Psychosemiotics and its Peircean Foundations

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Abstract:

The aims of this article are to outline the nature and scope of psychosemiotics and to highlight its foundations in the semiotic theory of Charles Sanders Peirce. Psychosemiotics, defined as the study of how humans learn, understand, and use signs, is grounded in the theory of the sign and semiosis as conceived by Peirce. Psychosemiotics addresses representation and meaning in seven signways: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, social-personal, and naturalistic. Two other features of Peircean theory are emphasized: (a) feeling and emotion as Firstness lie at the heart of every developing sign, and (b) the theory offers a framework for understanding psychosemiotics as an evolutionary phenomenon that operates within particular biological possibilities and restraints.

Psychosemiotics is defined as the study of how humans learn, understand, and use signs. This definition acknowledges several vital facets of the interface between psychology and semiotics. To begin with the semiotic dimension, the subject matter is signs, which are anything that stand for something else to somebody (e.g., Peirce, 1992, 1998). A focus on signs implies a focus on meanings and meaning-making. By examining how humans learn, understand, and use signs, the emphasis of psychosemiotics is on dynamic sign processes in context as opposed to relatively fixed and abstract sign content. The associated sign processes always occur in cultural settings of one kind or another within constraints imposed by nature's evolutionary processes. Signs and their actions both shape and are shaped by the sociocultural and natural settings in which they occur. Further, by virtue of being situated, signs always incorporate embodiment of one form or another.

As for the psychological dimension, the focus is on processes of human cognition, broadly defined. That means including, for example, both emotional and sociocultural influences on sign processes. When this broad view of cognition is taken together with an emphasis on meanings and intentional actions, psychosemiotics is much more closely aligned with cultural psychology (e.g., Bruner 1990) than with mainstream causal psychology and models of information-processing. By studying how signs are used in context, the pragmatic aspects of signs and their processes become paramount. In addition, psychosemiotics is concerned with all of the signs of cognition, not just verbal language. In this article, I will describe briefly how the dynamic nature of sign-and

meaning-making occurs across a full range of representational modes called signways (Smith, 2001), and how Peircean theory supports these processes.

To adopt another face of the prism, psychosemiotics seeks to examine human cognitive processes from a semiotic perspective. Semiotics, the study of signs and their actions, provides a compelling standpoint from which to understand human cognition. However, psychosemiotic explanations of cognitive phenomena differ in several fundamental respects from traditional psychological accounts. Over the past 40 years, the standard western approach to studying cognition has embraced an information-processing perspective that is consistent with the tenets of mechanism, a philosophical world view that promotes the discovery of universal causal relationships among measurable variables affecting human behaviour (Pepper, 1942). Most of this research has focussed on inside-the-head cognitive products resulting from conscious, rational, and usually verbal phenomena that exclude emotion, bodily awareness, and other ways of knowing.

By contrast, the psychosemiotic perspective that I am endorsing subscribes to an alternative world view of contextualism (Pepper, 1942). In this way, psychosemiotics seeks to understand cognition by examining how humans use signs to make meanings within their everchanging physical and cultural environments. This form of inquiry emphasizes the dynamic nature of sign-making (hence, meaning-making) within a variety of biological and cultural constraints and across a full range of representational modes or signways as described below. In this way, I take cognition at the individual level to include bodily sensations as well as emotional elements that often function beyond the range of conscious awareness. However, I also see cognition as functioning at the collective level in ways about which we still know very little. Mutual interactions across the signways between the individual and the collective constitute the essential bases of psychosemiotic inquiry.

The Sign

Psychosemiotics rests on the concept of the sign which was described by Charles Peirce on various occasions as a triadic, irreducible, and unceasing process. Let us examine two of his less complex renderings. The first definition is drawn from Peirce's well-known passage of 1897 (CP 2.228 or Buchler, 1955, p. 99):

> A sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in

reference to a sort of idea, which I have sometimes called the ground of the representamen.

The second definition appeared in a 1908 letter written by Peirce to Victoria Lady Welby (Hardwick, 1977, pp. 80-81):

> I define a Sign as anything which is so determined by something else, called its Object, and so determines an effect upon a person, which effect I call its Interpretant, that the latter is thereby mediated by the former. My insertion of "upon a person" is a sop to Cerberus, because I despair of making my own broader conception understood.

It should be pointed out that, although the latter definition fits well with a focus on human cognition, it was deliberately limited to humans at a despondent time in Peirce's life (Brent, 1993; Deely, 1990). At many other points in his writing, Peirce makes clear that the sign is a universal phenomenon. However, as we look at these two definitions, several additional points should be made about terminology. The word "sign" is generally used by Peircean scholars (e.g., Corrington, 1993; Serson, 1997) to refer to the entire triad of constituents, while "representamen", which appears in the first definition only, is used to denote the First of the three constituents. Hence, the representamen is taken as the sign in an existing form that is brought to a given situation whereas the interpretant is the sign in its more developed form following an acquaintance with the object. The interpretant becomes the representamen at the next involvement with the same object. Peirce's clearest definition of object was "that with which it [the sign] presupposes an acquaintance in order to convey some further information concerning it" (Buchler, 1955, p. 100, circa 1910). One of Peirce's later definitions of the interpretant, from around 1906, is that it is "the proper significate outcome of a sign" (Buchler, 1955, p. 275). A further delineation of both the object and interpretant will be presented in a following section on semiosis.

