

Musical Semiosis as a Process of Learning and Growth

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Introduction

Music signification can encompass two things: signification *in* music and signification *of* music. Neither is given in our biological inheritance nor cast in stone in the cultural forms of notations, performances, or aesthetic ideals. Instead, the shades of meanings suggested by *in* and *of* music are dynamically learned and grown into. The goal of this essay is to present a synoptic outline of these interrelated aspects of music signification. More emphasis is given to signification *in* music, since that aspect provides the basis for the meanings that musics—as multifaceted phenomena—have in the lives of individual people, their societies, and cultures.

My approach is systematic rather than developmental. Instead of summarizing musical development semiotically, the phylogenic, ontogenic, and sociogenic processes are conflated into one synchronic view of the system of musical semiosis. My approach is decidedly Peircean: the terms and tools employed owe allegiance to Charles S. Peirce's theories of semiotics and pragmatism. As I address music, my starting point is a pragmatist conception, outlined below; as I address learning and the arts, I draw from John Dewey's philosophy and more recent semiotics of education.

Before focusing specifically on music, the first part of this article discusses semiosis as a whole by examining the practical process of inquiry, habits, beliefs, and meanings. The second part turns to the relation of learning and semiosis. The third part then turns to musical semiosis. The goal is to outline a pragmatist hypothesis of how meaning is formed in music through signs in situations created by subjects in order that they be communicated, perceived, and experienced. In the process, I will develop a view of how musical semiosis—signification—is permeated with learning and growth.

The Pragmatic Triangle as a Model of Being-in-the-World and Pragmatic Inquiry

To begin, there is a distinction between *theoretical semiotics* and *applied semiotics*. Applied semiotics deals with semiotic issues in particular contexts, with objects and subjects participating in semiosis, but usually without an immediate concern for developing a theory of signification (see, for

example, Eco 1979, 3; Nöth 1995, 5; Danesi and Perron 1999, 40; Ojala 2013). I, however, am interested in the study of sign systems and the theory of sign functioning in general, “the general conditions of signs being signs” and “the necessary conditions of the transmission of meaning by signs from mind to mind” (CP 1.444).

The study of sign systems entails the study of mind and thinking, since, as Peirce put it, “every thought is a sign” (CP 1.538) and “*thought* is the chief, if not the only, mode of representation” (CP 2.274). It also entails studying how mind is related to the actual world, including its organisms and other objects. In Peirce’s words: “We are accustomed to speak of an external universe and an inner world of thought. But they are merely vicinities with no real boundary between them” (CP 7.438). This view accords well with current approaches to cognition (see, for example, Shapiro 2014; Newen, De Bruin and Gallagher 2018).

The big picture of the dynamic system of signification is best described by *the semiotic triangle* (fig. 1). Peirce defined a sign as

anything which on the one hand is so determined by an Object and on the other hand so determines an idea in a person’s mind, that this latter determination, which I term the *Interpretant* of the sign, is thereby mediately determined by that Object. A sign, therefore, has a triadic relation to its Object and to its Interpretant. (CP 8.343)

<PLEASE INSERT FIG. 1 ABOUT HERE>

Figure 1: The semiotic triangle

The semiotic triangle depicts a pragmatist model of being in the world, a model where a living organism, capable of perceiving, interpreting the perceived, and acting thereupon—i.e., capable of representation—is in a continuous, dynamic interaction with the *hard facts* of actual objects in actual situations of the world (CP 1.324; Määtänen 1993, 40–53; Määtänen 2015, 21–23; Ojala 2009, 290–97). The immediate object of the sign (iO in fig. 1) consists of the accessible, perceivable features or qualities of the dynamic object (dO). These are interpreted, resulting in interpretants of the particular sign.

