Music Cognition as a Window to the World: An Experiential and Epistemological Approach

Mark Reybrouck
University of Leuven – Belgium

Introduction

Worldviews are windows to the world. They can be static in referring to visual connotations as suggested by their name, but they can hold a dynamic and genetic view as well. As such, they imply a fundamental cognitive orientation, involving selection, interpretation and interaction with the world. What matters, in this view, is a kind of sense-making or semiotization of the world.

The semiotization of the "sonic world", accordingly, can be approached from different epistemological positions: is music reducible to symbolic labels that function as names, or is music only music when it sounds? And is music to be considered as an artifact that is out there or as something that must be listened to in order to make sense? Rather than joining these discussions, I propose to broaden the focus and to embrace psychological claims as well. Though psychology is not commonly considered as semiotics' companion theory of truth, there are points of convergence with respect to the hierarchical arrangement of epistemic interactions with the sounds: there is a lower level processing of sensory input (sensation), a somewhat higher level (perception) which involves a first level of sense-making—mostly at a preverbal level—, and a higher level of sense-making which is commonly labeled as cognition.

In what follows I will argue for a cumulative model with lower levels not being substituted by higher ones, but with higher levels being superposed on them. Music, in fact, is a sounding art with the richness of it sonorous unfolding as one of its major characteristics. Music processing, therefore, should keep step with the music as it unfolds over time, in a dynamic tension that does justice to the level of sensation as well as to the listener's continuous epistemic interactions with the sounds (Reybrouck 2005).

Music and the Sonic Universe

Music, as studied in academic circles, is mostly a restrictive category with a prevailing reduction to Western art music. There is, however, a

broader conception of music that deals with musics of the world, but even this broader interpretation calls forth a humano-centric web of culture in which there is little room for the natural (Geertz 1973). It is arguable, therefore, to broaden the scope still further and to conceive of music in its most general definition as being part of the *sonic universe* (Cogan 1984) which can be considered as a collection of sounding elements that represents the totality of sounds as a virtual infinity of possible combinations of individual vibrational events. Music, in this view, is merely a subuniverse of this more encompassing sonic universe, which is constrained by the limitations of human auditory physiology and psychology (range of hearing, absolute and differential thresholds) as well as by the pitch and timbre selections of the musical cultures all over the world.

The question, further, remains as to the delimitation of the sounding elements, which are eligible for inclusion in this musical subuniverse. Should we conceive of existing or man-made sounds, and of natural or artificial sounds? And is there a critical distinction between these kinds of sounds? The whole history of musical instrument building, e.g., has been one prolonged search for applying craftsmanship to raw materials in order to obtain "musical" sounds. About all kinds of materials have been scrutinized for what they afford to human ears from a musical point of view. This holds true for traditional instruments as well as for the many attempts at finding new sounds out of new materials (Reybrouck 2006). The related question is how listeners deal with these sounds. Is it enough to pick up musical sounds with a characteristic acoustic structure or is there need of some cognitive structuring by the listener? The question is important as it cuts across the objective/subjective dichotomy. Musical sounds, in fact, point to both ways: they are part of an existing structure that is objectively there, but the pickup of sounds depends on acts of focal attention which are subjective to a great extent.

Musical Sense-Making and the Continuous/Discrete Dichotomy

The objective/subjective dichotomy highlights the tension between music as a structure or artifact and the actual experience of music. The latter, especially, is the hallmark of music as a temporal and sounding art, which is characterized by its sonorous articulation over time. It calls forth *real time listening* and the construction of music cognition as the outcome of continuous epistemic interactions with the sounds. Cognition, however, mostly proceeds from "continuous" sensory processing to "discrete" and "symbolic" labeling with the transition from knowledge-by-acquaintance to forms of conceptual knowledge. This is the distinction between *percepts* and *concepts*, as described very elo-

quently in William James' doctrine of *radical empiricism* (James 1911). Conceptualization, however, is reductionist as it inserts percepts in a conceptual map, with the map remaining superficial through the abstractness and discreteness of its elements.