The three constituents of the sign are often shown as an inverted-Y, with the object placed in the lower left, the representamen at the top, and the interpretant at the lower right of the figure. Although the sign may appear as a static entity in its definition and illustration, the intent of Peirce's formulation is one of continuous change and development. In an abstract depiction of the sign, the representamen is determined by the object and in turn determines the interpretant (Deely, 1990; Whitson, 1997). The interpretant now represents the object and, as a more developed sign, also serves as the representamen on the next appropriate occasion. In this way, signs grow in an ongoing process of semiosis. It should be noted, too, that semiosis does not involve a specific ordering of events among constituents of the sign. Instead a continuous dialectic exists among the representamen, object, and interpretant.

Because of different terminology and conceptualizing, the sign process differs in several important ways from parallel explanations in mainstream psychology. In psychology, the external object is the perceived entity. This perception is followed by retrieval from memory of relevant existing knowledge about this object, with appropriate mental processing about what the object means and what actions to take. In the usual psychological analysis, such an event becomes both more linear in nature and more temporally-oriented than the dialectic view of Peircean semiosis. As well, psychology tries to clearly distinguish any separate functions of perception and cognition instead of treating the constituents as indivisible entities of a unified process. Finally, mainstream psychology focusses more on resulting behaviour than on evolving and ever-changing cognitive representations of phenomena.

Semiosis

DESCRIPTION

The concept of semiosis, that is, the triadic nature of the operation of a sign or the unceasing action of the sign, was introduced briefly in the previous section. In 1907, Peirce explained semiosis as follows (Peirce, 1998, p. 411):

> By "semiosis" I mean … an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs.

Semiosis became a central concept of the later Peirce's theorizing, especially after he perceived semiosis as a distinct area of inquiry around 1906 (Ayim, 1986; Deely, 1990). Although Peirce had long emphasized that signs do not simply exist but also grow, he gave particular attention to semiosis in his developed theory. Hence, the dynamic property of signs must be seen as an essential feature both of semiotics and of cognition in natural settings.

Semiosis is intimately connected with and dependent upon Peirce's universal categories of Firstness, Secondness, and Thirdness, which are central concepts in his powerful semiotic architecture applicable to all fields of human and nonhuman endeavour (e.g., Santaella Braga, 1993). According to Peirce, Firstness represents freshness, originality, and feeling, Secondness represents causality and reactance, and Thirdness represents becoming, developing, and bringing about (Peirce, 1992). Although two of Peirce's definitions of the sign have already been presented above, he also provided an additional definition which makes clear the links between the sign's constituents and

the universal categories:

> 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. (Buchler, 1955, pp. 99-100)

In order to characterize the action of the sign, Peirce then went further by describing at least one additional trichotomy to represent the categories within each of the sign's constituents. Between 1903 and 1908, Peirce advanced three distinct proposals: (a) three trichotomies yielding 10 classes of signs (CP 2.233-2.264, 1903 and CP 8.376, 1908), (b) ten trichotomies producing 66 classes of signs (CP 8.344, 1908), and (c) six trichotomies yielding 28 classes of signs (Hardwick, 1977, p. 84, 1908). However, for purposes of clarity and utility, most scholars confine themselves to the first of the three proposals (e.g., see Savan, 1988 and Serson, 1997).

Despite the number of trichotomies that exist among constituents of the sign which seem to beg for separate analyses, Peirce emphasized the irreducible nature of the functioning sign. This emphasis is quite clear in Peirce's definition of semiosis that was presented above. Because Thirdness is required for semiosis to occur, sign action cannot be reduced to activity between pairs of sign elements. Thus, assorted attempts by some scholars to isolate the trichotomies, especially the icon, index, and symbol, are ill-fated because of the ensuing destruction of the integrity of the developing sign in semiosis. Elsewhere (Smith, 1997), I have argued that dissociating the trichotomies in this way is akin to studying the effects of water by examining the separate properties of hydrogen or oxygen.

The Forms of Inference and Their Motivation

In his writings, Peirce expended much time and energy distinguishing three forms of inference: (a) abduction, based in Firstness, (b) deduction, of Secondness, and (c) induction, of Thirdness. Deduction has dominated western inference for over 2000 years, while induction has been a feature of philosophy and modern science for almost 700 years. Peirce's principal contribution to inferential forms was the elaboration of the third form of inference that he eventually termed abduction, the logic of discovery (Smith, 2001). These forms of inference constitute various forms of reasoning and could be considered the engine or driving force of semiosis.

In semiosis, the three forms of inference act continuously on the constituents of the sign triad to move from the diffuse qualitative and emotional features of Firstness in the

assorted sign relationships toward the laws and generality of Thirdness. Thus, semiosis is marked by everwidening cyclical processes of abduction, deduction, and induction in an ongoing dialectic of development. Why this process occurs, that is, what motivates the inferential processes in semiosis, is the topic to be considered next.

Before continuing, however, I think it is worth noting that the foregoing operations of the sign underlie every cognitive process and thereby constitute a semiotic theory of cognition. Four basic tenets of this theory, called the four incapacities (CP 5.266; Serson, 1997), were outlined by Peirce in 1868 and refined over time. The first proposition, rephrased here, is that no knowledge is possible without first engaging the abductive processes that attend sensing in and experiencing of the external world. The second tenet proclaimed that we have no power to intuit knowledge, but rather every cognition is determined logically by previous cognitions. The third incapacity stated simply that "we have no power of thinking without signs", a claim that supports all the arguments advanced above. The fourth proposition stated that "we have no conception of the absolutely incognizable". That is, not only can we not know something that is not a sign but, by implication, we can never reach the final end of semiosis.

Above, I have described briefly how constituents of the sign change continuously over time and how this change is driven by one or another of the three inferential forms. From a psychological perspective, such development is triggered by the foundational need to survive and by the supporting actions of striving to become competent in understanding and using the signs of the culture. From the semiotic viewpoint adopted by Peirce, such development is pushed by the need to make sense of the surrounding context through the removal of doubt. This genuine doubt arises from uncertainty based in experience within a particular context. The motivation to reduce or remove this doubt is the trigger for semiosis and for the resulting change in one's current beliefs, called the fixation of belief by Peirce (Buchler, 1955; Peirce, 1992).