The many accounts of interpretants in Peircean semiotics speak of the complexity and ambiguity of both the phenomenon and the notion (see, for example, Bergman 2003; Short 2007, 178–206). Here, it suffices to differentiate among the immediate (iI), dynamic (dI), and final interpretant (fI). The immediate interpretant requires an acquaintance with the system of signs, which determines the sign’s

interpretability: as such it is tantamount to “the interpretant as it is revealed in the right understanding of the Sign itself, and is ordinarily called the *meaning* of the sign” (CP 4.536).

At the core of pragmatist thought, however, is the maxim that the meaning of an object is equated with its practical consequences:

Consider what effects that might conceivably have practical bearings we conceive the object of our conception to have: then, our conception of those effects is the whole of our conception of the object. (CP 5.2; 5.402; 8.119)

As John Dewey illustrates, “the word ‘hat’ gains meaning in the same way as [an actual] hat, by being used in a given way” (1916, 19). In contrast to the immediate interpretant, which only “consists in the *Quality* of the Impression that a sign is fit to produce, not to any actual reaction” (CP 8.315), the dynamic interpretant (dI) is “whatever interpretation any mind actually makes of a sign,” a semiotic effect, more or less connected to (possible) action, but nevertheless always involving actual reaction. In other words, meaning is tied to practical activity in the world and its ramifications based on a subject’s habits of feeling, action, and thinking.

Lastly, the final interpretant (fI) is the result of interpreting the sign that “does not consist in the way in which any mind does act but in the way in which every mind would act” (CP 8.315). It is an ideal and indefinitely extended interpretation of the sign. The notion of the final interpretant resonates in the pragmatist conception of “truth” as “that at which inquiry aims” (CP 5.557). Beliefs gradually adjust during the process of inquiry as the sign conforms to its object (CP 5.554), that is, represents it more logically, or truthfully, at least from the viewpoint of the interpreter of the sign. Meanwhile, we act according to our current habits or existing beliefs.

Semiosis is an adaptive process of inquiry. When the interpretation of the sign conflicts with an established belief, it becomes what Peirce called an “irritation of doubt” that “causes a struggle to attain a [new] state of belief” (CP 5.374). The conflict initiates “the action of thought” that only “ceases when belief is attained” (CP 5.394): for Peirce, the “whole end of inquiry is the settlement of belief” (CP 8.41).

A few remarks may help clarify. First, how a sign is interpreted is determined not only by the object, but also by what Peirce called “collateral experience” (CP 8.314). Also called “collateral observation,” Peirce describes it as “previous acquaintance with what the sign denotes” (CP 8.179). Later, he points out that “no sign can be understood—unless the interpreter has ‘collateral acquaintance’ with

every Object of it” (CP 8.183, emphasis mine; see also Short 2007, 192–94). Each sign is interpreted in its relation to a set of references, to the pertinent *accumulated experience* (see, for example, Short 2007, 193n11; Ojala 2009, 300; Määttänen 2015, 62 and 73).

Second, it may not be easy—or even necessary—to distinguish among experience, belief, and habit. Peirce even uses the term “belief-habit” (CP 1.107; 2.148; 3.160), and he describes belief as a special case of habit, as “[a] cerebral habit of the highest kind, which will determine what we do in fancy as well as what we do in action” (CP 3.160; also 5.397). Here, Peircean pragmatism and semiotics meet. The interpretation of signs is based on habits. Reciprocally, interpretation either changes or fortifies established habits during the process of inquiry. Consequently, the collateral experience required for interpretation is the collection of established habits of feeling, action, and thinking (see fig. 1 above), functioning as a framework for interpreting the sign into immediate, dynamic, and final interpretants, respectively. Hence, each “belief is partly determined by old beliefs and partly by new experience” (CP 3.161). In this respect, mind can be taken as the total sum of the habits guiding our action as it dynamically evolves through inquiry.