The continuous/discrete dichotomy, further, is a central issue of musical sense-making. It describes the transformation from a flux to some kind of objectification, which has been called also the *dynamics of representation* (Godøy 1997: 66). It allows the listener to think of a sounding flux in different temporal representations, from real time and fine-grained moment-to-moment sequential unfolding to concentrated overviews that represent longer stretches of time in a kind of instantaneous and synoptic overview. The latter represent larger temporal unfoldings at a glance and emancipate themselves from a merely time-bound character of representation. As such, they lack sensory resolution (fine-grainedness of the elements) but they gain in abstract and conceptual autonomy. Listeners, therefore, can focus their attention on individual sounds, but also at the level of groupings of sounds, and even on still larger spans of time that may extend over several minutes or longer. As such, there are two major mechanisms of representation: the temporal extension or the *scope* of representation and the fine-grainedness or *resolution* of the distinctive elements (Godøy 1997; Reybrouck 2004).

The difference in scope of representation has implications for the actual way of listening, with a major distinction between *focal* versus *synoptic* listening. The former invites the listener to keep step with the music as it unfolds through time in a succession of now-moments that involve acts of apprehension, which are plainly episodic. Synoptic listening, on the contrary, recollects discrete now-moments in memory and imagination and holds a broader overview, somewhat related to the distinction Kramer (1988) draws between the *linear* or *active* and *non-linear* or *still-spectator* mode of listening. These modes have been coined also as *in time* and *out-of-time* representations (Xenakis 1992) with the epistemic interactions with the sounds relying on presentation to the senses (in time) or on representations in a kind of symbolic space (out-of-time).

The critical element in this distinction is the contiguity of discrete particulars and their perceptual bonding as against representations at a merely symbolic level. The former account for the particularities of the sounding flux in providing a succession of discrete units, but they do not provide an overarching principle of unity. Such a connecting structure can be found in the schematizing function of our imagination, as stressed already by Kant (1790), who claimed that imagination generates much of the connecting structure by which we have a coherent, significant experience over time. In providing a schematizing activity which organizes mental representations into meaningful units and which orders representations in time, it presents temporal succession as

a kind of virtual simultaneity, somewhat analogous to Condillac's and Euler's conception of algebra as the order of an end product that can be decomposed into a succession of its genesis (Duchet and Jalley 1977: 104). This genetic approach to knowledge construction is exemplified most clearly in the genesis of a geometrical figure, where the product of knowledge (e.g., a circle, an ellipse) is the outcome of an action (the process of drawing). It exemplifies rather unambiguously Kant's *phoronomic approach* to the description of the motion of a body, without regard to the forces that cause the motion (Kant 1786).

The hallmark of the phoronomic approach is its unfolding through time. As such, it is related to Langacker's distinction between *summary* and *sequential scanning* (1987: 248). The first is basically additive with the processing of the components proceeding roughly in parallel. All the facets of the elements of a complex scene are simultaneously available in a kind of atemporal relationships. Sequential scanning, on the other hand, involves the successive transformations of one configuration into another with component states being processed in series rather than in parallel. It is the mode of processing that most clearly defines what it means to follow the evolution of a situation through time. As such, it is an important tool for the description of "real time listening". Making sense of music, in fact, involves an act of imagination that grasps the sonorous unfolding as a processual figure that unfolds over time. What is meant is merely a path of becoming, a kind of continuous transformation that is not restricted to a single state (Reybrouck 2001).

Sequential Scanning and Deictic Claims

The concept of sequential scanning calls forth a series of epistemic interactions with the sounds: it involves a continuous process of mental pointing to the music as it unfolds over time. Conceiving of the listener as the source of reference, it is possible to introduce a deictic framework that does justice to the act of pointing to things in relation to the actual listening situation. It was Bühler (1934) who introduced the *deictic* as against the *symbolic field* of meaning. In providing socio-spatio-temporal anchoring ("I" hear [this] "here" and "now"), he provided the conceptual tools for an operational description of the communicative process between the parties of a referential exchange. Listeners, in this view, can mentally point to the music and can be conceived as the "origo" or the source of reference. It is the listener, in fact, who focuses at will in acts of deliberate attention in order to delimit those elements, which he/she considers to be meaningful.

