

Listening to Art: Aural Cognition in Electroacoustic Music

Gary S. Kendall
Sonic Arts Research Center
Queen's University Belfast
garyskendall@me.com

Abstract

The question of what listeners do when listening to electroacoustic music is considered and discussed in its relation to everyday listening. Specific cognitive mechanisms and idioms of electroacoustic music are examined that give rise to artistic meaning, meaning that includes the embodied sense of the flow of felt experience as well as the continuous emotional assessment of context. The importance of context for meaning is considered as well as the role of cognitive blending, especially the conceptual blending that creates analogy and compression in many electroacoustic works.

1. Introduction

We want to consider the question of what listeners do when listening to electroacoustic music. How do they make sense of it and, most importantly, how do they understand it as art? But before focusing on electroacoustic listening, we should consider the broader question of what listeners do in everyday life when making sense of the world around them. This question is far more important for electroacoustic music than for traditional acoustic music because the expansive acoustic palette of electroacoustic music incorporates the sounds of the everyday world. Not just the sounds, but by immediate extension, the listening strategies, knowledge of auditory patterns and history of auditory associations that are inextricably linked to everyday listening. Relating electroacoustic music to listening in the everyday world provides an alternative viewpoint for electroacoustic analysis whose literature frequently invokes specialized approaches to listening [9,10]. The alternative is to envision all listening in a continuum where new experiences constantly engender new connections and new associations whatever the source and context. If we spend more time and effort listening to electroacoustic music, then we will have a richer set of connections relating to it than to other things, such as sporting events. Even so, there are important observations we can make about the idioms that typify electroacoustic art and which shape artistic meaning.

We also want to explore the possibilities offered by connecting the ways in which the everyday mind finds meaning to the way listeners derive meaning in electroacoustic music. In everyday life we are engaged in a constant process of determining the meaning of the things around us. We are constructing an understanding of our context and what is going on around us. The meaning of things depends on the web of relationships we weave with other things. Comprehending the significance of a situation depends on our understanding of how all these things fit together. In everyday life, meaning and understanding are situated in time, limited to the scope of what we are currently experiencing and thinking about. We have sensory experiences that give rise to the awareness of elements, attributes and dynamics around us. We attempt to comprehend and understand our situation by interpreting what we experience, recognizing patterns, establishing relationships, forming new connections etc. As Mark Johnson says, "Meaning is happening without our knowing it" [5].

2. Perceptual Thinking

What listeners do can be described as *perceptual thinking*. It is largely invisible to them and to us as observers, part of the activity of the cognitive unconscious. Nonetheless, we can make strong inferences about these mental activities based on both general and specific knowledge of human cognition. In his great elucidation of visual art, *Visual Thinking*, Arnheim enumerates the activities of visual perceptual thinking: "active exploration, selection, grasping of essentials, simplifications, abstraction, analysis and synthesis, completion, correction, comparison, problem solving, as well as combining, separating, putting in context" [1]. These are activities of perception by the everyday world as well as in art.

Clearly listeners make associations among things. From moment to moment auditory experiences are related to typical patterns, and an effort is made to grasp the current situation. For the purpose of discussion and study, we can codify the recurrent patterns as cognitive schemas, possibly either relational (frames) or sequential (scripts). (Although there are numerous differences connected with these terms---'schemas', 'frames' and 'scripts'---they capture highly related constructs.) In addition to these schemas, we recognize that there are mental spaces [3] that hold the on-going information and associations that are relevant to us. We can represent the construction of meaning as the building and connecting of mental spaces. In the process of listening, new spaces are created when content requires making connections that reach outside of the existing framework. This viewpoint suggests that meaning is always produced in a specific context.

3. Meaning

There are some important observations we can make about formation of meaning by the everyday mind. One is the centrality of multimodal understanding. An important task of the cognitive unconscious is to integrate experience from our multiple domains and to form a centralized understanding of the world around us. From that perspective we can see too that our understanding must make sense of the feel, the look and the sound of objects in the world around us. For Lakoff and Johnson [5, 7], our patterns of understanding for objects, their relationships and physical forces are captured as *image schemas*, recurring cognitive patterns that are established through multimodal body experience. Image schemas not only capture these patterns of spatial and dynamic relationships, but also situate our understanding of such patterns directly in the realm of bodily experience. We understand image schemas such as *Source-Path-Goal* and *Removal-of-Restraint* in a mind-body combination. In his book *The Meaning of the Body*, Johnson [5] also connects these insights with Daniel Stern's notion of vitality-affect contours, "not the classic emotions" but "the patterns of process and flow of our felt experience" [11], an integral part of our innate sensations and feeling capacity.

