the object represented, and thus simply by investigating the icon in itself new information may be obtainable about the object that was not evidenced by an initial interpretation. This is the source of the incredible analytic powers of mathematics and logic. An equation, for example, is essentially diagrammatic, joining together symbolized terms and operations in a fashion that is meant to resemble (isomorphically or homomorphically) corresponding relations within its object. Through the manipulation of the terms according to a system of rules, that are designated to maintain the integrity of the signification, a great deal can be discovered about the object that is represented. It is in general the discovery of new resemblances that ultimately determines the progress of the sciences and mathematics.

If an index and its object are inspected, independent of the sign relation, it will be observed that they are in some way factually coincident or contiguous. According to Peirce "no matter of fact can be stated without the use of some sign serving as an index." (2.305) This division embodies the ideas of indication, symptom, and cause-effect relation. A pointing finger, a gesticulation, a nudge, a tear, a cough, a temperature above 98.6°F. as well as the expansion of mercury in the thermometer, a weather vane, or a cry of surprise are each examples in indices. Some are tokens, some are types, but each is linked to its object in some concrete factual way, independent of whether it is taken to represent this object. One of the most familiar examples of the necessity of indices for communicating about facts is the use of the "index" finger for pointing. Our acquisition of language is heavily dependent upon our first recognizing indications. Words like "that," "this," "here," "there," "what," "which," and all the varieties of pronouns are based on this relation. Indices, more than the other forms of sign, demonstrate the necessity of some previous acquaintance with our understanding of the object and its connection with the representamen. It is for this reason that, for instance, a nudge or symptom can often be quite ambiguous. However, since the sign is understood to be factually liked with its object it is possible by further investigation of the representamen to clear up such ambiguities in many cases.

In an undated note, Peirce makes a distinction between two prominent forms of index which he terms *designations* and *reagents.* (8.368n) Designations are directors of attention such as a pointing finger, a pronoun, or a letter attached to an element of a geometric diagram. Reagents are directly involved in their indication such as the color change of litmus paper, the turning of a weather vane, or a symptom of a disease. Reagents embody their object directly, designations are simply contiguous with their object in some way. I would interpret these as respectively First (reagent) and Second (designation) subdivisions of indices and would suggest that there is a Third: indication by virtue of habitual coincidence. For example, by the fact that we habitually cross out written mistakes by putting an "X" over the inappropriate word this habit can be generalized so that a picture of a lit cigarette with an "X" over it is interpreted as indicating that it is inappropriate to smoke in that place where the picture is posted.

If a symbol and its object are inspected, independent of the sign relation, it will be discovered that no similarity or common factual link need be shared by them in such a way that it must be employed in order to constitute the representation (though, contrary to some definitions, such a negation is not required for something to be interpreted symbolically). The word "tree" and the kind of object that it represents have neither resemblance nor factual link except through the sign relation itself. Nevertheless, it ultimately is based upon sign characters. Its dependence on icons and indices can best be seen in the way we teach such symbols to children. First we point to some particular tree and produce the sound and try to get the child to re-present that same sound, then we repeat this process again and again with other particular examples of trees, each exhibiting a general resemblance, until we recognize that the

child can herself distinguish and signify trees with that sound. Still later, the learning of the written form requires further *indications* of the connection between the letters and the corresponding sound pattern. In each case of the acquisition of a symbol both resemblance and indication are necessarily prerequisite. Peirce thus describes a symbol as related to its object solely by the convention (literally, "meeting" or "covenant") or rule that, independent of any intrinsic character of either, is shared by both by the very fact of their being convened within the sign relation. In this sense the metaphor of a "covenant" may be helpful, since a covenant is in itself not intrinsic to those who are bound together by it, but is rather some idea or agreement that causes persons to join together. Such actions as buying and selling goods present a good example of this. Buyer and seller are linked together by the exchange of something, a third or mediate element in their relationship. As we have seen, a symbol and its object require at least two mediate signs to link them together. That the three are bound together in this activity is not based upon any intrinsic characteristics of them but rather by virtue of some context within which all are involved. Such a triadic relation is *convened as an* instance of a *general type* of relation characteristic of that context.

A symbol, since it involves a legisign, is by virtue of this thirdness not any particular occurrence of a thing but rather a "kind of thing", a general rule. Moreover even the symbol's link with its object is general: the object is always a conceptual sign. It is this doubly third nature of symbols that accounts for their power of adaptation to a wide variety of contexts (which is founded upon their ability to condense many levels of convention into a single unit) and their total dependence upon an ongoing communication process involving a system of other icons, indices, and symbols. It is this last point which makes it so difficult to pin down exactly the nature of the symbolic object. As the following quotes illustrate, this systemic interdependence between symbols coupled with their abstraction from particular instances results in a cultural co-evolution of a symbol's interpretants as its contexts of usage changes over time. They are totally dependent upon the system of other symbols in which they arise and can lose all significance if that context should be destroyed. But consequently within that system of conventions_symbols enjoy a kind of virtual existence that transcends any particular usage. Peirce expresses this nicely with the following examples:

> "You can write down the word 'star' but that does not make you the creator of the word, nor if you erase it have you destroyed the word. The word lives in the minds of those who use it. Even if they are all asleep, it exists in their memories." (2.301)

> "Symbols grow. They come into being by development out of other signs, particularly from icons, or from mixed signs partaking of the nature of icons and symbols. We think only in signs. These mental signs are of mixed nature; the symbol-parts of them are called concepts. If a man makes a symbol, it is by thoughts involving concepts. So it is only out of symbols that a new symbol can grow. *Omne symbolium do symbolo* A symbol, once in being, spreads among the peoples. In use and in experience, its meaning grows. Such words as force law, wealth_marriage bear for us very different meanings than those they bore for our barbarous ancestors." (2.302)

Precisely what Peirce means by ‘convention’ is not always made explicit in his writing on symbols, but a few conditions can be inferred from the way he intends to use symbols relative

to their signs. First, we must ask, what exactly does a symbol generalize over? Part of the answer must be the use of other symbols within the symbol system. But to be more specific, if a symbol is described in terms of a rule about reference to objects there must be some regularity of reference which it regulates. This regularity must consist in patterns of indices and icons; this being what is meant by saying that symbols grow out of these signs. These patterns of use—regularities in behaviors which within a population reflect common ways of dividing up the world—must, in a broad sense, be what he intends to call convention; not any property of isolated signs but of systematically interrelated groups of them.[26]

The complexity of the concept of convention, which Peirce uses to define the relationship of a symbol to its object, has been a source of continual debate. To say that they they are linked by a convention or rule has been the source of a number of disagreements, criticisms, and confusions. For instance, both David Greenlee (cf. Peirce's Concept of Sign, pp. 74-78) and A. J. Ayer (cf. Origins of Pragmatism, pp. 146-7) question the validity of the second trichotomy on the grounds that the convention that links a symbol and its object is the same sign-convention that links *all* signs and their objects, including icons and indices. Greenlee suggests that for this reason all signs are essentially symbolic. While Ayer, agreeing that all must depend upon convention, suggests that Peirce breaks from his typical triadic form and considers the symbol as a sort of Hegelian synthesis of icon and index. Though Ayer captures Peirce's idea that the interpretation of symbols is ultimately based upon both the use of indices and icons (discussed below), both criticisms have over-simplified the basis for the categorical distinction and overgeneralized the notion of convention that I believe Peirce had in mind.

In the first place symbols are distinguishable by their not bringing any intrinsic commonalities (between representamen and object) into the sign-relation, even if they exist in fact. That is, a sign taken as a symbol does not function to represent its object via any significant resemblance or connection with it. For this reason a symbol must always be based on a legisign (a conventional type of representamen) whereas an icon or index might easily be based on a sinsign (a one-off event or configuration). Examples of the latter include, for instance, a sudden scream or cry from a startled person or animal, or the crunching of branches somewhere off in the woods. These neither require a conventional representamen nor any convention of interpretation (although they later could come to be conventionalized). Secondly, as these cases exemplify, the conventionality that can be exhibited by icons and indices is located in types of representamen that can serve as icons and indices. In other words, these criticisms confuse two different roles of conventionality at two different levels of the analysis, that with respect to sign vehicle (representamen) properties themselves irrespective of any object, and that with respect to which symbols and their objects are linked. The error is common, and is often responsible for confusing conventional icons, indices, and symbols, and calling them all symbols. The only sort of conventionality that can be exhibited by an icon or index is located solely within the form of the representamen.[27] In other words, a legisign can stand iconically or indexically in relation to an object, in this sense making them conventional types, but in no other way can icons or indices in their relation to an object exhibit conventionality. That is, an icon or sign whose representamen form is that of a legisign is a

---

[26] David Lewis, in Convention A philosophical Study (Harvard University Press, 1969), offers a modern re-analysis of the traditional concept of convention that, I believe is similar to the sense that Peirce intends. This approach frees it from the connotation of "agreement" and "rule" and shows how conventions can arise spontaneously.

[27] This is, of course, complicated by the fact that, as was earlier discussed in reference to icons, signs may be composed of many levels of "mixed" varieties of component signs. In the discussion here we are referring only to simple (i.e., single level) forms.

conventional type of sign signifying respectively either a resemblance or a factual link. This is not true of symbols, since besides the requisite conventionality of the form of its representamen there is another level of convention or mediation that determined the link between representamen and object. That is, a symbol is a conventional representamen representing a convention as its object.