These attended elements can be focal points or temporal zones with a certain extension in time, somewhat analogous to the distinction between snapshots of a movement and continuous gestures that make

up this movement. The latter involve the consummation of the sounding flux in keeping track with the music as it unfolds over time. This *sound tracking* has a temporal extension and is perceptually bounded, which means that it is dependent upon what is presented to the senses. The snapshots, on the other hand, involve a level of abstraction. In freezing a continuous perceptual image at a particular focal point in time, they resume and collect a lot of information that can be related to one "thing-as-signified" and that can be labeled also at a discrete-symbolic level.

Both modalities stress the in-time/out-of-time distinction which can be coined also as the *on-line* as against the *off-line* form of thinking (Bickerton 2009). The off-line mode supposes the ability to operate on abstract mental representations when being detached from the immediate environment. It allows the thinker to elaborate on these representations in a kind of virtual symbolic space, somewhat analogous to Leibniz' dynamic conception of space as a method of knowledge. In this view, space is not enclosed in itself but is a relative concept with three major moments: *multiplicity, continuity* and *coexistence* (Cassirer 1962: 270). In this virtual space, all elements can be interrelated infinitely with the imagination providing the connecting structure that allows a transition from a discrete succession of particulars to relational continuity and virtual simultaneity, and to point back and forward in a kind of deictic space.

Knowledge Construction and the Role of Epistemic Interactions

The possibility of infinite relations beyond the constraints of contiguity is an important epistemological tool. It allows listeners to distance themselves from perceptual bonding and time-bound reactivity and to perform mental computations on symbolic replicas of the sounds. There is, however, a danger of distancing and polarization between the listener and the music. In taking distance from the richness of the concrete sounding experience, the listener relies on discrete labels rather than on continuous processing of the sonic articulation through time. As such, there is a tension between the process of *exploring* and *observing*, which is analog-continuous, and the process of *measuring* and *labeling*, which is digital-discrete. Exploring is more sensitive, as it works outside of the limitations of fixed thresholds, and is closer to the real world which is not segmented, but which presents itself in ranges and continuous transitions. Measuring, on the contrary, constrains the real world from a relatively large or continuous set of values to a relatively small set of discrete and quantized values, which have the advantage of distinctness and communicability. They allow the knower to share an experience without actual living it and illustrate dramatically the economy of

abstraction as against the subtlety of experience. Or to state it in another way: they highlight the difference between an analogue image system and a languagelike or propositional system (Watkins and Dyson 1985: 72). In passing from the sensory to the cognitive representation, there is, in fact, a systematic stripping away of components of information which reduces the experience of the phenomenally rich thing to only one or some of its components (Dretske 1985). This is a process of *digitalization* or *conceptualization* with a piece of information being taken from a richer matrix of information in the sensory-analog representation and featured to the exclusion of all else.

Digitalization and conceptualization focus on generic features that group together the maximum of information with the least cognitive effort. They consider as equivalent a number of things that can be distinguished from each other but which can be subsumed under the same conceptual category. As such, they neglect their idiosyncrasies in order to allow discrimination at a more abstract level of similarity and to "recognize" things rather than to "experience" them.

Distinctions, however, involve interventions by the mind, as nature and life are continuous rather than discrete. They call forth epistemological interactions with the world in order to create new *observables* and to differentiate between things, which can be distinguished from each other. This is basically the delimitation of a universe in a logical conception of the term, where a space is severed or taken apart, and where a "this" is differentiated from "everything else but this" (Spencer Brown 1969). Translated to the realm of music, this should mean that the listener can make distinctions in the sounding flux, which is continuous. This discretization of a continuous phenomenon can be so fine-grained that it reflects the idiosyncrasies of the particular experience; it is possible, however, to go beyond the particularities of concrete experiences as well and to generalize from mere particulars to broader and more encompassing categories. In doing this, there is the danger of distancing and polarization between the listener and the music. The distinctions, then, are suited for sharing experiences between listeners, rather than for experiencing the idiosyncrasies of the experience proper.