The activity of understanding the world around us gives rise to the apparent continuity of our experience. Continuity requires an on-going notion of one's context, and part of our grasp of context is our attempt to make projections about the future. The appraisal of our context informs our estimation of how everything will affect our well-being and our goals. Our emotional state embodies our assessment of our situation, moment-to-moment and ongoing. Emotions are part of our cognitive engagement with the world, an intrinsic component of meaning and understanding. Our projection of outcomes affects us whether it is the contingencies of everyday life or the evolution of an electroacoustic work. Certainly we are aware of the differences between artistic and practical outcomes, but listening, even artistic listening, gives rise to meaning as a direct manifestation of this everyday cognitive process of understanding the world around us. We can recognize the continuity between everyday and artistic experience in the way meaning is embodied in feelings and emotions. Importantly, we want to understand the nature of art's role in this continuum with everyday life. Consider that art has the same opportunities as everyday life to affect us, train us and teach us---to improve our living capacities and to make connections that are otherwise obscure or unresolved in everyday life.

1.1. Gist

As a window into the essential commonality of listening in everyday life with listening to electroacoustic music, let us consider one of the practical problems of meaning, the experience of not being able to keep up with the realtime flow of events. Whatever the context, the demands of the moment often surpass the listener's mental resources. But even when a situation cannot be completely assimilated, the listener will grasp the 'gist' of things. Gist is often described as what the perceiver acquires from a brief glimpse of something and usually includes the most salient elements of the situation. Such situations reveal that listeners are always constructing gist and that its formation is essentially automatic and nearly instantaneous. Gist enables the listener to construct a working sketch and to keep up with the realtime flow of events even when the details cannot be absorbed. Gist is a first sketch of meaning, but not necessarily with projections about the future.

1.2. Context Dependency

Given the existence of gist, we can see that meaning will generally be as complete as it can be under the circumstances of listening. But the listener's grasp of context might also be impoverished. In that case, the listener might well need to make inferences about the context. So what constitutes a grasp of context? That would be knowledge of the appropriate frame into which the attributes of the present moment are mapped. This knowledge enables the listener to fill in the many blanks with default values. Listening to electroacoustic music can involve many domain specific mappings and associations. Are the synthesis techniques familiar from other works? Is the piece acousmatic? Was it composed by Stockhausen? Meaning varies within the context of each of these circumstances.

It can be said that meaning is simply what we make of an artwork. And while one might think that there are as many 'hearings' of a passage as there are listeners, in truth, there are a limited number of plausible hearings within the context of the appropriate domain. Consider the difference in context for works that are regarded as either acousmatic or soundscape compositions. In the case of acousmatic works, we expect that the physical identity of sound sources is not apparent and probably immaterial to the meaning of the piece. In the case of soundscape compositions, the sounds are deeply connected to the physical world. This is true even when the location is purely mythic as in the case of Truax's *Island*.

In art as well as everyday life, meaning is obviously dependent on the ongoing context. Sounds will take on particular meanings depending on their context. They can take on the 'role' of opening, closing, marking boundaries, etc. For example, a church bell has the role of being the opening sound in Varese's *Poème électronique*. When it returns later, it has the role of closing a large subsection. Coulson says, "Contextual variation in meaning is ubiquitous because context is an inherent component in the meaning construction process" [2].

1.3. Temporality

Up to this point we have been discussing meanings that are largely relational without fully accounting for the temporality of electroacoustic music or the temporality of the listening experience. We can begin to engage these issues by considering a schema for the temporality 'events' and examining how it combines with purely relational schema in the creation of meaning. Narayanan [8] has demonstrated a single schematic structure that "captures the basic temporal structure of our conceptualization of events." We will adapt Narayanan's schema to our discussion and rename it as the

Event schema [6]. This schema captures our generic cognitive pattern for things that happen including auditory ‘events.’ It is a dynamic model that includes component parts representing processes and others representing states. The model is dynamic in several respects. First, it is a pattern that executes through time. Second, it has junctures at which the listener can interpret flow along alternative paths. As shown in Figure 1, execution runs from beginning to end, but can also include interactions and interruptions.