Peirce described four methods by which to fix beliefs: tenacity (holding onto beliefs in the face of doubt), authority (accepting beliefs from credible leaders), a priori (incorporating beliefs into an already existing belief structure), and experiment. In the latter method, the one preferred by Peirce, we remove doubt by first collecting a sufficient number of observations, then by generating hypotheses through abduction to explain the perplexing data, and finally by testing these hypotheses through deductive and inductive means. In this way, as we come to know both ourselves and external objects, the meaning attached to the sign deepens, doubt is reduced or removed, and beliefs become established (Cunningham, 1998).

As indicated above, emotion or feeling is a quality based in Firstness, a central property shared with abduction. For Peirce, emotion has a foundational role in the development of the sign and therefore in semiosis. Corrington (1993) portrays this role of emotion succinctly:

> Peirce advances what could be called an "intentional" theory of emotion. Such a theory denies that emotions are purely internal states of affairs that merely serve to color the surface of self-consciousness. Rather, emotions are outward-directed intentions that predicate qualities of objects. To have an emotion is to project (intend) a feeling-state outward onto an objective field. To be angry, for example, is to be angry at some thing or person. Without an external and intentional referent, the emotion could not emerge in the first place. (p. 81)

To extend this account, emotion is derived from feeling, which is in Firstness, is intentional, and moves outward to experience in Secondness. Peirce assigned a central role to feeling in defining mind, at times almost equating the two concepts. In 1892, Peirce emphasized his doctrine of "synechism", the law of mind that perceives all mind to be directly or indirectly connected with all matter and the tendency of feeling toward connectedness and relation (Buchler, 1955; see Bohm, 1980 for a similar discussion). In its role as a foundational relational structure, feeling is social from the very beginning and serves to link one mind with every other mind. Because mind-feeling is linked to matter, not only is all thought in signs, but all signs are embodied. In this sense, Peirce anticipated current discussions about the embodiment of mind when in 1892 he wrote:

> What we call matter is not completely dead, but is merely mind hidebound with habits. It still retains the element of diversification; and in that diversification there is life. When an idea is conveyed from one mind to another, it is by forms of combination of the diverse elements of nature …. if [these forms] are eternal, it is in the spirit they embody; and their origin cannot be accounted for by any mechanical necessity. They are embodied ideas. (Buchler, 1955, p. 351)

In his writings, Peirce also described how feeling possesses dimensions of both time and space. In his full account, feeling is spatial and temporal as well as relational. In this way, and in sharp contrast to mainstream work in cognitive psychology, feeling is taken to be the essential foundation of psychosemiotics.

The Signways

Thus far in the article, I have underlined the structure and processes of the Peircean sign as fundamental to psychosemiotics. I turn now to the various modes of representation, called signways, which constitute the main channels of semiosis for both individuals and cultures. In this analysis, psychosemiotics involves syntactic, semantic,

and pragmatic processes operating within seven quasi-independent but usually well-integrated signways. Hence, I reject the view of cognition as a unitary and general-purpose process for the acquisition and use of all forms of knowledge. However, I also reject alternative positions that restrict cognition to functions of a large number of autonomous innately–specified brain modules such as colour perception (e.g., Fodor, 1983) or that confine cognition to verbal and other contents permitted by capacities of the single brain. Rather, I interpret cognition to consist of different ways of knowing through signways that are situated in a personal Innenwelt, or internal individual cognitive representation or schema, and biocultural Lebenswelt, which is the human sociocultural and environmental personal world or Umwelt (J. von Uexküll, 1957, 1982). Because the signways serve to bridge individual and collective minds, they are also distinct from domains (cultural activities) and fields (cultural institutions) which are grounded in societies.

With one exception, the terms used to designate the signways are the same as those recorded by Howard Gardner (1983, 1999) in his well-known theory of multiple intelligences. My decision to use most of Gardner's terms has the advantage of employing conventional words in a somewhat familiar context, but carries the risk of having those words interpreted in the same sense employed by Gardner. In his theory, Gardner adopts a psychological, that is, individual-based, perspective by specifying seven (now eight) biopsychological potentials that are available to the normal human brain. However, as a result of their trafficking in signs, the signways necessarily extend beyond the individual to link with environmental and cultural artifacts. The specific signways have been chosen because the attending signs and relevant sign systems have been found to exist in at least some form among the different cultures of the world. Although conscious rational thought is always worthy of study, psychosemiotics also pays attention to dynamic nonconscious and emotion-based processes of meaning-making that underlie such psychological concerns as learning, motivation, and memory within the various signways.

The seven signways and their particular representational forms are as follows: (a) linguistic, concerning all kinds of written or spoken verbal language; (b) musical, involving the conventions, sounds, rhythms, and skills of music; (c) logical-mathematical, concerning linear and sequential knowledge and operations; (d) spatial, referring to visual-spatial arrays; (e) bodily-kinesthetic, involving use of the body and its parts; (f) social-personal, concerning the signs of knowing about others and oneself, and (g) naturalistic, involving the recognition of patterns in the natural and cultural worlds

and the classification of objects and events. In this listing, the social-personal signway eliminates Gardner's distinction between intrapersonal and interpersonal factors while at the same time highlighting the sociocultural bases of signs. A brief description of each signway is presented next.