Within the Logical System three divisions of the Interpretant are made, dividing signs according to their representation to the Interpretant as a sign of possibility, of fact, or of reason. These are termed, respectively, a Rheme, a Dicent Sign (or Dicisign), and an Argument.[28]

The rheme is comparable to the modern linguistic notion of a morpheme, the designation given to the smallest meaning bearing units of a language, though a rheme is neither limited to language nor being only the smallest unit. In this sense prefixes, suffixes, roots, and signs of plurality as well as complete and compound words could be considered linguistic rhemes, but perhaps also whole narrative passages whose representational function might be comparable to introduce a single concept into some larger context. In wider usage rhemes may be considered the veritable semantic molecules and atoms, the smallest significant subdivisions of any sign, such as the lines or boxes of a diagram or possibly a pointing finger as it is involved in a gesture. In and of itself, one could not say for instance that a particular rheme was either true or false. Since it signifies only a possibility or potentiality it can only be deemed appropriate or inappropriate to its dicent context, according to its contribution to or confusion of a dicent sign within which it occurs. Every sign which professes to communicate some possibility of further information concerning some fact or instance is a rheme.

A dicent sign (or dicisign) can be exemplified by a sentence, proposition, or judgment and can be understood to be either true or false. However, the truth or falsity of the dicisign cannot be ascertained without reference to the argument context to which it presents itself. Thus, although a dicisign can be either true or false it can supply no reasons as to why this must be so (2.309-310). Every sign that professes to represent an instance, occurrence, or fact, whether or not it is true in any sense, is a dicent sign. This need not, then, be confined to linguistic signs, but any sign function which accomplishes some semiotic transformation, such as a prescribed performance like putting on a ring at a wedding.

An argument is a sign of inference. It was with the study of the forms of inference that we began an explanation of the concept of signification because representation was so directly discernible within an argument. In the less complex levels of sign-function this representational character is not so evident. An inference is in general a process or development in which certain combinations of dicent signs bring to mind others. We interpret each developing level of signification ultimately in terms of the signs that are subsequently brought into that same context and as these all contribute to the development of some more complex sign. Peirce recognizes in the forms of inference, or argument-signs, the conventions by which signs are ultimately brought into relation with other signs. That there should only be three forms will be further clarified by the determination of the sixty-six signs of the cognitive system.[29] Basically an argument-sign is subject to interpretation only in terms of the habits it establishes or assures in regards to its object. This, for instance, expresses why a mathematical proof is grounds for the establishment of some convention of operation in the manipulation of mathematical signs. Such a convention may then be used to formulate further proofs but these arguments themselves are in some sense outside of the systems they found in that they are

[28] In the Cognitive System these were apparently renamed Seme, Pheme, and Delome.
[29] cf. Chart 9.3

not so much expressions within the system as communications to the mathematician or user of these signs about this use. They are in this sense metacommunications. This fact will become especially important in linking the theory of signs with its pragmatic context.

The three trichotomies producing nine functional categories comprise what I have called Peirce's logical system of signs. This taxonomic system can be arranged as in the diagram in figure 4 (see also Figure 6), as two dimensions of Firsts, Seconds, and Thirds.

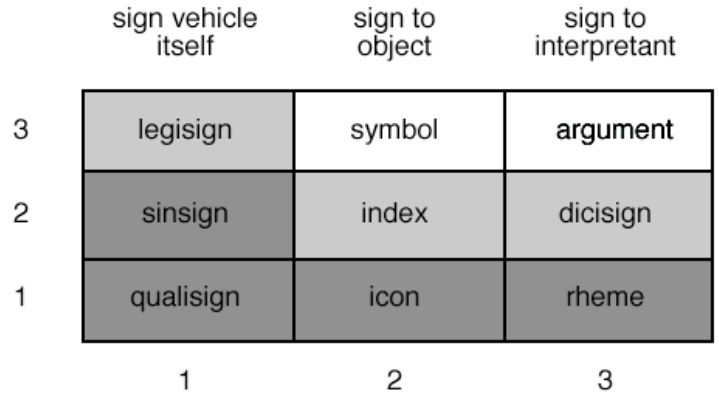

Figure 4.

Each form of sign involves a combination of sign vehicle (representamen), sign-to-object, and sign-to-interpretant relationship creating a taxonomic division in which each form of sign is described by three aspects each. However, Peirce argues that not all combinations are possible. Firsts cannot be analyzed to seconds and seconds cannot be analyzed to thirds, only the other way around, via prescission. So a sign vehicle that is a mere quality (a qualisign) cannot have a relation to its object that is indexical or symbolic. Only a fact or a type of fact can indicate a factual relationship and only a type of fact can symbolize a conventional relationship. And, an icon cannot be interpreted as a dicent sign or argument since it cannot be understood to present any fact or demonstrate any inference. So in constructing possible sign forms the representamen must be of at least as high an order as the relationship between the sign and object and that relationship must be at least as high an order as the sign's relation to its interpretant. Following these constraints, ten divisions of signs are discerned which can be listed as follows (using Peirce's form):

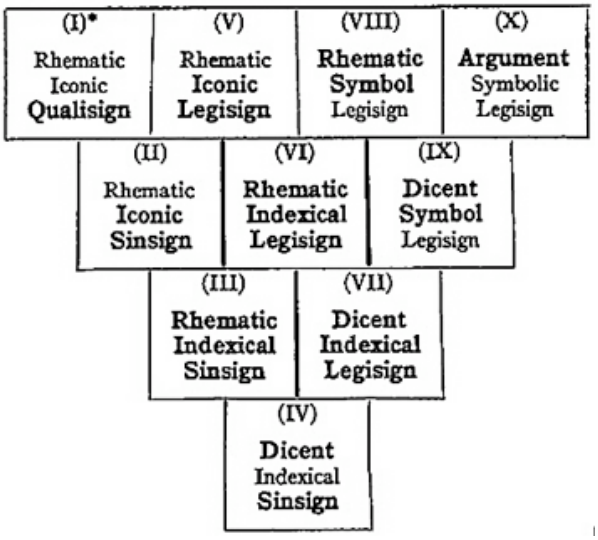

Figure 5.

There is accordingly an order by which signs can be progressively constructed from simpler forms and to which they can be analyzed or interpreted. The constructive hierarchic relationship that generates these 10 forms is depicted in the diagram below.

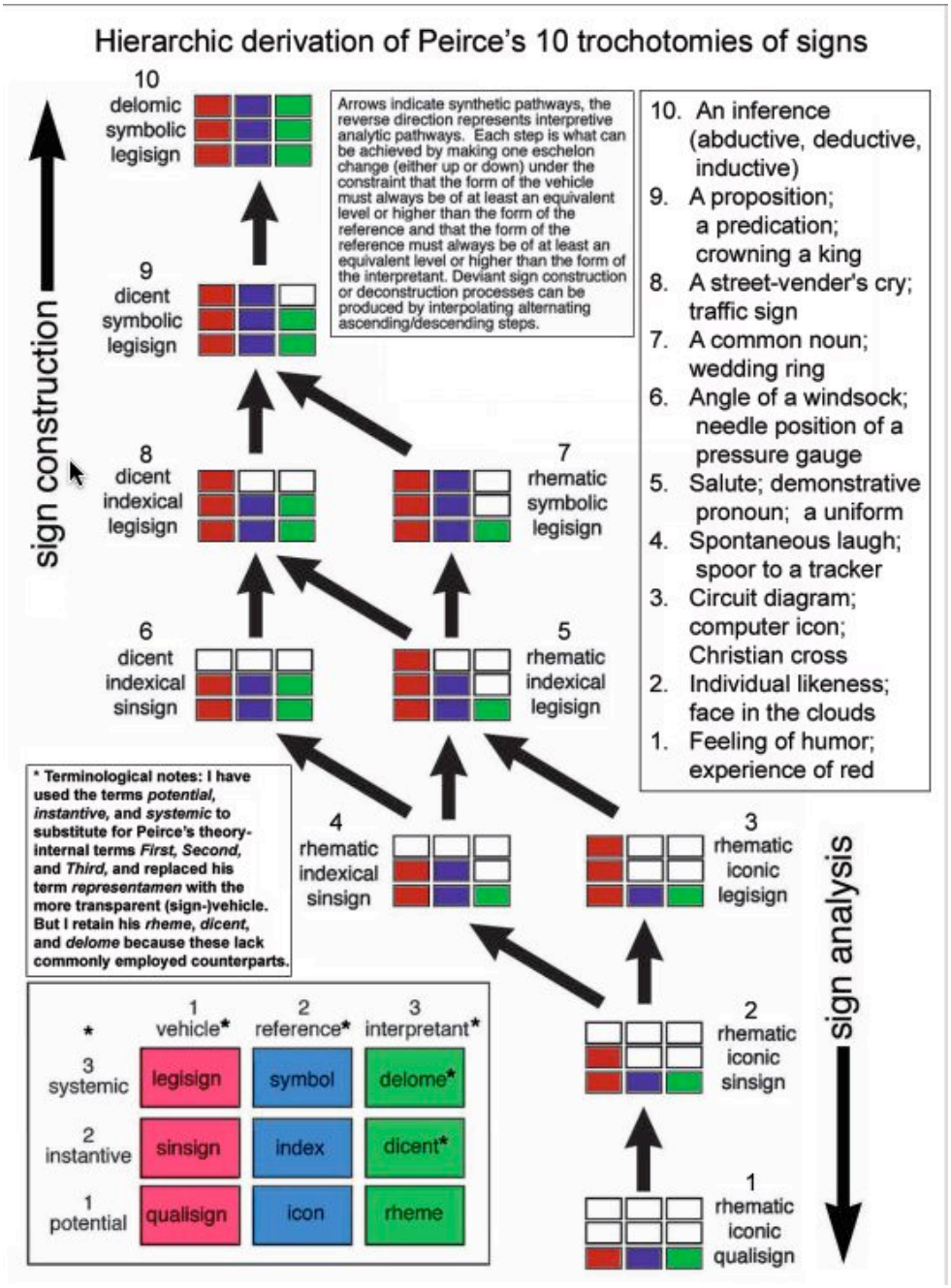

Figure 6. Construction of the 10 forms of sign from the three trichotomis of the logical system. My terminological deviations from Peirce's original terms or cases where Peirce's terminology may vary are indicated by asterisks. The only significant deviation from figures 4 & 5 are the use of Peirce's term "delome" instead of "argument." The examples given in the upper right are a mixture of Peirce's and my own suggestions. [This diagram was added later.]