Finally, the process of inquiry reveals that the accumulated experience and habits are not volatile or particular, but law-like, general, and beyond the temporal scope of immediacy or actuality. According to Peirce,

every habit has, or is, a general law. Whatever is truly general refers to the indefinite future; for the past contains only a certain collection of such cases that have occurred. The past is actual fact. But a general (fact) cannot be fully realized. It is a potentiality; and its mode of being is *esse in futuro*. The future is potential, not actual. What particularly distinguishes a general belief, or opinion, such as is an inferential conclusion, from other habits, is that it is active in the imagination. (CP 2.148)

The possibility of relying on habits allows us to make predictions of the future based on the past experience, and then to act accordingly. Consequently, overcoming temporal volatility opens up avenues for *imagination*, the competence of anticipating and estimating hypothetical, virtual situations. Peirce describes imagination as

an affection of consciousness which can be directly compared with a percept in some special feature, and be pronounced to accord or disaccord with it. Suppose for example that I slip a cent into a slot, and expect on pulling a knob to see a little cake of chocolate appear. My expectation consists in, or at least involves, such a habit that when I think of pulling the knob, I imagine I see a chocolate coming into view. When the perceptual chocolate comes into view, my imagination of it is a feeling of such a nature that the percept can be compared with it as to size, shape, the nature of the wrapper, the color, taste, flavor, hardness and grain of what is within. (CP 2.148; see also Ojala 2009, 25–34)

Anticipating actual situations and imagining virtual situations have, according to the pragmatic maxim, practical bearings (see *CP* 2.148). Without a direct constraining of semiosis by the hard facts, imagination may be erroneous, and in some cases, potentially harmful, since we “risk a great deal” on our living beliefs (*CP* 5.589). Conflicts between habits and encountered or imagined situations are resolved through further inquiry, resulting in adjustment of habits. Furthermore, imagination may expand habits of feeling, action, and thinking, and engage us in an interaction with the world in new ways. These possibilities may create unprecedented situations in the actual world to be experienced by the self and by others. In short, the fallibility of inquiry and imagination enables *creative* action (Ojala 2009, 31).

Semiotic Understanding of Learning and Growth

Peirce’s writings do not deal extensively with learning or teaching—nor does his philosophy much engage music or the arts. While writers like Peirce’s student John Dewey have had a notable impact on theories of art and education, a more specifically semiotic approach to learning has only recently emerged in the form of *edusemiotics*. Here, the notion of learning is examined in ways that serve the current task, the analysis of musical signification.

At the core of semiotics of learning is the process of inquiry, the interpretation of signs, and the subsequent adaptation to the hard facts through adjustment of habits of feeling, action, and thinking. According to Peirce, “the interpretation is the learning” (*CP* 7.536), which leads to the notion of learning as change of habits. Nöth explicitly connects the principle of adaptation with learning and growth in inquiry:

Self-correction from errors or for the purpose of adapting to the semiotic environment is a form of autonomous learning. By acquiring new and changing old meanings, signs and sign systems become better adapted to their purpose of creating interpretants. Through learning, signs and semiotic systems grow. (2014, 12; see also Gough and Stables 2012; Olteanu 2017, 194)

Learning is the goal-oriented and active construction of knowledge. Through action, the environment is modified, as action affects the dynamic objects. Through the immediate object, partly determined by the dynamic object, the changes in the environment may again be perceived and interpreted. The active subject in the changing world propels a continuous learning cycle, the spiral of semiosis. While current beliefs are what we are willing “to risk a great deal upon,” Peirce’s account of self-correction in inquiry emphasizes the “conditional ideal” of truth:

Thus it is that inquiry of every type, fully carried out, has the vital power of self-correction and of growth. This is a property so deeply saturating its inmost nature that it may truly be said that there is but one thing needful for learning the truth, and that is a hearty and active desire to learn what is true. If you really want to learn the truth, you will, by however devious a path, be surely led into the way of truth, at last. No matter how erroneous your ideas of the method may be at first, you will be forced at length to correct them so long as your activity is moved by that sincere desire. (*CP* 5.582)

What is being learned when habits change clearly depends on what kind of interaction takes place with the evolving nature of objects, what features of the objects are accessible to the subject, and how the features of the object are represented in previous habits of feeling, action, and thinking. Hence, learning is constructivist, contextual, and situated; signs are embodied in the environment and in our experience (see Semetsky 2017, 6; 144–49).