For the sake of working convenience, the seven signways may be categorized into three overlapping clusters that flow from the conceptualizing of Charles Peirce and Jakob von Uexküll. According to Peirce (1992, 1998), signs and meaning begin in feeling with its temporal, spatial, and relational facets. Drawing from von Uexküll, the signways reflect two classes of elementary sign processes in living beings: organizing signs (composed of time and space in given contexts) and signs of content in context (J. von Uexküll, 1982; T. von Uexküll, 1982). Thus, the signways associated in the first instance with time and sequence are the linguistic, musical, and logical-mathematical. The signways linked primarily with space and place are the spatial and bodily-kinesthetic. The final two signways, the personal and the naturalistic, are associated essentially with development of the personal Innenwelt and the Lebenswelt (J. von Uexküll, 1982).

THE LINGUISTIC SIGNWAY

It is perhaps fitting to begin with the signway that supports linguistic capacity, which is usually specified as the factor that most clearly distinguishes humans from nonhumans. Perhaps for this reason, language in all of its manifestations has also drawn the most sustained attention from the greatest number of scholars in semiotics. Two prevailing beliefs are held by a legion of scholars in language and linguistics. The first of these is that linguistics is equivalent to or a supercategory of semiotics. The second belief is that the syntactic, semantic, and pragmatic aspects of language should serve as the semiotic model for all other sign domains and systems. For example, de Saussure's theory is often singled out as the prime example of the latter conviction even though many other semioticians also support this position. On the other hand, major thinkers such as Charles Peirce and Thomas Sebeok have emphasized the full breadth of semiotics and the numerous and ancient non-linguistic forms of semiosis. In this latter view, the one that I accept, the linguistic signway is only one, albeit an important one, of seven representational modes that comprise psychosemiotics.

The classical approach to studying language has been to treat it as a formal structured system composed of a specified set of algorithmic rules. In this way, language has been viewed through history as a cold, bloodless, and essentially rational creation while scholars subscribed to classical notions of language by presuming that meaning resulted

from predetermined semiotic links among basic linguistic units. These persons believed that expressed language provided a reliable and neutral entry into the cognitive systems of individuals. Increasingly, though, scholars have turned their attention to language function in context. In this view, language is not just a formal means of expressing ideas but is also a way to communicate emotions, wishes, and desires and, especially, as a way to get things done. For example, "Let's go" could mean "I've been at your parents' house long enough", or "Hurry up?we'll miss the bus", or "Let's find a more private place". The meaning of this simple utterance is dependent on who says the words for what reasons under what circumstances.

The Russian literary theorist Mikhail Bakhtin was foremost among those who espoused this alternative view of linguistic function. In his writings, Bakhtin refused to acknowledge the separation of self from others and any free-standing form of language. More contemporary works by those such as Johnson (1987) and Lakoff (1987) are also consistent with a Peircean view in their support for the movement away from formalized systems of language. According to Lakoff, lexical categorization does not depend on any objective and logical set of criteria, but is instead tied centrally to cultural experience. In Lakoff's view, sets of experience produce knowledge that is organized not by abstract categories but by idealized cognitive models that are created within the mind of the individual. Further, these models are linked to the human sensory systems. In this way, concepts emerge from experiential linguistic contexts rather than from abstract general structures. Both language and thought become extensions of the human sensory system. The embodiment of language can be seen in utterances (in the Bakhtinian sense) and in gestures that are linked to body rhythms (e.g., Kendon, 1981). This poststructuralist approach to understanding language in its situated and embodied form emphasizes that we can understand nothing, even in linguistic form, with which we have had no experience. However, as a further step, this experience may become culturally diffused if some cultural needs are being satisfied. This process of cultural diffusion results in the experience becoming more remote from the senses and increasingly abstract in nature.

To conclude this section, I have barely touched on the innumerable aspects of the linguistic signway. A legion of topics, including metaphor, gossip, the semiotic square, discourse analysis, paralanguage, poetics, writing, reading, and linguistic narrative remain unexplored. This truncated coverage does not reflect the emphasis placed on formal language by researchers in psychosemiotics or by most contemporary societies.

THE MUSICAL SIGNWAY

Interest in music and music theory is at least 2000 years old. However, the association of music with semiotics is relatively recent, apparently stimulated by Roman Jakobson's essays from the 1930s that linked musicology and linguistics (cf., Hatten, 1998; Nöth, 1990). Semioticians working in the tradition of structural linguistics, in particular, were soon attracted by the many similarities between language and music. Nöth (1990, p. 433) summarized the major points of correspondence as follows:

> A first common feature of language and music is their linear and acoustic manifestation … both language and music are cultural systems of arbitrary, recurrent, and structured sounds … both systems make differential use of acoustic phenomena such as pitch, duration, quality, and intensity of sounds … music, like language, proves to be a semiotic system of values.

Over the past 40 years, a number of structural theories have been developed which embrace music as a formal system of signs based on these linguistic parallels. An important alternative approach, poststructuralist in nature, emphasizes the unique aspects of musical meaning. Both major strategies to understanding music will be summarized below.

First, though, I wish to address two attributes highlighted by the musical signway: time and, for poststructural semiotics, emotion. Even more obviously than language, music is connected to the general themes of time and sequence. Thus, music is able to shape time and to otherwise manipulate the temporal qualities of sound (Epstein, 1995; Hatten, 1998). As is the case for language, this manipulation includes the element of silence. The use of time and temporal sound patterns in music are tied closely to expressive significance. Expressivity is often accepted as a central attribute of emotion, which was linked many years ago to music and symbolism by Langer (1957). Langer argued that music is the logical expression of feelings and thereby an implicit symbolic form. Emotion is associated with the Firstness of the sign as enunciated by Peirce, although most structuralist accounts of music avoid the topic of emotion entirely.