9. The Cognitive System

The expansion of this taxonomic system appears to have been developed sometime between 1904 and 1908, since in two letters to Lady Welby dated respectively he changes from one system to the other. However, the second correspondence was apparently never sent, and so except for some brief mention in his lectures on pragmatism, this system was never presented in a complete form. For this reason we cannot attempt to analyze this system in any depth beyond simply reconstructing some of the ways in which it is an expansion of the earlier system, linking the former with its pragmatic context.[30]

The expansion is primarily based upon recognition of two forms of Objects and three forms of Interpretants rather than simply one of each. The Object of the Logical System, being a relative second in the sign relation, becomes distinguishable into a genuinely second aspect called the Dynamical Object and a degenerate aspect (which relative to the Dynamical Object is a First) called the Immediate Object. The Dynamical Object is the Object as it is in its independence from the sign that represents it, and the Immediate Object is the Object as it is re-presented within the sign relation. This is not to imply that the Object is necessarily a "thing" outside of the sign-relation, or that the Immediate Object is in some way fictitious, but rather that the Object's involvement with the sign has two aspects: a Dynamical aspect that is relatively "other" and distinct from the sign (i.e., that which is presented *to* the sign-relation), and an Immediate aspect which is in some sense woven *within* the semiotic process itself (i.e., that which is re-presented *in* the sign-relation).[31] Correspondingly the Interpretant, being relatively a Third in the sign-relation, becomes distinguishable into a genuine Third aspect, a dyadically degenerate aspect, and a monadically degenerate aspect. These three are called the Final, Dynamical, and Immediate Interpretants, respectively. The Immediate Interpretant is immediately involved in the interpretation of the sign. It is what is ordinarily called the meaning of the sign (4.356). It is something like a constrained potential for interpretation, like the definition of a word as listed in a dictionary, which embodies all the possible ways that a sign could be taken. The Dynamical Interpretant is the direct actual effect produced within an interpreter that is linked with a particular appearance of the sign. The Final Interpretant is that general condition (a kind of semiotic "habit," as discussed below) that is brought into being by the appearance of the sign. As a genuine third, it is the sign's ultimate significant effect.

The above six divisions of sign-functions can be portrayed by the following diagram.

	I	II	III
I	Sign	Immediate Object	Immediate Interpretant
II		Dynamical Object	Dynamical Interpretant
III			Final Interpretant

Table 9.1 The sign, two divisions of objects, and three divisions of interpretants arranged according to their categorical modes.

[30] To aid in this comparison I call the first his Logical System and the second his Cognitive System.

[31] Though a sign represents a dynamical object to the final interpretant, the sign itself can only convey that aspect of the dynamical object which is of a general or sign-nature. Although the final interpretant can only be semiotically determined by this one aspect of the dynamical object it can nonetheless have an effect on the dynamical object itself. (cf. 5.473)

The three divisions that are necessary for the Logical System only take into account the Sign, the relationship between the Sign and Dynamical Object, and the relationship between the Sign and the Final Interpretant. The trichotomies that these generate become the first, fourth, and ninth trichotomies of the ten trichotomies that Peirce felt were relevant to this revised taxonomy. The second and third trichotomies are based on the modes of the immediate and dynamical objects; the fifth, sixth and eighth trichotomies are based on the modes of the immediate, dynamical, and final interpretants; the seventh trichotomy is based on the modes of relationship between the sign and the dynamical interpretant; and the tenth is based on the relation between the dynamical object and the final interpretant. Of the possible relations that could be recognized, seven were left out apparently because they were considered superfluous to the intent of the system. These superfluous relations include the relations between the sign and immediate object, the sign and immediate interpretant, the immediate object and immediate interpretant, the dynamical object and the immediate interpretant, the immediate object and dynamical interpretant, the dynamical object and dynamical interpretant, and the immediate object and final interpretant. All of these are internal to relationships mentioned in the ten trichotomies and so would have offered no further information. They have been mentioned only because in some other contexts (especially in contexts that involve degenerate sign relations) they might prove useful. The ten trichotomies are listed in diagram 9.2 with an indication of where the superfluous trichotomies would have been placed and an indication of other names that have been used.

Of these thirty subdivisions only the nine that occur also in the logical system have been written about to any extent, that is with one exception: the three subdivisions of the final interpretant. Previously, however, there has been considerable confusion on this point since as the idea for this later system was developing the names that Peirce applied to these concepts were also changing.

What Peirce has called the *emotional, energetic,* and logical interpretants, as mentioned in many of his writings and lectures on pragmatism, correspond to what he calls the production of gratification, action, and self-control in the cognitive system. However, all of the later interpretations of Peirce's work with but one exception have identified these with the immediate, dynamical and final interpretants. [32] This attests to the complexities that inevitably arise when using the three categorical divisions over and over to distinguish yet more subtle subdivisions of the semiotic process. Such difficulties have been a strong argument against the adoption of this system, buy not so strong as to outweigh the clarity that it provides when clearly understood.

John Fitzgerald is the only recent interpreter of Peirce's system who finds reason to question this apparent correspondence. In his study of the interrelation of Peirce's semiotics and his pragmatism he came across statements that suggested to him that rather than being other names for the immediate, dynamical, and final interpretants they were subdivisions of the dynamical interpretant. However, his arguments are unconvincing when compared to Peirce's own subdivision of the dynamical interpretant into sympathetic, *shocking, or* usual effects of a sign. It is also unlikely that they can be shown to correspond with the suggestive, imperative, or

---

[32] cf. Weiss, Paul, and Burks, Arthur, Peirce's Sixty Six Signs J. of Philosophy, XLII (1945), pp. 383-388.
Feibleman, James, An Introduction to Peirce's Philosophy Harper & Brothers Publishers, New York and London (1946), p. 133.
Buchler, Justus, Charles Peirce's Empiricism London, Kegan Paul, Trench, Trubner & Co., Ltd. (1939), p. 1O4162.
Thompson, Manley, The Pragmatic Philosophy of C S Peirce University of Chicago Press. (1953), p. 295, n. 18.

TEN TRICHOTOMIES	I	ii	iii	THREE INITIAL TRICHOTOMIES *(excluded relationships)*
I Sign Vehicle (representamen)	Potisign, Qualisign, tone	Actisign, Sinsign, token	Famisign, Legisign, type	1
II Immediate Object	Descriptive	Designative	Copulant	*(sign to immediate object)*
III Dynamical Object	Abstractive	Concretive (instance)	Collective (class)	
IV Sign to the Dynamical Object	Icon	Index	Symbol	2
V Immediate Interpretant	Hypothetical	Categorical	Relative	*(sign to immediate interpretant, immediate object to immediate interpretant, dynamical object to immediate interpretant)*
VI Dynamical Interpretant	Sympathetic (reinforcing, unconscious)	Shock (unexpected, conscious)	Usual (expected, predicted)	
VII Sign to Dynamical Interpretant	Suggestive (constraint)	Imperative (injunctive, instructive)	Indicative (rule, law)	
VIII Final Interpretant	Emotional (gratification, recognition)	Energetic (action, effort)	Logical (habit, self-control)	*(immediate object to final interpretant)*
IX Sign to Final Interpretant	Rheme (seme)	Dicisign (pheme)	Delome (argument, inference)	3
X Dynamical Object to Final Interpretant	Instinct	Experience	Form (design)	

Table 9.2 An attempt to reconstruct Peirce's 10 divisions of sign relations and their three aspects, yielding 30 sign-components. Links to earlier system show on right.

indicative relations between the sign and dynamical interpretant. Fitzgerald apparently was unaware of these divisions and does not take into account the letter in which these are outlined. The sympathetic, shocking, or usual effects appear to refer to the nature of the expectation involved in interpretation, what might be called an unnoticed and thus unconscious effect, an unexpected and thus shocking effect, or a consciously expected effect, while the suggestive, imperative or indicative relations appear to characterize the constraining, instructional, and lawful aspects of the interpretant. That the emotional, energetic, and logical interpretants do not correspond to the immediate, dynamical, and final interpretants can be clearly demonstrated. First, there is the fact that, according to Peirce, although every sign *must* have an immediate, a dynamical and a final interpretant; "not all signs ... have logical interpretants;" additionally, every sign must have a final interpretant of some form. Secondly Peirce himself distinguishes between these in the following somewhat confusing quote which is cited by Fitzgerald:

> "I have already noted that a Sign has an Object and an Interpretant, the latter being that which the Sign produces in the quasimind, that is the Interpreter by determining the latter to a feeling, to an exertion, or to a sign, which determination is the Interpretant. But it remains to point out that there are usually two Objects, and more than two Interpretants. Namely, we have to distinguish the Immediate Object, which is the Object as the sign itself represents it, and whose being is thus dependent upon the Representation of it in the Sign, from the Dynamical Object, which is the Reality which by some means contrives to determine the Sign to its Representation. In regard to the Interpretant we have equally to distinguish, in the first place, the Immediate Interpretant which is the interpretant as it is revealed in the right understanding of the Sign itself; and is ordinarily called the *meaning* of the sign; while in the second place, we have to take note of the Dynamical Interpretant which is the actual effect which the Sign, as a Sign, really determines. Finally there is what I provisionally term the Final Interpretant, which refers to the manner in which the Sign tends to represent itself to be related to its Object." (4.536)

The feeling, exertion, or sign correspond to the emotional, energetic, or logical interpretant that may be produced by a sign. As Peirce goes on to imply, rather than just one interpretant divided into these three possible forms, there are three interpretants presumably each with three subdivisions. The order of presentation also indicates something about the development of these divisions. Apparently, Peirce recognized that there might be more than one interpretant in all. The distinction is further expressed in his writings since in discussing the subdivisions he implies that *(either)* an emotional, an energetic, *or* a logical interpretant *may be* produced by a sign; which contrasts with his discussion of the interpretants where he implies that an immediate, dynamical, *and* final interpretant *are* produced by a sign.

The most consistent interpretation is that the emotional, energetic, and logical interpretants are subdivisions of the Final lnterpretant, corresponding to the production of gratification, action, or self-control, respectively. This conclusion is also consistent with the development from the earlier conception of a single interpretant. Since Peirce's ninth trichotomy, the relation of the sign to the final interpretant, corresponds directly to the third trichotomy of the logical system, the relation of the sign to the interpretant, it follows that the

notion of the final interpretant corresponds directly to the single interpretant of the logical system. And this finally explains why Peirce discovered the subdivisions of the final interpretant before he had recognized that this interpretant was only one of three forms.

SIGNS		TEN TRICHOTOMIES									
10.66		1	2	3	4	5	6	7	8	9	10
i.	1	1	1	1	1	1	1	1	1	1	1
ii.	2	2	1	1	1	1	1	1	1	1	1
	3	2	2	1	1	1	1	1	1	1	1
	4	2	2	2	1	1	1	1	1	1	1
iii.	5	2	2	2	2	1	1	1	1	1	1
	6	2	2	2	2	2	1	1	1	1	1
	7	2	2	2	2	2	2	1	1	1	1
	8	2	2	2	2	2	2	2	1	1	1
	9	2	2	2	2	2	2	2	2	1	1
iv.	10	2	2	2	2	2	2	2	2	2	1
	11	2	2	2	2	2	2	2	2	2	2
v.	12	3	1	1	1	1	1	1	1	1	1
	13	3	2	1	1	1	1	1	1	1	1
	14	3	2	2	1	1	1	1	1	1	1
vi.	15	3	2	2	2	1	1	1	1	1	1
	16	3	2	2	2	2	1	1	1	1	1
	17	3	2	2	2	2	2	1	1	1	1
	18	3	2	2	2	2	2	2	1	1	1
	19	3	2	2	2	2	2	2	2	1	1
vii.	20	3	2	2	2	2	2	2	2	2	1
	21	3	2	2	2	2	2	2	2	2	2
v.	22	3	3	1	1	1	1	1	1	1	1
	23	3	3	2	1	1	1	1	1	1	1
vi.	24	3	3	2	2	1	1	1	1	1	1
	25	3	3	2	2	2	1	1	1	1	1
	26	3	3	2	2	2	2	1	1	1	1
	27	3	3	2	2	2	2	2	1	1	1
	28	3	3	2	2	2	2	2	2	1	1
vii.	29	3	3	2	2	2	2	2	2	2	1
	30	3	3	2	2	2	2	2	2	2	2
v.	31	3	3	3	1	1	1	1	1	1	1
vi.	32	3	3	3	2	1	1	1	1	1	1
	33	3	3	3	2	2	1	1	1	1	1

SIGNS		TEN TRICHOTOMIES									
		1	2	3	4	5	6	7	8	9	10
vi.	34	3	3	3	2	2	2	1	1	1	1
	35	3	3	3	2	2	2	2	1	1	1
	36	3	3	3	2	2	2	2	2	1	1
vii.	37	3	3	3	2	2	2	2	2	2	1
	38	3	3	3	2	2	2	2	2	2	2
viii.	39	3	3	3	3	1	1	1	1	1	1
	40	3	3	3	3	2	1	1	1	1	1
	41	3	3	3	3	2	2	1	1	1	1
	42	3	3	3	3	2	2	2	1	1	1
	43	3	3	3	3	2	2	2	2	1	1
ix.	44	3	3	3	3	2	2	2	2	2	1
	45	3	3	3	3	2	2	2	2	2	2
viii.	46	3	3	3	3	3	1	1	1	1	1
	47	3	3	3	3	3	2	1	1	1	1
	48	3	3	3	3	3	2	2	1	1	1
	49	3	3	3	3	3	2	2	2	1	1
ix.	50	3	3	3	3	3	2	2	2	2	1
	51	3	3	3	3	3	2	2	2	2	2
viii.	52	3	3	3	3	3	3	1	1	1	1
	53	3	3	3	3	3	3	2	1	1	1
	54	3	3	3	3	3	3	2	2	1	1
ix.	55	3	3	3	3	3	3	2	2	2	1
	56	3	3	3	3	3	3	2	2	2	2
viii.	57	3	3	3	3	3	3	3	1	1	1
	58	3	3	3	3	3	3	3	2	1	1
ix.	59	3	3	3	3	3	3	3	2	2	1
	60	3	3	3	3	3	3	3	2	2	2
viii.	61	3	3	3	3	3	3	3	3	1	1
ix.	62	3	3	3	3	3	3	3	3	2	1
	63	3	3	3	3	3	3	3	3	2	2
x.	64	3	3	3	3	3	3	3	3	3	1
	65	3	3	3	3	3	3	3	3	3	2
	66	3	3	3	3	3	3	3	3	3	3

Figure 9.3; the sixty-six signs

The vertical columns are arranged according to the ten trichotomies and each row represents the ten components of one of the sixty-six sign complexes. The ten numbers that define each of the sixty-six signs indicate whether a component is a first, second, or third division of a particular trichotomy. The sixty-six signs are also distinguished according to the way they correspond to the ten signs of the logical system, represented by roman numerals (refer to the list of the ten logical signs at the end of the last section for the corresponding descriptions).

This analysis suggests that Peirce did not struggle with his original system, finally replacing it, as many have suggested. He did not abandon it at all, but simply expanded it from this early basis into a much more complex and comprehensive form. Thus, we are not faced with two distinct systems, but two views of the same system as it was further amplified over the course of his studies.

This coherence is dramatically demonstrated in the way the ten trichotomies of signs form the logical system are interwoven into the sixty-six possible signs that can be distinguished by the cognitive system. As with the derivation of the ten signs from three trichotomies the same methodical constraint of not allowing a preceding subdivision to be lower in the categorical level than its following subdivision is used to determine the possible combinations of ten component characters. Chart 9.3 lists these sixty-six signs and shows the correspondences between the ten from the logical and sixty-six from the cognitive system. Note, for instance, that there are only three forms of arguments, numbers 64, 65, and 66, as was one of Peirce's earliest realizations.

10. Pragmatism

> "Now quite the most striking feature of the new theory was its recognition of an inseparable connection between rational cognition and rational purpose; and that consideration it was which determined the preference for the name pragmatism." (5.412)
>
> "It is impossible to apprehend the pragmatist's position without fully understanding that nowhere would he be less at home than in the ranks of individualists, . . ." (5.504)

The source of most of the confusion still surrounding Peirce's semiotics is based on a misunderstanding of the concepts behind the different interpretant roles essential to the sign process. The tendency for logic, linguistics, and the broader fields subsumed by semiotics to ignore or bracket out any consideration of interpretants and instead assume an unspecified interpreter or context in their place, perpetuates the "misplaced concreteness" attributed to interpreters, that Peirce wanted to avoid. It also reinforces a dualistic perspective that is still, three quarters of a century after Peirce, the major barrier to the study of communication. For this reason, in the remainder of this essay I will not attempt to map Peirce's semiotic categories to those subsequently developed in linguistics, information theory, aesthetics, mathematical logic, and other semiotic disciplines; leaving this to an interested reader. Instead, to address this more pressing problem, I will focus on the role of the interpretant, the critical element whose absence from these modern theoretical systems is the source of many current confusions and begged questions.

Peirce called his theory of interpretation *pragmatism* (or pragmaticism, in order not to be confused with theories of others who had adopted the name but not what he considered the foundations of pragmatism) after the Greek "πραγματικοζ", pertaining to action, deed, or affair. Since pragmatism is based on his entire theory of the interpretants of a sign there is no simple description, outside of a discussion of each of the forms of interpretant, that is sufficient to portray the scope of this idea. Previous to a more detailed look at interpretation, however, we can capture some of the broader implications of Peirce's brand of pragmatism, and how it contrasts with other perspectives.