Habits overcoming temporal volatility means that a situation can be perceived not only as an immediate object of the “object” of learning, but of the *process* of learning as well. That is, signs can be signs of semiosis itself, of how habits change in connection with a subject’s action, and what is the relationship between habits of action (i.e., the meaning of the sign) and the subject’s environment (i.e., the context of the sign). This prompts the subject’s growth toward self-regulation. Interaction between the self and others—enabled by the interpretation of dynamic objects—entails the development of a theory of mind: the ability to distinguish among oneself and others and to understand all as individual, semiotically empowered subjects.

Learning is a “self-organizing activity of the ecosocial system” in which individual subjects participate as members of learning communities (Lemke 1997, 48). Learning practices, therefore, are thoroughly social and cultural, and not just a matter of an individual subject’s cognitive re-organization. Learning basic skills for action and interpretation is a prerequisite for learning to act in social contexts. While the starting point here has emphasized the individual, the social and cultural aspect of semiosis and learning should be given their due attention. According to Olteanu, “learning is both a cultural and a biological phenomenon; and is continuous with the rest of the world. Living and learning are coextensive and cannot be separated” (2017, 202).

These views of learning and growing point to the complex habits of action needed for social interaction and cultural agency. Yet the body, with its sensorimotor and nervous apparatuses, is not only the underlying vessel for semiosis, but, as Olteanu writes, “the body is the learning self” (2017, 200). In

semiosis, we realize meanings as habits by physically acting on dynamic objects, the features of which are manifested in semiosis as an immediate object. Semiosis is an actual process of the subject-organism. Semiosis, mind, and learning are both socially and individually embodied.

A Pragmatist Conception of Music

The ubiquity of music across time and place, its varying social conventions, and the cultural diversity of different musics, understandably lead to multiple constructions of the concept of “music.” Yet, in order to consider the semiotics of music and learning, the concept needs to be delineated within a Peircean framework. The following is a heuristic outline of *a pragmatist conception of music*, expressed in six premises, used here as an abductive model and tool for examining the system of music signification (see Ojala 2008; 2009, 94–142; 2010).

(1) *Music is real*. Music is a semiotic process that involves subjects as bodily, perceiving, thinking, and acting organisms. A subject’s existence, formed through practical inquiry and the experience that accumulates therein, interprets organized sounds (broadly understood) as real objects of the actual world.

(2) *Music is communicative*. Through music, some purport is shared through the production of dynamic objects across individual, social, and cultural channels. Communicative praxis is the action used to affect the experience of subjects—others or oneself—participating in the process. This action is guided by the practical wisdom of “what is good” (Aristotle, *NE* 1140b), in momentary and long-term scales of time. The interpretation of a sign may be different from the intended meaning, and depends on the interpreter. Regardless, the habits of producing and experiencing a sound can be shaped and reshaped.

(3) *Music is representational*. Sound, as a dynamic object, is detached from its origin: in a sense, it is *acousmatically liberated* from its source or cause (for example, an instrument; see Schaeffer 1966, 91–92; Chion 1983, 18). Hence, in music, sound becomes a sign, regardless of where a subject’s process of interpretation may lead, and may be perceived and interpreted as standing for something beyond itself.

(4) *Music is useful*. The sound can be perceived and interpreted in ways serving the needs of the listener. The acousmatic liberation enables music to function as a “laboratory” for experiencing, a (relatively) safe testing-ground for actual or possible, virtual situations.

(5) *Music is embodied*. Semiosis in music, and in general, is embodied through (a) participants and sound being dynamic objects; (b) participants being capable of interaction with the environment (that is, engaged in inquiry); (c) representation taking place in the nervous system; and (d) representation being based on spatial characteristics of perceived features of objects (see, for example Zbikowsky 2002; Ojala 2009, 328–29; Larson 2012; Cox 2016).