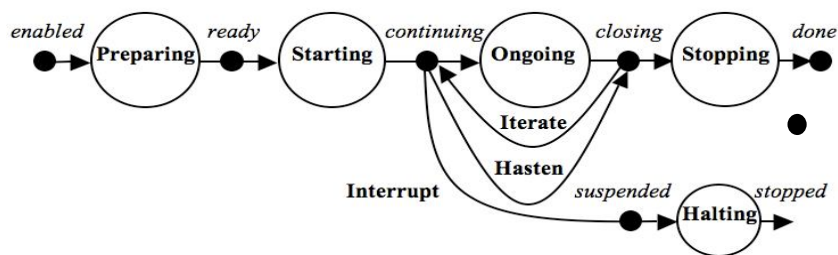


Figure 1. Representation of the Event schema. Processes are represented as circles and states as dots.

4. Artistic Blending

4.1 Events and Circumstances

While the Event schema captures the essential states and processes that we associate with ‘events’ in general, it lacks all of the specifics that we associate with an actual event. In the realtime process of listening, the listener must blend the Event schema with the particular ‘circumstances’ of the moment. The specific way in which the listener binds these together is the act of understanding that unites the abstract with the concrete. In electroacoustic music, the circumstances may include information about the sounding object, the physical processes, the location of a sound recording--in short, all of the information that takes the abstraction of Event and binds it to the schema for the instantiated SoundEvent (see Figure 2). The schema of the SoundEvent itself contains important slots to be filled with the source of the sound and the agency of its production. But it is not simply a matter of filling in all of the empty slots with data. Circumstances may include categories of information that go well beyond the scope of the SoundEvent schema, information that enriches the general pattern with context and associations. The blending of such disparate elements requires a creative act. For example, the circumstances may include associations with the signal processing techniques, other works by the composer, etc. In short, the instantiated SoundEvent can be an amalgam of many diverse kinds of information and associations that are aggregated together. The novelty and nuance of such creative blends is itself a source of artistic content.

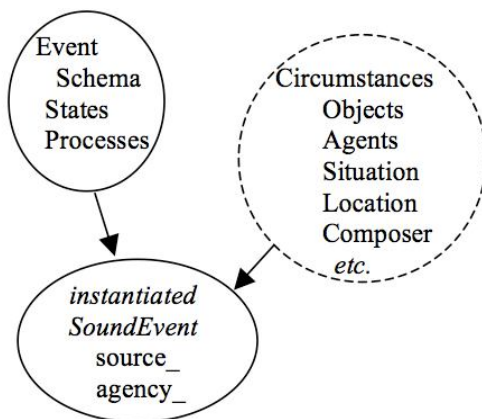


Figure 2. The blending of the Event schema with Circumstances to form an instantiated SoundEvent.

On the other hand, this blending often involves artistic abbreviation that intentionally leaves slots in the listener’s mental space open for the imagination. This is a primary characteristic of acousmatic works. Because the basic information about the sound source and agency may be unknowable, the listener’s attention is shifted typically toward the flow dynamics of the event.

4.2 Conceptual Blending

Cognitive blending plays a fundamental role in the meaning of electroacoustic music. As we have seen, artistic meaning often emerges from the binding of frames that would be novel or unusual in other contexts, in particular, from the novel blending of information. In the process of listening, new mental spaces are created when content requires making connections that reach outside of existing frames. Hearing familiar things in unfamiliar (and artistic) contexts causes us to construct maps of the relationships of these things to their new contexts. Artistic content also arises in the use of frame-shifting [2], i.e., when existing content is reevaluated in a new context. Consider the entrance of the

Northumbrian bagpipes in Smalley's *Pentes*. The listener's entire sense of the preceding content is thrown into a new light.