The first general tenet of pragmatism is recognition of the physical agency of signs and generals such as physical or psychical "laws." In Peirce's words: "Not only may generals be real, but they may be *physically efficient,* not in every metaphysical sense, but in the commonsense acception in which human purposes are efficient?" (5.431) For instance, a sign is physically efficient, first by virtue of its matter or energy, as a sound causes eardrums to vibrate, second by its ability to determine an interpretant, which itself is some matter-energy form, as is a pattern of nervous activity, and third by its ability to create habits which by their generality shape events of a particular type to conform in a significant way to the concept embodied in that habit. (cf. 5.547) When we speak of the proper effect of a sign it is usually the latter two to which we are referring. These are the effects embodied in the production of the interpretants. They are triadically determined by the sign and are, for example, quite distinct from the strictly dyadic physical determinations of the material basis of the semiosis, such as the transmission of vibrations of air constituting the sounds of words. This isn't meant to imply that triadic determination is independent from dyadic determination of this sort (it is), but simply recognizes that it is the rule, or the general features of this embodiment in matter-energy forms that is the ultimate locus of the "efficiency" of these relations. Furthermore, this triadic "agency" of the interpretant that is the essential characteristics of any sign-relation. This special causal sufficiency is the very essence of what makes something an interpretant.

For Peirce's pragmatism, whatever can be characterized by lawful behavior is, by definition, of a sign-like nature. The relation between dyadic or immediate causality and triadic or mediate causality can be expressed in the following simplified way. Suppose that some type of event *A* dyadically produces some other type of event *B* with such regularity that we attribute to it a lawful character. It is by virtue of the recognition of this lawfulness that it becomes possible to use *A* as a *means* for producing *B*. That is, *A* becomes capable of being used for this purpose only insofar as the generality of its relation to *B* is signified to the interpreter (defined as the source of a sufficient interpretant) capable of producing *A*. Or similarly, in this relation the recognition of *B* may act as an *index* of *A* by virtue of the general sign of their factual connection. Though, after the general concept becomes habitual for the interpreter, the physical habit of *A* producing *B* may cease to function while the representative character of *B* need not necessarily also disappear; *B* may still symbolize *A* by virtue of some habit of the interpreter to link them so.

In general, we are only able to make use of the world insofar as we can come to conceptualize its sign-character, its thirdness. So, for instance, Peirce takes it to be the aim of scientific studies to discover, with both more precision and more generality, this sign-character. As Murrey G. Murphey paraphrases: "Whatever is subject to law is capable of representation by a sign of which that law is the meaning, and whatever is subject to law is itself a sign of the law to which it is subject." (p. 317) For Peirce, representation and lawful behavior cannot be distinguished:

> "Now that which brings another thing before the mind is a representation; so that generality and regularity are essentially the same as significance. Thus, continuity, regularity, and significance are essentially the same idea with merely subsidiary differences? (7.535)

In other words law or habit is responsible for the association of signs. Significance grows out of regularity and generality and in itself may introduce new generality in its significance.

When for instance we say that we associate a sign and object by virtue of some similarity or factual connection between them, what we really mean is that some regularity or habit of bringing them together constitutes" this resemblance or connection. (cf. 7.498) Perhaps the clearest statement of the role that signification plays in the world is that signs are the agents by which non-efficient relations can become efficient For instance, the fact that the temperature of a room drops below a certain value is not in itself capable of turning on a furnace to heat it back up. But, either by our recognition that the room is becoming uncomfortably cool and that the furnace would heat it again if switched on, or by our embodying this sign process into a mechanism such as a thermostat, the operation of the furnace can be efficiently linked to the temperature of the room. Unfortunately, this somewhat trite example does not do justice to the scope of this idea (and may give the misleading impression that the thermostat, as embodied sign-relation, is itself producing interpretants). What this captures is the incredible power of signification to literally bring any two events into efficient connection. This potentiality is behind the miraculous organization of the living world in contrast to the non-living.

Thought is in no intrinsic way different from the semiotic activity characteristic of life in general, except for its being further and further abstracted from its matter-energy constraints, much as symbols are more abstracted from their dynamical objects than are icons and indices. This distancing is what makes thought much more semiotically free and capable of taking on and losing habits than are chemical systems alone. Peirce suggests that we experience ourselves as a sign of this potential agency, as a seme (rheme), in the world. It is the recognition of this *virtual* nature of signification that characterizes the pragmatist's view of meaning. This is what makes it possible for novel sign relations to be created by old signs. This much was clear to Peirce even back in 1868 when these ideas were first being formulated.

> "Finally, no present actual thought (which is mere feeling) has any meaning, any intellectual value; for this lies, not in what is actually thought, but in what the thought may be connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual. (5.289) (1868)

In this sense meaning is seen as a living growing relation. The punctuations of this process by particular signs are not in themselves meaningful any more than the role of an individual organism can be understood in isolation from an ecosystem or other organisms. As the life of an organism is tied up within all others, so the meaning of any sign is tied up within all other signs to some degree and, thus, is presented only as a potential at any one instant.

> "... I do not think that the import of any word (except perhaps a pronoun) is limited to what is in the utterer's mind *actualizer, so* that when I mention the Greek language my meaning should be limited to such Greek words as I happen to be thinking of at the moment. It is on the contrary, according to me, what is in the mind, perhaps not even *habitualiter,* but only *virtualiter,* which constitutes the import. (5.504)

It is for this reason that Peirce ultimately settled on the notion of *habit* as the final or ultimate interpretant of a sign, since that habit is not any particular action but rather a propensity to produce a particular *type* of action.

> "To say that I hold that the import, or adequate ultimate interpretation, of a concept is contained not in any deed or deeds that will ever be done, but in a habit of conduct, or general moral determination of whatever procedure there may *come to be,* is no more than to say that I am a pragmatist. (5.504)"

I would suggest that, as a way of remembering these points, the pragmatist position might superficially be characterized by the various interrelated senses of the concept of meaning: the middle or intervening (meantime), agency or intermediary (means), intention or aim (mean to do something), and the possible or virtual significance of a sign (meaning). All four are etymologically linked, expressing different senses of the concept of mediation. The pragmatist position would be the recognition of the interdependence of these; intervening process, agency, intention, and signification. To say that the meaning is the *use* or even potential use is far too limiting and, what's more important, it effectively avoids what Peirce believed to be the most important question: *use by what or whom?* Vagueness on this point was one of Peirce's major criticisms of other so-called pragmatist theories. Signs are "used" or "determined" or "meant" by other signs. It is not sufficient to say they are used by persons, minds, or users since this communicates nothing about their sign-character (and passes the buck to a black box account). Clearly, artifacts are used by minds to act as signs, but this "use" is use *by* a sign in relation to some *other sign*. The mind or personal locus of its use is a sign as well, for Peirce, and this use is the triadic production of another sign. Niether the user nor the use stand outside the sign-process. It is the sign-character of things that is capable of being linked by signification and intention, and not the things themselves. Confusion on this point stems from a traditional tendency to symmetrically oppose and information and energy (i.e., mass-energy), and thus talk about them as though they could interact. For instance, we often say that energy conveys, carries, or contains information, as though the latter were substantial in the same way. It would be clearer to say that information is conveyed or distributed from locus to locus via energetic processes, and with respect to the physical patterns involved. The very same events are described, but from Second and Third perspectives, respectively

Confusion can be avoided by recognizing that the two concepts, energy and information, are hierarchically related ways of focusing on the dyadic and polyadic relational aspects of the same phenomena. Energy appears more real or concrete only because of the fact that although a consideration of dyadic relations is essential to triadic and thus all higher forms of relation, a consideration of polyadic relations is unnecessary to dyadic relations. That is, we can *prescind* energy from information but not information from energy. Clearly energy and information do not interact. They are not in this sense symmetrically related to one another, but are concepts signifying different modalities of causal relationship. There is no sense in which information can be understood in terms of the dyadic relations of energetic metaphors, but information nevertheless cannot be understood clearly without at least acknowledging its dependence on physical-energetic processes.

Perhaps the most important consequence of the pragmatist positions is the recognition that the notion of an individual mind, the solipsistic cogito, is an illusion produces by analyzing mind through the constraints of a dyadic epistemology. For Peirce, it must be understood in terms of a complex sign-process whose identity or "personality" is experienced as a continually evolving seme (rheme) within this process. From this perspective it is non-sensical to regard personhood as something distinctly individual or even in any important way isolated form the world. As a sign, a person is that which mediates between signs, being brought into existence by and bringing into existence other signs. As Peirce points out, signs are punctuations or

instances of the general continuous character of the thought process, or more generally, semiosis. He goes on to say:

> "It may ... be declared that there can be no isolated sign. Moreover, signs require at least two Quasi-minds; a *Quasi*-utterer and a *Quasi-interpreter; and* although these two are at one (i.e., are one mind) in the sign itself, they must nevertheless be distinct. In the Sign they are, so to say, *welded. . .every* logical evolution of thought should [thus] be dialogic." (4.551)

Here Peirce locates both the sense in which a *Quasi-mind,* as he calls it, must be distinct and yet must be in some aspect identical with some other *Quasi-mind.* In other words minds are dyadically distinct and thus may be experienced as direct otherness, and they are triadically interdependent and thus must be experienced as a unity in the Sign.[33] Furthermore, the feeling of otherness can only be experienced through a sign, thus through the unity of the thought process. As with an organism, in semiotic unity with its ecosystem, a mind is a habitual locus of interpretation of other signs and is experienced only through these signs as a sign of their interpretation. This sign is always interpreted as a seme because it represents a potential or virtual meaning depending upon its context among other signs (i.e., its ecological, economic, or cultural context). In pragmatism there can be no mind-body (information-energy) distinction, nor any concept of an isolated individual mind. Clearly there can be no isolated sign. Both confusions arise only when communication is treated as a Second, where otherness is the dominant character, and all triadic forms of relation are overlooked.