(6) *Music is non-arbitrary*. The interpretation of the sign (the features of the sound) is based on isomorphisms and metaphors, so that the features, objects, and situations of sounds stand for other, analogous features not based on random choice or arbitrary agreement.

The Constitution of the Sign in Music

Peirce's sign theory is based on three phenomenological categories (firstness, secondness, and thirdness), and three relations: the sign in itself, the relation of the sign to its object, and the relation of the sign to its interpretant (*CP* 2.227–64). Instead of traditional presentations in triangular but two-dimensional illustrations, tables, or written-out trichotomies (for example, *CP* 8.376; 2.264; Cumming 2000, 80–104; Short 2007, 207–34; see also Monelle 1991), figure 2 brings out the three-dimensionality of the model. The three trichotomies yield, not 27, but ten classes of the sign, due to the inclusion of firstness in secondness, and secondness in thirdness. What follows describes the transitions between the phenomenological categories in each trichotomy. Based on the premises above, and the transitions between the phenomenological categories of Peirce's ten-fold classification, the constitution of the sign in music can be summarized as follows, coincidentally in six parts (*CP* 2.227–264; Ojala 2006; 2009, 265–83, 306–28, 431–37). The transitions are:

- (1) *manifestation* of qualisign in sinsigns,
- (2) *selection* or *filtering* of icons into indices,
- (3) *binding* of rhemes to dicents,
- (4) *definition* or *categorization* of sinsigns in mutual relation with legisigns,
- (5) *correlation* of indices to symbols, and
- (6) *understanding*: dicents leading to arguments.

<PLEASE INSERT FIGURE 2 ABOUT HERE.>

Figure 2: The constitution of the sign in Peirce's tenfold classification

What follows outlines the semiotic model in figure 2, accompanied by a rudimentary sketch of what each transition may entail, in indented text. While this sketch uses the opening of the first movement of Beethoven's Piano Sonata op. 81a ("Les Adieux"), please note the model is not limited to Western classical music.

First, the accessible, changing features of sound, shaped and reshaped in order to affect experience, are *manifested* in perception for interpretation. That is, the possibilities of the qualisigns as signs are embodied in actually felt sinsigns (CP 1.306; 1.422–6; 2.244; 2.254). The sign is thereby causally and logically connected with the actual world through perception. The word "music" may refer to notation, but clearly, if *music* is understood *as semiosis*, it is necessary that actual vibrations of atmospheric pressure affect us as subject-organisms and produce a perception of sound in our perceptual system. That said, we may develop habits that enable us also to *imagine* the actual sound in more or less accurate ways. This is mental imagery of sound. Those familiar with "Les Adieux," or capable enough of solmization, can evoke the perception of the opening. The qualities of the sound of the opening have the possibility of signifying, but become meaningful only after they are really heard, as a particular performance, as actual or imagined sound.

Second, the continuous, chaotic flow of perceivable features is filtered, and relevant features of the sound are *extracted or selected*; relevance is determined in relation to accumulated experience. This is a pivotal transition in terms of growth from a mere reaction to an actual representation of objects. Growth is necessary for cognitive processes, where "concepts have function in reasoning and in acting that is independent of perception" (Gärdenfors 2000, 122). In music, this implies the emerging of meaningful perceptual elements, such as pitch, volume, or timbre. Different traditions (cultures, styles, genres, works) of music vary in terms of their "form-bearing elements" (McAdams 1989). In Beethoven's sonata, regardless of the actual performance, it may be relatively safe to assume that the selection of an average listener's perception is mostly geared to a relatively quiet *volume*, an evenly and slowly paced *rhythm* and *tempo*, a consistent piano *timbre*, and, in varying ways, to the *pitch* organization, both "horizontally" and "vertically." Clearly, there are individual and cultural differences in what is and what is not perceived as meaningful, and the selection is affected by not only the habits of the listener, but also by possible

disturbances and incidental noise. Note that the listener's habits of selecting may be developed not only by exposure and participation, but, even at this fundamental level of semiosis, also through goal-oriented study, which is largely the objective of music analysis.