One of the other ways in which cognitive blending emerges in electroacoustic music is in the form of *conceptual blending* [3], studied and discussed most often in relation to language and reasoning. Fouconnier and Turner analyze these blends as arising in networks of mental spaces called conceptual integration networks. The prototype integration network has four spaces. Two represent the mental spaces for the input elements that are being blended. One represents the space of the common elements that relate the two inputs, the "generic" space. In this blending, selective content of the input spaces is projected into a new space that represents the 'blend'. This blend contains relationships that cannot be represented in either input.

We can illustrate these concepts using Barry Truax's composition *Riverrun*, the first significant artistic use of granular synthesis. An important aspect of the piece is the way in which it invokes the mental imagery of a natural soundscape without recourse to recorded sound. The electroacoustic soundfield is heard as an analogy to a river in the natural world. This is an example of conceptual blending. We can understand the structure of this blend by examining the conceptual integration network shown in Figure 3. The two inputs are the mental frames for the granular synthesis and for the flowing water. These two spaces have in common the concept of component and composite elements. The grains correspond to drops of water and the granular 'clouds' correspond to the body of water. The conceptual blend produces a novel space that contains an 'electroacoustic river,' exactly the mental image reported by listeners.

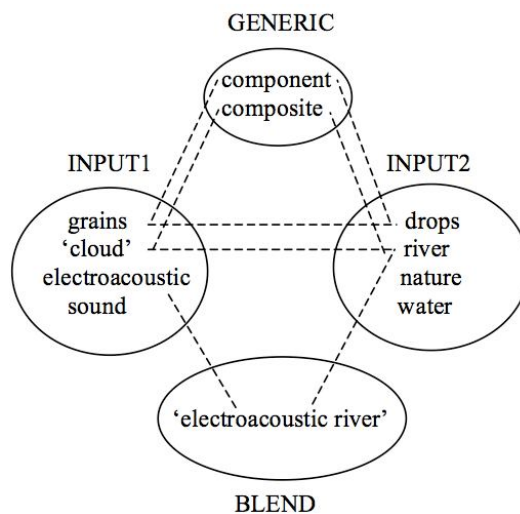


Figure 3. Simplified Conceptual Integration Network for *Riverrun* by Barry Truax.

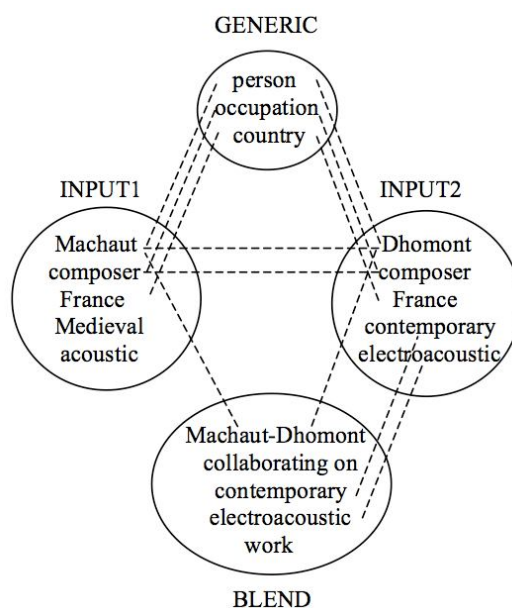


Figure 4. Simplified Conceptual Integration Network for *Novars* by Francis Dhomont.

A conceptual blending with time compression can be illustrated in Dhomont's *Novars* that includes a processed excerpt from Machaut's *Messe de Notre Dame*. The inclusion of Machaut is a significant artistic choice. Dhomont is making connections between his work as a French composer and that of a medieval predecessor. The result is a conceptual blend with a tremendous compression of time in which we experience Machaut and Dhomont working together to create a work of electroacoustic music. The conceptual integration network is shown in Figure 4. The two inputs are the composers and their contexts. The Generic space represents their common characteristics while the Blend contains both composers collaborating on the current work.

5. Conclusion

We have attempted here to explore a number of specific ways in which listeners experience meaning in electroacoustic music. We have rooted our discussion in cognitive processes of the everyday mind. The construction of meaning is seen as part of the cognitive unconscious, a product of the relationships and connections formed moment-to-moment and day-to-day. In this way, meaning in electroacoustic art is seen both in its continuity with everyday life and in its distinctive and idiomatic traits.

6. Acknowledgements

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7. References

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