11. Habit and Interpretation

> "The deliberately formed, self-analyzing habit --- self-analyzing because formed by the aid of analysis of the exercises that nourished it --- is the living definition, the veritable and final logical interpretant. Consequently, the most perfect account of a concept that words can convey will consist in a description of the habit which that concept is calculated to produce? (5.491)

The logical basis of pragmatism is the theory of the interpretants of a sign. From these concepts alone all the tenets of pragmatism can be deduced. As we shall see these concepts are based on a theory of the nature of what Peirce calls a "habit." It is through this concept that Peirce's semiotics finds its strongest ally in modern organizational and communicational research, the theory of cybernetics. Cybernetics, the study of information processes and the way they must be organized in order to co-ordinate and control biological, socioeconomic or mechanical systems, was not developed until nearly fifty years after Peirce did his major work on the concept of habits. It was first developed to meet the demands created in designing complex electronic systems, and immediately led in the early 1950's to the rapid development of computer technology. Cybernetic theorists were faced with many of the same problems as was Peirce, but engineering considerations required that the analysis be quantitively precise and semiotically vague. In designing communication and control systems questions of signification and intention were secondary to questions of channel capacity, ability to compensate for noise,

[33] The feeling of otherness is also a synchronic or temporarily isolated perspective, an "instantaneous" relation by nature of its secondness, whereas the semiotic unity mentioned here can only be experienced in process and never at any particular instant.

and efficiency of coding. These devices were to be used as tools for communication and control. What particularly was to be communicated through these toots and constituted the significate character of these messages did not require specification.

From a semiotic perspective the organization of the information processes used to achieve coordination, control, and adaptation is an essential part of the interpretation of a sign. Signification cannot be prescinded form the communicational habits that arise from it. But Peirce's concept of habit is, consequently, a much broader conception than the notion of a homeostatic or regulative circuit of messages. It is a way of linking these ideas with the logical concepts of generality and law. Peirce, however, did not have the mathematical tools that would have been necessary to clearly define this broad notion of habit. Even presently his ultimate goal to explain the evolution of natural laws in such terms is still far beyond reach. A clear development of semiotics has had to await the development of cybernetics because it was held back by the vagueness of the concept of habit. Now that a theory is developing which can begin to describe more clearly the nature of self-organizing adaptive habits of communication this difficulty may finally be resolved. In these last two sections we will outline some basic correspondences that suggest a fundamental link between semiotics and cybernetics.

For Peirce a habit is the epitome of thirdness. The term applies not just to human patterns of behavior but to any recurrent, generalizable, quasi-lawful behavior recognized in nature. For Peirce, physical laws such as gravitation must even be considered "habits of nature." This led to three underlying assumptions that frame Peirce's theory of signs and without which much of the cognitive system is not understandable: 1) by assuming that all stability, regularity, and lawful behavior is an expression of a habit he demands that we treat nature entirly as a process; 2) habits always come into being through the interactions of other habits and so in turn give rise to new habits in their interactions with still others (i.e. habits are both the products and agents of evolution. Even the most fundamental habits of nature must have evolved from other habits.); and 3) it is through habit (i.e. thirdness) that human thought and the natural world are linked in a continuum.

> “We must, under this theory regard matter as mind whose habits have become fixed so as to lose the powers of forming them and losing them, while mind is to be regarded as a
> chemical genus of extreme complexity and instability. It has acquired in a remarkable degree a habit of taking and laying aside habits." [That is, it should be added, taking and laying aside habits in response to the many levels of ecological, sociological, and cultural habits to which it must be constantly readapting.] (6.101, parenthetic remarks mine)

> “ ... remember that mechanical laws are nothing but acquired habits, like all the regularities of the mind, including the tendency to take habits, itself; and that this action of habit is nothing but generalization, and generalization is nothing but the spreading of feelings." (6.068)

It should be clear then that when Peirce is speaking of habits he is referring to something that is of an essentially semiotic nature. We recognize and discover "laws" in nature precisely because they are of the same character as thought. Cybernetics, however, appears to have made some headway in distinguishing and describing regularity and habituality since Peirce's time. Referring to these concepts will be useful in the analysis of the various interpretants. With the following brief digression we can introduce a few elementary cybernetic concepts in order that we may refer to them as schematic models of habits in our discussion of the interpretants.

When we look more closely at the nature of habits it becomes apparent why it is that habits and sign processes are so inextricable interrelated: habits are a way of talking about repetition or redundancy, that is, something being re-presented again and again. Different degrees of habits can be distinguished as distinct forms of redundancy. In processes where the redundancy of some events within some series is noticed but no relationship between preceding events exist, except for the fact of the continual appearance of the same events again and again, one can at least say that the series is *constrained.* For instance, the series of numbers ...314122213312... appears constrained to include only integers less than 5 and greater than 0. No other regularity but the re-occurrence of the same group of numbers is recognized. All habits must in some way exhibit constraints. If we define a series where besides the above constraint, every 1 always is followed by a 2, every 2 by a 3, every 3 by a 2, and every 4 by a 1 we define a *determinate* series. By observing such a series, for example the series ...3232323... some, but seldom all, of these transformations can be discovered. In such a series, we can say that subsequent members in the series are completely constrained by their preceding members.

In the first kind of series, there is only a constraint imposed upon what members are possible anywhere in the series. But there is a distinct effect in a determinate series on the overall constraints of the series that must also be pointed out. In the above series for instance, it can be recognized that the sequence ...232323... will be exhibited more often, even if we periodically break the rules, than any other habitual sequence. This sequence can be said to be a *basin* within the series. Thus, every time the rules are broken and some spontaneous number suddenly appears, the series will quickly revert back to this basin habit. Over a long series the whole will be constrained to produce twos and threes almost exclusively.

We can describe the above determinate series by a transformation rule A, such that:

Input	1	2	3	4
Output A	2	3	2	1

symbolizes that 1 transforms to 2, 2 to 3, 3 to 2, and 4 to 1. We can depict a number of such rules (or parameters of the system) A, B, C, ... operative on the same finite set of elements 1, 2, 3, 4, as:

Input	1	2	3	4
Output A	2	3	2	1
Output B	3	4	3	1
Output C	2	4	1	3

By changing from parameter to parameter during the process of the series we can change from one habit to another with an intervening *transient* period. Beginning with the stable habit constrained by Rule A, then changing on the fourth transform to Rule B, we get the series ...3232413333... with the transient “413” intervening between the two habits. If we change back we get the series ...33332323... with no intervening transient pattern.

A habit can be described in this way by the particular individual events of the series, by the particular transformations of events, and by the rules of transformation. In order to analyze a series of events we thus need to first distinguish similar events, then comparing the transformations in which they occur we can discover its general patterns.

A series, such as is represented above, exhibits both dyadic and triadic characters. The concept of a transformation from one member of a series to the next expresses a dyadic

relation. In as much as it is a rule about "which member must follow which: it is a triadic concept. But supposing that only the series is given and that the transformation rules must be inferred from the redundancies of the series. One can infer such general information by observing individual dyadic relations only if the series is understood to be simply determinate, that is only if this general character were previously given. Otherwise the analysis must involve the habit of comparing each dyadic relation to each other until one becomes satisfied that no new relation will be found by continuing the procedure, and thus, that the series obeys some general rule. This examination habit is itself a series of events already exhibiting a general rule. This is what is meant by the statements--only a third can interpret a third; only a general can analyze another general; and only a habit can experience another habit.

There can be no such thing as an isolated habit. By the very nature of thirdness a habit only exists in terms of other habits. It is the habit-nature of signs that is capable of representation, and it is for this reason that signs must be understood as processes. Though a representamen may be a structure such as an artifact or printed symbol, in order to become significant it must be transformed into a process. This may be accomplished by some behavior like scanning it with the eyes (a habit used to create a habit), transforming the structural regularities into temporal regularities. As the sign-habit reinforces, interrupts, or is expected by ongoing habits (i.e., other semiotic activities) it gives rise to an already ongoing habit, a resistance to or effort to change an ongoing habit, or a newly created habit.

A sign must give rise to an interpretant and that interpretant is a sign which must give rise to another interpretant, and so on. As a consequence, a long series of signs is produced. As much as each sign produced can only give rise to a small number of possible signs as interpretants this series will show some degree of redundancy and possibly convergence. Over time, a habitually produced sign may tend to become more and more predictably located with respect to the series of signs that surrounds it, and so, respectively its interpretants become more reliably linked to it as the entire process becomes more habit-like. But semiotic habits tend to grow in complexity as they interact with each other, producing ever higher-order habits undermining determinate predictability. In general, habits of the real world are only proximately determinate at best, and the production of semiotic habits generated to “analyze” habits of the world, are thus inevitably only minimally, myopically, and fallibly superimposed upon the world, and subject to disruption and dissolution to the extent they are dependent upon worldly resources.