Third, actual object representation requires a *binding* of the selected features, each carrying potential clues for representation, into a unified experience, resulting in a more or less coherent factual representation of the object. The unified features tend to correspond, since the actual world has a relatively consistent "logic" of causal relations of dynamic objects (although this is not always the case—a sign can present its object falsely, after all). The consistency is important, as it enables the development of habits and imagination, and is thereby the basis for the subject's logical operation in general. While "a *Rheme* is a Sign which, for its Interpretant, is a Sign of qualitative Possibility" (CP 2.250), a *Dicent* is, for its Interpretant, a "Sign of actual existence" (CP 2.251). For music, the features of sound are bound to sound objects, a notion understood broadly as the auditory structuring of tones with pitch and duration, melodic and rhythmic motifs, harmonies, but also as other objects, since sound is but a part of the sign. Here, the opening three events form an organic entity, aided by the longer duration of the chord in measure 2 and subsequent change of texture (albeit the three events can also be taken as separate sound objects). The three may amount to a unified musical *gesture* (see Hatten 2004, 109; 177). At the indexical level (fig. 2), the pitch, temporal, and timbral features are organized into a sound object, a unified Gestalt that will not be interpreted based on its immediate source, unlike a ringtone signaling an incoming phone call, but that we find meaningful and useful. The sound object is a sign of actual existence, but what and how it signifies requires further development of the sign. Part of this process is binding, which takes place at the symbolic level (VIII–IX in fig. 2).

Fourth, the particular perceptual features and perceived objects of sound are compared with and thereby defined by the relevant accumulated aggregate of similar features and objects, initiating a reciprocal process of mutual updating; the relation between particular sinsigns and law-like legisigns is a relation of mutual definition (CP 2.246; 8.334). In this manner, the temporal volatility of the particular is overcome, and law-like habits are formed. So far, the description of how the opening of "Les Adieux" is constituted as a sign, has mainly dealt with a particular: an instance of its (actual or imagined)

performance. It has become clear, however, that there are differences in how meaningful features are selected and subsequently combined into a sound object. These result from how the habits are established across listeners, and how they change over time. The interpretation of each particular sign here, that is, each feature and object in “Les Adieux,” is determined by how it relates to the corresponding habit-like sign of the listener. For instance, the first sets of pitches are perceived and interpreted in relation to how our conceptual *pitch space* is structured: for example, in terms of pitch height or consonance vs. dissonance of intervals and chords, which in turn, depends on the physiology of hearing, the complexity and context of the sound, and the socially and culturally learned habits, the latter increasing in importance the further the interpretation proceeds. Reciprocally, each listening of the opening reinforces the habit—the schematic surprise (Huron 2007, 270–71)—of a deceptive chord progression for those who have developed such a habit: the two first events set up expectation of a E \equiv major chord, but the emerging bass line turns the consequent chord into a C-minor chord. (Regelski 2017). Insofar as meanings are habits, immersion in musical semiosis results in learning habits that propel the semiotic process further by guiding the subject’s future actions and inquiries, in musical praxis, but also at large. The significance of these actions is again determined by their use: subjects may engage in musical praxis, producing organized sounds for themselves or for others to experience. As a result, the individual subject learns to *autocommunicate* and to *communicate* by using subjective and intersubjective semiotic processes of music (fig. 3). Such actions serve individual needs, such as needs for self-regulation, identity negotiation, and regulation of emotions. These are important for the subject’s well-being and may lead to overall benefits in cognitive performance and creativity (see Hallam 2015). Such action and participation also serve joint social and cultural needs, such as those of group identity, conflict resolution, and cultural transmission.