According to van Leeuwen (1998), the formal tradition in the semiotics of music began in the 1960s in French structuralism. The resulting structural approach to understanding music seeks to establish the formal associations that exist among basic musical units. In this approach, each musical element such as a note is understood only in the context of the musical system, such as its position within the system and its relationship with other elements. Most structural theories in musical semiotics have appropriated the harmonic system of European tonal-functional music as the elemental

system underlying musical structure (van Leeuwen, 1998). The resulting semiotic inquiry consists of analyzing units that can be notated, such as rhythmic pattern, dynamic level, melodic contour, harmonic movement, texture, and timbre (Henrotte, 1992). In this view, musical comprehension is independent of extramusical context and relies almost exclusively on derived syntactic rules. Stated more bluntly, music is assumed to have no meaning outside this system of acoustic elements. Representative individuals who are closely associated with attempts to establish a formal, logical system of musical signs include Nicolas Ruwet, Jean-Jacques Nattiez, and Ray Jackendoff.

An important underlying assumption in many structuralist theories in music is that the resulting models have universal application. Indeed, research suggests that some universal aspects do exist, including the findings that music is embodied (e.g., Dissanayake, 1992) and that humans are innately sensitive to particular forms and structures. For example, the fundamental beat structure, hierarchy of the tonal order, and centrality of the octave appear widespread among the world's cultures. Further, most musical systems include an interval that matches the western perfect fifth (Sloboda, 1985).

However, different cultures also show substantial variations in musical structure, attitude toward music, and formal systems of musical notation, such as the difference between North Indian and Western music in how pitches are represented. Rhythmic style provides a further illustration of cultural difference. Accordingly, the poststructuralist stance is to try to understand music as much more of a culturally and contextually based system of meaning-making. For example, a note that is taken as a single sound is conceived differently in different cultures. Thus, the Gamaka note of Indian classical music seems like several notes to westerners. Several scholars who are associated with attempts to emphasize meaning in music include Roland Barthes, Eero Tarasti, David Lidov, Robert Hatten, and Manfred Clynes.

Of the three signways associated with time and sequence, the musical signway is the one which has received the least formal institutional support within modern western cultures. One can speculate on why this might be the case. One reason might be the result of music's close links with the body, a highly suspect entity since the time of Descartes. However, precisely because of its embodied nature, music is a highly significant signway for both personal and cultural development. In his comprehensive review, Hatten (1998) believes that one area of immense potential for development in musical semiotics is the intersection of music as a performed or embodied gesture and

music as abstract patterning. He argues that "music can be a unique laboratory for studying ways in which meaning arises from the synthesis of bodily and mental processing" (p. 80).

A second reason for downplaying the musical signway may be the standard emphasis on individual rather than collective achievements in social institutions such as schools. This focus has made it difficult to determine the adaptive value of music. However, if evolution is linked to adaptation of the gene pool, then music is more important to social groups than it is to individuals. Singing and making music serve to promote group cohesion, and music serves as a sign of cultural identity. For cultural purposes, music can serve in a variety of social roles such as the chant for religious functions, the waltz for social release, Musak for commercial manipulation, the march for military display, and opera and other kinds of music to designate social class (Lidov, 1986). I expect that, as a result of semiotic advances over the past two decades that have moved beyond static structures to embrace processes and meanings, music will continue to draw substantial interest from semioticians.

The Logical-Mathematical Signway

The logical-mathematical signway has assumed an elevated profile in contemporary western cultures by virtue of the emphasis placed on certain forms of logical and mathematical thinking that pervade formal education and a number of other social fields. In school, for example, one central element of formal mathematics constitutes one of the so-called basic 3 R's of reading, 'riting, and 'rithmetic. In conjunction with language, a modern society's success in schooling is measured by the paper-pencil performance of its children and adolescents on international achievement tests in mathematics (e.g., Beaton et al., 1996). However, one dictum is as true for mathematics as it is for any other domain: the nature of the operating sign is highly dependent on experience within the particular cultural context. Accordingly, in the present analysis, major attention will be paid to logical and mathematical thought in specific situations.

Let me begin with the logical facet. Although it is often difficult in practice to distinguish between logical and mathematical operations, some attention will be paid here to characteristics that may be considered mainly logical and, below, mainly mathematical. The classical view concerning the form of human logic has been represented by scholars such as Gottlob Frege (1848/1925), Bertrand Russell (1872/1970), and Jean Piaget (1896/1980). For example, Frege developed a symbolic logic that was based on a few principles of abstract human reasoning and that

introduced the modern view of quantification (Pelham, 1998). Through his logic, Frege attempted to prove that the foundation of arithmetic rested on a few principles, an effort which he eventually abandoned. Russell is associated with his work on a logic of formal propositions which he took to be signs of an external reality. Finally, as reflected by his experimental tasks in psychology, Piaget believed that human reasoning is derived from principles of formal logic.

However, Peirce's notions (e.g., Marcus, 1998), especially those involving abduction, together with research since the mid-1960s has shown repeatedly that the classical view of logical reasoning is out of step with natural practice. Instead, human reasoning is linked closely with real world events and the demands of specific contexts. In a number of tests of reasoning, human problem solvers often fail on abstract tasks that demand the application of formal logic. The question then becomes: are humans simply poor at any form of rational thought, or do they reason in ways that differ from classical logic in order to enhance their abilities to survive in their everyday worlds?

The flouting of the formal principles of rational thought appears in various forms of human interaction, when it is assumed that people with certain characteristics will also exhibit other particular features. For example, people tend to rank the statement "Mike is a bank manager and drives a late model car" as more probable than "Mike is a bank manager", although any rational account asserts that the probability of a single event is always greater than the probability of two independent events. However, through particular cultural knowledge, many of us assume that, when compared with a university professor, for example, a bank manager is more likely to wear a suit to work and to drive a late model car. Thus, in life, the laws of probability are often pushed aside by the principle of representativeness (Tversky & Kahneman, 1983).