In general, we will assume that the habits that interpret any particular sign are themselves semiotic processes. This presents a model of the organism-ecosystem as a hierarchy of semiotic processes. A series of signs interpreting signs in a more or less redundant pattern may become the habitual basis upon which other signs are interpreted. A simple example is the continuous biochemical processes that maintain neurons in habitual readiness to behave when presented with stimulus signs from other neurons. This means that the selective capacity of interpretation on any particular level of semiotic activity is based upon the general properties of the activity on a lower level. Or, in other words, that the secondness of one level depends upon the thirdness of the lower level of semiosis.

With this conception of habitual activity in mind, we can elaborate some on the characters of the three interpretants. Although it is assumed here that we are describing these processes as they are experienced within an organism, this can be generalized to include all forms of semiotic activity.

The first of these, the immediate interpretant, is of the three the most unclear in terms of the above model. I have assumed for the sake of the consistency of the following description that the three orders of the immediate interpretant can be analyzed in these

terms, although the names Peirce gives these do not seem to represent these characters precisely.

The three immediate interpretant functions will be distinguished according to the three aspects of a habit that can be used as an interpretant: a possible monadic event, an actual dyadic transformation, or a general rule of transformation. Peirce calls these a hypothetical, categorical, or relative immediate interpretant accordingly. If a sign merely gives rise to an event within an ongoing habit it cannot change that habit in any significant way, if it gives rise to a transformation the habit may be altered, and if it gives rise to a rule or pattern of transformations it may be capable of giving rise to a new habit altogether.

The dynamical interpretant is the actual organismic distrubance produced by the initial effect of the sign on an ongoing habit. The first order of organismic effects are those that are in "sympathy" with an ongoing "feeling." This occurs when the sign produces an initial effect which does not reorganize the habit in any way that conflicts with its original pattern. The new information fuses together with this ongoing habit to reinforce it within the wider context. This sort of effect is seldom conscious. The second order of organismic effects are those that interrupt an ongoing feeling. This occurs when the sign produces an effect that tends to cause a change in habit that is in conflict with an ongoing habit. The abrupt reorganization is experienced as a "shock" or "surprise" to the ongoing feeling and is consciously felt in its otherness. The third order of organismic effects are those involving expected changes or interruptions of ongoing feelings. As a result of repeated similar changes, we quickly learn to expect them, that is, we generalize in formulating new habits which are an attempt to fuse the many sudden habit changes into a higher order habit. Thus the tendency of habit-systems is to internalize *otherness by* taking on the habits of habit reorganization that previously were externally imposed. This at first involves a kind of *prediction* that the expected disturbance will occur, which is felt as a conscious period of expectation. If the expectation is not fulfilled and completed then the result is again some further feeling of interruption and a new process of expectation must be initiated. If the expectation is fulfilled and completed, especially if it is again and again repeated, it tends to become more and more internalized, the signs tend to become experienced as first order effects, in sympathy with the new ongoing habit, and they correspondingly become less and less conscious. This third order is always experienced as a transitory stage between the consciousness of otherness and the unconsciousness of familiarity. Learning always involves the production of such third order dynamical interpretants.

We can now be more specific about the relation of a sign to the dynamical interpretant it produces. We might say that the dynamical interpretant is the direct physical effect of the sign on the interpreting system. The first order of this relationship would be that of "suggestion" and constraint. This relationship of the sign to the dynamical interpretant does not require any particular reorganization of the ongoing habits though it may nonetheless be taken as shocking or expected because the implicit constraints on the possibilities of suggestion may not be met by the condition of the interpreting habits. The second order of this relationship is that of *injunctions* and *instructions. Since* it is an "imperative" relationship it must produce either a second or third order dynamical interpretant. It is always experienced in the form of a command from an other. Although this command might be relatively expected. The third order of this relationship is that of rules and laws. Signs that present rules or laws must produce a third order dynamical interpretant, that is, they must introduce some expectation. Thus, we must learn to obey rules whereas we need only pay attention to follow instructions.

The final interpretant is the habit produced by a sign. This habit is not necessarily put into action but is rather a propensity to respond in a particular manner in specific

circumstances. The dynamical interpretant represents the coming into activity of particular habits. The final interpretant is the production of some habit in response to the effect of the dynamical interpretant (which itself may be seen as an instance of some other final interpretant). At the first order, often referred to as the emotional interpretant, there is simply the *recognition of* a habit, an *acceptance* of the fact of a disrupted or ongoing feeling, and no other response other than the production of *emotion.* It might be called the production of a habit of not interfering with the habits and habit changes that are being experienced.

The second order, often referred to as the energetic interpretant, is on the other hand a clear response to the experience, an exertion of effort. In order to compensate or regulate a change of habit effort is required even if this is no more than a sort of mental effort. This is the sort of feeling that is experienced, for instance, when trying to concentrate, resisting the myriad distractions that are continually trying to unseat an ongoing train of thought. However, in the case of a sign producing such a final interpretant it is the other way around; that is, the sign produces a habit that in some way is in conflict with a number of other ongoing habits. So it must bring an effort into play in order to overcome these tendencies. This is necessarily the case with any kind of motor response to a sign, since a number of other habits must be superseded if *action* is to result. This is *not* to suggest that action as a final interpretant can never be spontaneous. A startling event, both may disrupt a number of ongoing habits, and may cause one to shout with alarm, as an emotional call-to-action is generated. This exemplifies the sort of reponse that the energetic interpretant refers to. It is independent of self-conscious purposiveness, but still involves the generation of organismic work, automatically produced as a higher-order autonomic habit evolved as a mechanism to interrupt lower-order ongoing habits.

The third order of interpretant, often referred to as the logical interpretant, is a response that involves, in contrast, the purposeful formation of some habit by repeated efforts. On this point we can refer to Peirce's own words:

> “Careful examination has pretty thoroughly satisfied me that no new association, no entirely new habit, can be created by involuntary experiences. In the second place, the event that causes a habit change may be a muscular effort ... [but] nothing like a concept can be acquired by muscular practice alone. When we seem to do that, it is not the muscular action but the accompanying inward efforts, the acts of imagination, that produce the habit." (5.478-9)

> "Every man exercises more or less control over himself by means of modifying his own habits; and the way in which he goes to work to bring this effect about in those cases in which circumstances will not permit him to practice reiterations of the desired kind of conduct in the outer world shows that he is virtually well-acquainted with the important principle that reiterations of the inner world—fancied reiterations—if well-intensified by direct effort, produce habits, just as do reiterations in the outer world; and these habits will have power to influence actual behavior in the outer world; especially, if each reiteration be accompanied by a peculiar strong effort that is usually likened to issuing a command to one's future self." (5.447)

This is a striking example of the necessary involvement of the many levels and forms of interpretant functions that must together be orchestrated to achieve the conscious creation of

a habit, and thereby some degree of self-control. The "self" that is doing the "controlling" is of course the sign that brings the logical interpretant into existence. It is the sign of a possibility, as we have said; and it is the creation of a logical interpretant that enlarges that possibility. It is a seme (rheme), the first order in the next trichotomy, the relation of a sign to the final interpretant. This trichomtomy has been sufficiently discussed in Section 8 and does not warrant our discussing it in any depth here except to remark on its relation to the trichotomy of final interpretants. As can be discovered from the order of the trichotomies a sign that represents a possibility to its final interpretant can have either an emotional, energeetc or logical interpretant; a sign that represents a fact can gave either an energetic or logical interpretant but not simply an emotional interpretant; and a sign that represents an inference must have a logical interpretant. Thus, the conclusion of a reasoning process is the formulation of a logical interpretant. In this way, Peirce speaks of science being a method of developing more and more comprehensive logical interpretants. Some special comments should be made at this point regarding the concept of effort in line with our earlier comments about the relation of information to energy. When we say we are exerting an effort in order to overcome or to develop some habit we do not mean something like what we mean when we say that energy or work is required to overcome inertia. There is certainly a component of work involved which we realize after being forced to concentrate for an extended period (as is involved in closely studying some confusing document), since we can be physically tired as a result of the inward "effort" involved and can have literally "burned up" a great deal more energy than usual in the process. Habits are information processes, however, and though most tend to be selfstabilizing this is something quite different form inertia. As a matter of fact, metaphorically contrasting the two, one would have to admit that habits tend to be much harder to overcome (often requiring continuous "effort" and attention) than befits the notion of inertia. So, too, habits tend to start up again spontaneously after having been arrested for a time.

Comparing the second orders of the dynamical and final interpretants, two complementary examples of effort-like experiences can be recognized. When suddenly confronted with a sign that interrupts an ongoing habit we experience a kind of resistance and conflict as though running up against some outside "effort" opposing our direction. The closest we have been able to come to describing it seems to be through metaphorically comparing it to inertial shock, as though suddenly running into something solid. What is occurring in this case is an imposed inhibition of ongoing habits. Since we identify with the habits, the sign that is the cause for the inhibition and consequential reorganization is experienced as an external imposition. In order for this to happen we, of course, must *let ourselves* interpret the sign and thus allow the sign to command our inhibitory response. Compare this with the application of "effort" in the energetic interpretant which is directed to overcome some habit. Here since the "source" of the effort is identified with oneself, the habits resisted become "other" (though often we are quite aware that it is simply another aspect of oneself that is experienced as "other").