<PLEASE INSERT FIGURE 3 ABOUT HERE.>

Figure 3: Parallel processes of semiosis

In shaping and reshaping sounds and situations of music, the subject deploys imaginative ability: “possible worlds” can be engaged and explored; hypothetical situations can be estimated and assessed; and the hard facts of dynamic objects can be ignored or transcended as the subjects act under imaginary

circumstances that may (or may not) be realized. The presented sound presented constitutes a situation, shaped so, that—together with the collateral experience—the interpretation will produce an experience that reinforces, readjusts, or creates habits of action (see left or right half of fig. 3, musics of two subjects). When realized, the subject's habits of "real action" would have been prepared by imagination (see *CP* 2.148, cited earlier); hence, the individually and socially rewarding virtuality of music semiosis.

Distinguishing between autocommunicative and communicative practices in music is not easy. Interpretation of shared sounds differs among individuals, social groups, and cultures, but the dynamic object—the sound—is the same. Through interpretation, the sound may convey complex meanings between subjects, even though it does not contain them (see fig. 3, both sides). This is because we, as subject-organisms, are also dynamic objects for our own semiosis. There are similarities in habits arising from similar experiences of, say, early physical and social development, or the generally similar stages of cognition at various ages. We more or less intersubjectively share habits of feeling, action, thinking, and the collateral experience relevant to the interpretation of sound. By way of contrast, though, there are variations in habits that are due to individual, social, and cultural differences.

The ubiquity of musics hosts a rich variety of intersubjective practices where individuals participate in the semiotic process of interpreting sound to explore and experience actual or virtual situations. Through exposure and active participation, semiotic practices are learned. The outcome contributes to our semiotic empowerment and agency: we grow *into* and *as* individuals. Through sharing the dynamic object of sound in these processes and by interacting with others, we learn. Since actions are realizations of habits of *meaning*, through communication (and autocommunication) we learn of ourselves and of others, and grow into a better understanding of how and who we are, and what the world is to us.

References

- Aristotle. (s.a.) 2009. *The Nicomachean Ethics*. Translated by David Ross. Reprint, Oxford: Oxford University Press.
- Bergman, Mats. 2003. "Peirce's Derivations of the Interpretant." *Semiotica* 144 (1/4): 1–17.
- Bowman, Wayne and Ana Lucía Frega, eds. 2012. *The Oxford Handbook of Philosophy in Music Education*. Oxford: Oxford University Press.
- Chion, Michel. 1983. *Guide des objets sonores*. Paris: Buchet/Castel.
- Cox, Arnie. 2016. *Music and Embodied Cognition: Listening, Moving, Feeling, and Thinking*. Bloomington: Indiana University Press.
- CP = Peirce, Charles S., Charles Hartshorne, Paul Weiss, and Arthur W. Burks, eds. 1931–1958. *The Collected Papers of Charles Sanders Peirce*. Electronic Edition. Charlottesville, VA: InteLex.
- Cumming, Naomi. 2000. *The Sonic Self: Musical Subjectivity and Signification*. Bloomington: Indiana University Press.
- Danesi, Marcel, and Paul Perron. 1999. *Analyzing Cultures: An Introduction and Handbook*. Bloomington: Indiana University Press.
- Dewey, John. (1916) 1980. *Democracy and Education*. The Middle Works 9, edited by Jo Ann Boydston. Reprint, Carbondale: Southern Illinois University Press.
- Eco, Umberto. 1979. *A Theory of Semiotics*. Bloomington, Indiana University Press.
- Gärdenfors, Peter. 2000. *Conceptual Spaces: The Geometry of Thought*. Cambridge, MA: MIT Press.
- Gough, Steve, and Andrew Stables. 2012. "Interpretation as Adaptation: Education for Survival in Uncertain Times." *Curriculum Inquiry* 42 (3): 368–385.
- Hallam, Susan. 2015. *The Power of Music*. London: iMERC.
- Hatten, Robert. 2017. *Interpreting Musical Gestures, Topics, and Tropes: Mozart, Beethoven, Schubert*. Reprint, Bloomington: Indiana University Press.
- Huron, David. 2007. *Sweet Anticipation: Music and the Psychology of Expectation*. Cambridge, MA: MIT Press.