To turn to the mathematical facet, just as infants display some functional forms of reasoning from birth, so do they manifest an innate knowledge of number. They are able to display awareness of counting and prefer one of a pair of slides that shows the number of household objects which matches the number of drumbeats that they are hearing. Infants are also able to assign one tag for each item in a display and to let the final tag represent the value of the set (Gelman & Brenneman, 1994). This research shows that infants are responding to signs in an appropriate manner even though their knowledge is not apt to be in any symbolic form at this early stage. Indeed, it appears that infants' initial representations of number have a qualitatively different structure from that of our counting system, although their abilities with number concepts do not have to be explained by higher-order levels of abstraction of the kind proposed by Piaget

(Wynn, 1992). Neither do we have to accept the Platonist view that mathematics involves the specification of real but abstract entities such as sets that must be designated by mathematical signifiers such as count-nouns (Mortensen & Roberts, 1997). Instead, from early in life, children are aware of the positive integer with its two central principles of one-to-one correspondence and succession, in which every number has a distinct successor (Carey & Spelke, 1994). Early in their school years, children acquire more formal notions of zero, infinity, and the rational number. Even later in their schooling, they learn to dissociate number from counting, to abandon the successor principle, and to acquire new understandings of various arithmetic operations such as division that constitute the beginning of mathematics as a human creation.

Thus, the early abilities of children in mathematics suggests that, counter to claims of classical logicians, mathematics does not consist of free-standing truths that are independent of human existence. Instead mathematics is closely linked to human capabilities and, by extension, to cultural resolutions. In this view, the bases of mathematics are to be found in the cultural practices in which mathematical activities are embedded (Rotman, 1987; Stigler & Baranes, 1988). The earliest numbering systems were linked closely to human bodily attributes, such as our ten fingers and toes, a characteristic that we see with young children or others who grapple with the need to count. However, with the growing social need for numbers of ever-increasing size, this type of iconic embodiment eventually proved inadequate. As a result, modern cultures moved to a formal syntactic and semantic system of signs that are purely arbitrary in their elementary characteristics (Posner, 1996).

To summarize, two major points stand out. Firstly, contemporary trends away from an embodied number system for societies have been paralleled by corresponding movements away from experience-based measurement systems as well. For example, the system of Imperial measures founded on embodied notions such as the foot and the inch have generally been replaced with the metric system. Secondly, many studies have shown how individuals can differ in how they understand and apply mathematics in formal school tasks versus practical activities outside school (cf., Saxe, 1988; Schliemann & Carraher, 1993; Stigler & Baranes, 1988). This research shows that, as is the case for reasoning, abstract mathematical calculations may not be the best way to solve everyday problems. Such results support the claim that, for many individuals, meaning-making in mathematics is similar to meaning-making in the other signways by virtue of its context dependence. However, when compared with linguistic and musical capabilities, the linking of mathematics with semiotics has occurred much less

frequently (cf., Marcus, 1986, 1998; Mortensen & Roberts, 1997; Rotman, 1988).

The Spatial Signway

Meaning-making in the spatial signway is achieved by such means as integrating visual percepts, reading a map, recognizing people, and navigating through space. The semiotic objects of the signway include paintings, maps, photographs, movies, architecture, and physical features of the environment. The spatial signway involves sensory signs that are usually visual in nature, although not exclusively so, as spatial awareness is also available to hearing and touching. Gibson (1966) goes even further by suggesting that space is amodal in that each of the senses can provide information about spatial arrangements. The resulting affordances impart meaning to the perceiver. One feature of Gibson's theory is that affordances may be represented by artificial sources such as drawings and photographs that do not actually contain the affordance registered. That is, a banana in a photograph does not provide sustenance, and watching a film taken by a freefalling sky diver does not afford danger.

Aspects of the spatial signway will be summarized under two main themes: the static object and the mobile object, where the object designates one apex of the Peircean sign. Very young children begin their acquaintance with static representations through the embodied activity of scribbling. These early actions express both the Firstness of feeling as reflected by the delight of self-generated motion and by the initiation to semiosis through two-dimensional representations in the spatial signway. As an early sign, scribbling represents only itself through its links to embodiment. As an activity, scribbling is uncontrolled and unplanned. However, around the age of three years, young children reach Secondness by the realization that their lines can represent material objects of their physical environment. With further experience, children reach Thirdness by depicting objects in a routinized stereotypic form, directed at least in part by adults who value some configurations over others. The static object is seen in pictographs, maps, architectural drawings, cartoons, and comics. However, for most people, the most familiar static form within the spatial signway may be the picture, which has existed universally in one form or another since the beginning of human history. Although we know that pictures resemble in appearance what they claim to portray, they still lack a generally acceptable semiotic definition (Sonesson, 1998).

One form closely related to pictures is photography, which has been subject to substantial ongoing debates about its status as a semiotic object, with most discussion revolving about whether a photograph was a Peircean icon or index. Peirce (CP 2.281)

claimed that photographs were both icons and indexes: on the one hand, photographs are exactly like the objects represented while, on the other hand, they exhibit a physical connection with their objects by virtue of a point by point correspondence with nature. Central figures in this discussion include Barthes (1915?1980) and Lindekens (1927?1980).

In passing, it should be noted that metaphors may be represented in most of the signways, including the spatial (e.g., Johns, 1984; Kennedy, 1982, 1999). Although metaphor is usually understood as a linguistic entity, the linking of metaphor with visual images is at least a century old and is more common than we may realize. As is the case for language, the essential ingredients of a metaphor in the spatial signway consists of a concrete entity to represent an abstract concept.