It can be argued, therefore, that music should be dealt with at two levels of epistemic interactions: the level of *physiognomic perception* that does justice to the richness of the full sensory experience and the level of *abstraction* and *generalization* that strips off all non-essential elements and that identifies sounding events (this is [...]) in terms of predication, which assigns a general element to a particular (A is B) by using names or labels. This is, in fact, the transition from demonstrative to conventional terms with a corresponding shift from qualifying to generalizing, or, as James would have put it: from percept to concept. As such, there is a tension between the experiential as against the symbolic approach,

between the richness of experience and the economy of abstraction, between perceptual immediacy and symbolic representation, and between in-time and out-of-time processing of the sounds.

References

BICKERTON, Derek.
    2009.   *Adam's Tongue: How Humans made Language, How Language Made Humans* (New York: Hill and Wang).

BÜHLER, Karl.
    1934.   *Sprachtheorie: die Darstellungsfunktion der Sprache* (Stuttgart: Gustav Fischer, 1965).

CASSIRER, Ernst.
    1962.   *Leibniz' System in seinem wissenschaftlichen Grundlagen* (Hildesheim: Georgs Olms Verlachbuchhandl).

COGAN, Robert.
    1984.   *New Images of Musical Sound* (Cambridge (MA): Harvard University Press).

DRETSKE, Fred.
    1985.   "Précis of Knowledge and the Flow of Information", in *Naturalizing Epistemology*, ed. H.Kornblith (Cambridge/London: MIT Press), 169-187.

DUCHET, Michele and Michèle JALLEY.
    1977.   *Langue et langues de Leibniz à l'encyclopédie* (Paris: Union Générale des Editeurs)

GEERTZ, Clifford.
    1973.   *The interpretation of cultures: selected essays* (Basic Books: New York).

GODØY, Rolf Inge.
    1997.   *Formalization and Epistemology* (Oslo: Scandinavian University Press).

JAMES, William.
    1911.   "Percept and Concept—The Abuse of Concepts", in *The Writings of William James. A Comprehensive Edition*, ed. J.McDermott. (New York: Random House, 1968), 243-252.

KANT, Immanuel.
    1786.   *Metaphysische Anfangsgründe der Naturwissenschaft* (Riga).
    1790.   *Kritik der Urteilskraft* (Hamburg: Felix Meiner, 1974).

KRAMER, Jonathan.
    1988.   *The Time of Music. New Meanings, New Temporalities, New Listening Strategies* (New York - London: Schirmer Books).

LANGACKER, Ronald.
    1987.   *Foundations of cognitive grammar, Vol. 1* (Stanford CA: Stanford University Press).

REYBROUCK, Mark.
    2001.   "Musical Imagery between Sensory Processing and Ideomotor Simulation", in *Musical Imagery*, eds. R.I.Godøy and H.Jörgensen (Lisse: Swets and Zeitlinger), 117-136.

2004. "Music Cognition, Semiotics and the Experience of Time. Ontosemantical and Epistemological Claims", *Journal of New Music Research* 33. 4, 411-428.

2005. "A Biosemiotic and Ecological Approach to Music Cognition: Event Perception between Auditory Listening and Cognitive Economy", *Axiomathes. An International Journal in Ontology and Cognitive Systems* 15. 2, 229-266.

2006. "Music Cognition and the Bodily Approach: Musical Instruments as Tools for Musical Semantics", *Contemporary Music Review* 25.1/2, 59-68.

SPENCER BROWN, George.

1969. *Laws of Form* (London: Allen and Unwin).

WATKINS, Anthony J. and Mary C.DYSON.

1985. "On the Perceptual Organisation of Tone Sequences and Melodies", in *Musical Structure and Cognition*, ed. P.Howell, I.Cross and R.West (London: Academic Press), 71-119.

XENAKIS, Iannis.

1992. *Formalized Music: Thought and Mathematics in Composition* (Stuyvesant, New York: Pendragon Press).