- Larson, Steve. 2012. *Musical Forces: Motion, Metaphor, and Meaning in Music*. Bloomington: Indiana University Press.
- Lemke, Jay. 1997. "Cognition, Context, and Learning: A Social Semiotic Perspective." In *Situated Cognition: Social, Semiotic, and Psychological Perspectives*, edited by David Kirshner and James A. Whitson, 37–56. Mahwah, NJ: Lawrence Erlbaum.
- Määttänen, Pentti. 2003. "Aesthetic Experience and Music Education." *Philosophy of Music Education Review* 11 (1): 63–70.
- Määttänen, Pentti. 2015. *Mind in Action: Experience and Embodied Cognition in Pragmatism*. Cham: Springer.
- McAdams, Stephen. 1989. "Psychological Constraints on Form-bearing Dimensions in Music." *Contemporary Music Review* 4: 181–198.
- Monelle, Raymond 1991. "Music and the Peircean Trichotomies." *International Review of the Aesthetics and Sociology of Music* 22 (1): 99–108.
- Newen, Albert, Leon De Bruin, and Shaun Gallagher, eds. 2018. *The Oxford Handbook of 4E Cognition*. Oxford: The Oxford University Press.
- Nöth, Winfried. 1995. *Handbook of Semiotics*. Bloomington: Indiana University Press.
- Nöth, Winfried. 2014. "Signs as Educators: Peircean Insights." In *Pedagogy and Edusemiotics*, edited by Inna Semetsky and Andrew Stables, 7–18. Rotterdam: Sense Publishers.
- Ojala, Juha. 2006. Peirce's Ten Classes of Signs and Spatiality in Semiosis. In *Music and the Arts*, vol. 1, edited by Eero Tarasti, 199–209. Imatra: International Semiotics Institute.
- Ojala, Juha. 2008. Spatial embodiment of musical semiosis. In *Music–Senses–Body*, edited by Dario Martinelli, 497–504. Roma: Università di Roma Tor Vergata.
- Ojala, Juha. 2009. *Space in Musical Semiosis: An Abductive Theory of the Musical Composition Process*. Imatra: International Semiotics Institute. <http://urn.fi/URN:ISBN:978-952-5431-28-5>
- Ojala, Juha. 2013. "Reach or Breach? On Methodological Approaches to the Study of Musical Signification." In *Music: Function and Value*, vol. 1, edited by Teresa Malecka, and Małgorzata Pawłowska, 281–294. Cracow: Akademia Muzyczna w Krakowie.

- Olteanu, Alin. 2017. "Reading History: Education, Semiotics, and Edusemiotics." In *Edusemiotics: A Handbook*, edited by Inna Semetsky, 193–205. Singapore: Springer.
- Regelski, Thomas. 2017. "Pragmatism, Praxis, and Naturalism: The Importance for Music Education of Intentionality and Consummatory Experience in Musical Praxes." *Action, Criticism, and Theory for Music Education* 16 (2): 102–43.
- Rosen, Charles. 1995. *The Romantic Generation*. Cambridge, MA : Harvard University Press.
- Schaeffer, Pierre. 1966. *Traité des objets musicaux*. Paris: Éditions du Seuil.
- Semetsky, Inna, ed. 2017. *Edusemiotics: A Handbook*. Singapore: Springer.
- Shapiro, Lawrence, ed. 2014. *The Routledge Handbook of Embodied Cognition*. London: Routledge.
- Short, Thomas L. 2007. *Peirce's Theory of Signs*. Cambridge: Cambridge University Press.
- Zbikowsky, Lawrence. 2002. *Conceptualizing Music: Cognitive Structure, Theory, and Analysis*. Oxford: Oxford University Press.