To turn to the mobile object, psychological research has shown that the human ability to make meaning of motion in the spatial signway begins early and naturally. Indeed, the motion of objects in space may be the primary foundation of spatial meaning (Gibson, 1979). Currently, we are also able to comprehend motion in various two-dimensional manifestations such as film, computer images, television, and videotape.

For example, presemiotic analyses of film extend back many years, perhaps highlighted by Eisenstein's theory of montage, which showed how the juxtaposition of images or sequences produce meanings that go beyond the sum of the individual elements. The semiotic era in film is considered to have begun in 1964, when Metz proposed that film be considered as a language founded on a linguistic basis (Müller, 1998). The subsequent phase (1975?1980) was also dominated by Metz (1981), who linked film analysis with the psychoanalytic principles of Sigmund Freud and Jacques Lacan. Beyond Metz, other perspectives have gradually made their presence felt in film semiotics. For example, both narratology that considers the dynamics of narrative structure (cf., Stam, Burgoyne & Flitterman-Lewis, 1992) and feminism that looks at often-implicit gender and other social issues (e.g., Mulvey, 1990) are making contributions to the area. Typical research strategies are to analyze the various codes within a given film text or a particular code across a body of films. A film may be examined from the perspective of its text, or its influence on the viewer, or a combination of the two.

However, our everyday lived environments provide the most sustained use of the spatial signway, whether by playing field sports, driving a car through rush hour traffic, or manoeuvring through crowds of Saturday afternoon shoppers at the local mall. Indeed, we rely continuously on spatial information to provide us with configurations from which

we are able to draw meaning and thereby continue developing the relevant sign. Although I have emphasized visual spatiality here, spatial information is available to all of the senses. However, much more work remains to be done to bring to semiotics the spatial understandings derived from the other sensory modalities.

THE BODILY-KINESTHETIC SIGNWAY

The bodily-kinesthetic signway is concerned with signs and meanings that are derived from all kinds of body movements initiated at the level of the individual. Because this signway is grounded in corporeality, semioticians interested in structuralist models based on abstract linguistics were slow to embrace the essences of embodiment that are linked closely to motion and emotion. The possible exception was the study of gesture, which likely received enhanced attention because of its close association with speech and because it could be subjected, at least in part, to linguistic analysis. However, because humans must navigate continuously through the Lebenswelt, inquiry into bodily signs is essential if we are to understand better how we survive in our given environments and cultures. Beyond the individual, most cultures have developed standardized and ritualized meanings for particular forms of body movement such as those for sports, drama, and dance, all of which are important to this signway but not addressed further on this occasion. Most of the signs and semioses within the bodily-kinesthetic signway result from daily use of the body while moving from place to place, engaging in cultural activities, and relating to other people.

The haptic (or touching) system, the largest human sense organ, is an underappreciated one in many modern cultural activities. However, we use it continuously to support or confirm meanings in our environment. The various bodily receptors include skin sensors for such matters as movement, posture, pain, heat, and pressure that permit us to make sense of ongoing events. In this regard, Gibson (1966) proposed that the essential information provided by touching movements came from tactile postures of the fingers and thumb. In particular, we use haptics in our relationships with other people through such actions as hand shaking, hugging, kissing, and guiding. The extent and power of these haptic capabilities become especially obvious when individuals are deprived of other senses such as sight. In his work with the blind, Kennedy (1993) found that congenitally blind adults possess a coherent sense of space due primarily to their ability to make meaning from touch.

From the perspective of semiotic understanding in the bodily-kinesthetic signway, kinesics (or "body language") may offer the primary locus of interest within nonverbal

communication. Whatever sense is being made by observers of the nonverbal actions, the user is employing his or her body in detailed and meaningful ways. Many of these actions are quite deliberate. For instance, in our daily living, we often communicate in the embodied form known as dactylology, which is the art of relaying ideas with the fingers. Relevant examples include Winston Churchill's famous "V" or the Roman thumbs up, the latter of which carries contemporary meanings such as the English-language "A-OK!" and the Brazilian Portuguese "Positivo!".

One arena that highlights kinesics is acting, including mime, whether the action takes place on stage, in the movies, or on television (McAuley, 1998). Although the facial behavior of actors tends to be the primary focus of audience attention, their postures and gestures are also featured prominently. However, because gestures are perceived as being under substantial conscious control, Wilson (1985) suggests that postures should be examined instead in order to understand a person's more basic and usually unconscious emotional expression, especially off the stage in everyday life. In this argument, postures arise from deep feelings while gestures are communicational devices that can be used in addition to or instead of words. Of course, cultural variations are important in understanding posture. For example, Japanese who bow tend to be fulfilling a cultural ritual rather than professing great humility to the persons to whom they are bowing.

THE SOCIAL-PERSONAL SIGNWAY

The social-personal signway is characterized by an early intersubjectivity that underlines the essential sociocultural nature of the human species. This intersubjectivity develops into an increasingly sophisticated form that leads directly into personal elements and the affiliated evolving sense of self and identity (e.g., Brothers, 1997; Butterworth, 1995; Trevarthen, 1990). From the abundant research on the intersubjectivity of infants, Muller (1996) advances the following semiotic claims:

1. The mother-infant interaction is governed by an exchange of cues structured by a code.
2. This code has the essential features of a semiotic code insofar as it specifies cues as signs, indicates their legitimate substitution and combination, and organizes the pragmatics of turn-taking for the positions of sender and receiver of these cues.
3. The infant learns to use and respond to such cues.
4. The mother recognizes the infant as actively cuing.
5. The infant's role as semiotic partner impacts the mother's semiotic behavior.
6. The mother's violation of the semiotic code is disruptive to the infant and this indicates

that the infant has learned the basic rudiments of the code.