This points out that in some sense the two are the same process only inverted. Both involve the inhibition of, or conflict with, some ongoing habit. And in this interaction we experience the exertion of effort very much like the exertion of effort that might be experienced if it involved muscular control. This comparison to muscular control is not simply metaphoric, however. The organization of muscular activity involves a complex of hierarchically organized semi-autonomous, selforganized habits. When such a habit is set into action it tends to complete itself spontaneously. In order to arrest or alter it in mid-process, inhibitory responses must be able to override the ongoing activity either by activating opposing habits, via opposed musculature, or inhibiting the nervous activity in that particular brain or spinal cord

region so that the firing thresholds are too high to sustain the spontaneous firing pattern. In either case, blockage of the semiautonomous habit involves the sudden operation of a large constellation of systems and a consequential commitment of relatively larger stores of potential energy to their functioning. In the following discussion by Paul Weiss,[34] the autonomous nature of these levels of habits is discussed in more detail. Here the concept of a habit is given some definite physiological counterparts.

> "The working of the central nervous system is a hierarchic affair in which functions at the higher levels do not deal directly with the ultimate structural units, such as neurons or motor units, but operate by activating lower patterns that have their own relatively autonomous structural unity. The same is true for the sensory input which ... operates by affecting, distorting, and somehow modifying the preexisting, preformed patterns of central coordination ... The final output is then the outcome of this hierarchical passing down of distortions and modifications of intrinsically preformed patterns of excitation, which are in no way replicas of the input. The structure of the input does not produce the structure of the output, but merely modifies intrinsic nervous activities that have a structural organization of their own. This has been proved by observation and experiment. Doghill has shown that the motor patterns of the animal develop prior to the development of sensory innervation. I have shown, as others have, that the removal of the sensory innervation does not abolish the coordination of motor activities. Moreover, co-ordinated motor functions of limbs and other parts develop even if these parts have been experimentally prevented of ever becoming ennervated by sensory fibers. Therefore, the sensory pathway can have nothing to do with the structure of the motor response. There are still some authors who try to save the old associationist idea that actually the input shapes the structure of the output. I think that they are fighting a losing fight, and I think that today's discussion ought to have given them the coup de grace.
>
> Intrinsic automatic rhythms have been shown, for instance, by Adrian in the brain stem of the goldfish and in insect ganglia, by Prosser in other arthropods, by Bremer and by van Hoist in the spinal cord, and by Bethe in jellyfish. I have shown experimentally that any group of bulbar or spinal nerve cells taken from vertebrates, if deprived of their structural bonds of restraining influences and allowed to undergo a certain degree of degradation, will display permanent automatic, rhythmic, synchronized activity of remarkable regularity. Rhythmic activity, therefore, seems a basic property of pools of nervous elements. The rhythm is not something generated through an input rhythm but is itself a primary rhythm which may be released and even speeded up or retarded by the input, but is not derived form the input. So we have experimental evidence that rhythmic automatism, autonomy of pattern, and hierarchical organization are primary attributes *of* even the simplest nervous systems, and I think that this unifies our view of the nervous system." [35]

---

[34] Not to be confused with the philosopher Paul Weiss, co-editor of the Collected Papers.
[35] Jeffries, L.A., ed. Cerebral Mechanisms in Behavior—The Hixon Symposium. New York: Wiley, 1951.

Just previous to Peirce's later formulation of the theory of interpretation, John Dewey proposed what has since become known as the conflict theory of emotions.[36] Dewey and his later followers suggested that an emotional response was experienced as a result of the activation of competing tendencies to respond. Because neither habit could reach completion and neither could override the other, the organism experienced an impasse. The feeling of an emotional response was the "surfacing" of this frustrated activity. Ten years earlier F. Paulhan had presented a similar theory that was somewhat more general. Paulhan suggested that affective phenomena were experienced whenever a "tendency awakened undergoes inhibition" and cannot reach completion whether by conflict with some of the simultaneous tendency or because of confusion or lack of clarity and organization.[37] The later developments along these lines of explanation tend to consider inhibition or blockage primary, with conflict or confusion as special cases.[38] This conception of the nature of emotional experience is essentially parallel to Peirce's concept of interpretants that involve effort. Peirce does not speak of "affect" in this way, however, and would have likely avoided most of the dualistic metaphors that accompanied such theories of the emotions. It is possible, though, that he was aware of these ideas, especially those of Dewey who later was to reinterpret and popularize many of Peirce's ideas. More recently, in an analysis of the elicitation of emotion by music, Leonard Meyer, utilizes Dewey's theory of emotion to explain the effect:

> "... such states of doubt and confusion are abhorrent [to the human mind]; and, when confronted with them, the mind attempts to resolve them into clarity and certainty, even if this means abandoning all other previously activated tendencies."[39]

A "tendency toward the resolution of doubt" was also a central theme in Peirce's pragmatism. It can be seen that this is related to the fact that the tendency to form habits is the only tendency that grows of itself. That is, the tendency to resolve confusion and ambiguity into some higher order regularity is an assimilation of non-habit-bound signs into habits. Peirce called this notion a tendency to resolve "doubts" into "beliefs"; beliefs being the acceptance of some habit. The concept of information in cybernetics is closely related to this belief-doubt distinction. Information in this sense is a measure of the uncertainty removed by a particular message or sign. What is signified, however, is not considered within this context. Rather, only the uncertainty of receiving a particular sign is of use in determining such things as channel capacity and signal/noise ratios. Accordingly, when all doubt about succeeding signs is removed one says that no information is being conveyed. You might say that information considered in this way is a measure of otherness or newness. When no further information is conveyed in a continuing communication it is because of some identity of receiver with sender, i.e., some common habit (produced by sender expected by receiver). We have seen that it is by virtue of the redundancies or repetitions of messages that we are able to discover logical interpretants of such signs. i.e. habits of semiosis. It is so, too, in cybernetics that redundancies

---

The quote is taken from an ex tempore contribution by Paul Weiss to the discussion of K. S. Lashley's paper on "The Problem of Serial Order in Behavior." The italics are supplied by Arthur Koestler who quoted this passage in his book, The Act of Creation (Dell Publishing Co., Inc., 1964). pp. 434.435.

[36] Dewey, John. "Theory of Emotion," in Psychological Review (1:1894), 553-69.

[37] Paulhan, F. "Laws of Feeling," (1887) trans. C. K. Ogden (New York: Harcourt, Brace & Co., 1930).

[38] MacCurdy, J. T. "Psychology of Emotion" (New York: Harcourt, Brace & Co., 1925).

[39] Leonard Meyers Emotions and Meaning in Music (University of Chicago Press, 1956), pp. 15-16.

make it possible to reconstruct a message even in the presence of noise. In other words, if a semiotic regularity (*aka* logical interpretant) can be produced from the noisy series of signs, missing or ambiguous aspects can be reconstructed by recognizing where the message deviates from the habit. If the transmission of signs is incessant, any amount of noise can be compensated for by an appropriate increase in redundancy, which will eventually disclose a habit. The receiver must have learned that habit (or be able to learn it from the message itself, as in music) in order to be able to distinguish the useful from non-useful signs. This is as true of the signs themselves as well as for what they signify. *Thus far anstince thr monkey may beno ise typewrter both wi th esgns thems elves nd in the in finity formation thy represent*.[40] However, when the logical interpretants are formulated and the ambiguities on both levels removed, the originally doubtful message can inform the already unconscious habit and what was once uncertain may become the basis by which new uncertainties can be rendered informing.

Doubt or confusion is the inability to subsume something under some belief or habit of the understanding. As a result, such a sign is always shocking and disruptive of ongoing feeling. By discovering some regularity we can come to expect its effect, subsume it under some logical interpretant, and thus by induction demonstrate its reasonableness. Doubts for which reasonableness can be discovered can thus resolve into an unanalyzed habit of expectation, a belief. Thus, we experience a continual movement of new information from first to second to third and then back to first order as doubts and uncertainties are transformed into beliefs. These new habits (beliefs) then become the basis for the transformation of new ambiguity into regularity, otherness into identity. This general property or tendency is not just peculiar to human thought but should be characteristic of ultimately every semiotic system.

This consideration of the way semiotic regularities are used to tame doubt can be extrapolated to a general theory of argument or explicit inference. And so it leads us to the third order of Peirce's ninth trichotomy the delome (or argument) and its relation to the last trichotomy; i.e. an argument's relationship to a final interpretant. As Peirce had suggested early in his career, there are three canonical forms of delome: abduction, deduction, and induction. These three correspond to the three divisions of the dynamical object-final interpretant relation, which he describes as assurance of 1. instinct (or belief), 2. experience (or reality), and 3. form (or reasonableness). As we have seen in the organization of the sixty-six sign-forms, the distinction between the kinds of delomes is by virtue of these last three divisions. In them, the relationship between an interpreter and the object of an interpreted sign is assimilated to a fully explicit and analyzed habit of mind.

[Deletions and re-editing notes: Many changes have been made to this text over the years since the original publication (Printed at Fairhaven College in 1976). In the first version of this chapter, for example, there was a final section "12. Signification in Cybernetics." It is missing from this version, deleted in the mid 1980s due to doubts about its usefulness to a Peircean semiotics primer (copies of the chapter were distributed to at least one seminar on semiotics taught at Harvard University). Also over the intervening years leading up to this OCR digitized version, other editing changes were introduced by the author which deleted and changed some wording from the original. Overall, the text remains true to the original undergraduate essay. I hope the reader will be charitable to its overconfident youthful author. TD, 2004]

[40] Thus for instance there (monkey) may be noise (typewriter) both within signs themselves and the (infinity) information they represent.