7. The semiotic rules for the interaction are culturally distinct.
8. The code that structures the interaction stands as a third term to the dyad, as the holding environment for both mother and infant.
9. The mother's distinctive responsibility, what distinguishes her from other objects in the infant's environment, is not as a desired object but rather as a desiring subject.
10. The process of mutual semiotic recognition leads to the emergence of subjectivity in the infant, eventually effected in the use of "I" and "you". (p. 21)

Inevitably, many of us are unable to perform well in the signs of one or other of the signways. However, most of the time our relative inadequacies go unnoticed?unless we have difficulty functioning in the social-personal signway. These remarkable inter- and intra-personal capabilities are usually taken for granted even though some people, especially those labelled with autism, have extreme difficulty in making and using representations in this signway. Children with autism display deficits on typical standardized measures of interactional ability and self-concept development. Typically, these assessed deficits are interpreted from a standard cognitive perspective involving theory of mind concepts (e.g., Baron-Cohen, 1995; Happé & Frith, 1995). However, other explanations have also been offered (cf., Hobson, 1993; Loveland, 1993).

In the process of becoming competent in the social-personal signs of one's culture from infancy through adulthood, one's personal side gradually becomes more developed and integrated with the signs of the surrounding culture (cf., Barth, 1997; Shweder & Bourne, 1984). The emphasis on personal development, on becoming who one is in a given cultural context, has been described by many psychologists. However, several scholars have also addressed the self from a semiotic perspective, including Colapietro (1989), Muller (1996) and Wiley (1994). For example, Wiley (1994) combines some major ideas of Charles Peirce and George Herbert Mead in his attempts to establish an autonomous "semiotic self". Depending on the researcher's preference, any one of a number of possible theoretical frameworks might be used to explain the structures and processes of the personal self.

In any examination of the social-personal signway, cultural components of the developing personal self must be acknowledged as explicitly as they are for the other signways. Tomasello (1993) offers a step in this direction:

> Human cognition, including cognition of the self, is in large measure a social enterprise… . Accounts that ignore the social dimension of human cognition and focus only on information processing will not only distort many facts about human cognition but also will be incapable of explaining even the

most rudimentary phenomena of human self-understanding. (p. 182)

The Naturalistic Signway

The naturalistic signway involves the classification of physical objects and events, and the recognition of patterns, in the Lebenswelt. This signway differs from the social-personal signway through establishing meanings from functional categories and patterns created from environmental phenomena rather than from dialogical exchanges with another person. These categories are constructed from a wide variety of signs that include cultural artifacts such as clothes and cars and rituals such as shopping and ordering food in restaurants. The naturalistic signway recognizes the capability to distinguish among objects and to discern patterns within both natural and cultural phenomena. For example, those who are expert at fishing, farming, gardening, and cooking reflect high levels of competence in this signway. Sometimes competence can be shared or taught, as is the case for biological taxonomies or dance notations. At other times, competence resides within the individual and must be learned by others through experience. Below, I shall first address categorization and then patterning.

To begin with categorization, this capability may have evolved from survival pressures based in biology. Today, however, relevant processes apply equally well to cultural phenomena with no evidence that the resulting categories must be transferred from the biological to the cultural sphere (Hirschfeld, 1994). Hence, the ability to categorize and classify is now as much a hallmark of competence and survival in culture as it is in nature. Prior concepts support the development of classifications that in turn foster and shape larger belief systems (Keil, 1994).

Patterns, which in everyday life are often associated with dynamic situations, appear in most natural and cultural phenomena. The rhythm of the seasons is an example of the former, and marriage ceremonies are an example of the latter. Patterns are reflected in most of the scripts devised to permit a person to behave appropriately in social arenas. For example, in North America and increasingly around the world, people dine regularly in so-called fast food outlets of which the outstanding icon is the stylized "M", the "golden arches", of the McDonald's chain of restaurants (cf., Manning & Cullum-Swan, 1994; Sneddon, McDougall & Moskal Fysh, 1994). McDonald's is a semiotic delight for its assorted advertising blitzes, gimmicks, colors, menu arrangements, and routines. Its patterns have been learned by all patrons who are able to function at McDonald's restaurants in approved fashion. However, similar patterns can be specified for functioning competently in social institutions such as court houses, banks, churches,

hospitals, and schools and at social gatherings of all kinds. For the latter, books and general advice on such matters as etiquette have long been popular within particular social circles. As is the case for the other signways, some individuals display great ability in mastering knowledge and performance of the naturalistic signway. This ability extends to both cultural and natural patterns, although I have emphasized the former element.

Summary

Peircean notions are fundamental to understanding semiosis within the various signways and to guide relevant inquiry in psychosemiotics. Two aspects of Peirce's thinking in particular are central to adopting a psychosemiotic perspective. In the first place, Peirce outlined a theory of signs that incorporates feeling and emotion as Firstness at the heart of every developing and developed sign, even if the sign eventually functions in the abstractness or habit of Thirdness. Thus, feeling and emotion intrude into rational thought and action, and underline the view that all cognition begins as embodied. In the second place, Peirce's theory of signs offers a framework for understanding psychosemiotics as an evolutionary phenomenon that operates within particular biological possibilities and restraints. In this way, theory and research in psychosemiotics must attend to the human proclivities that have been developed over eons of time. Guided by Peircean notions, psychosemiotic research involving the signways can be expected to both supply and apply an amalgam of psychological and semiotic insights. The eventual utility of psychosemiotics will be seen in a range of pragmatic cultural activities such as educational practice (Smith, 2001).

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