A Top-Down Approach to Musical Meaning

Ole Kühl, February 2006

The study of music takes many forms. Musicology itself has traditionally been concerned with two levels: 1) music's internal structure, mainly studied through scores, and 2) historical and cultural aspects. The vital questions of what music is and why it is of so great concern to us has been left aside. Other disciplines have approached these questions in a variety of ways, so we have a musical aesthetics, a musical anthropology, a musical semiotics, a bio-musicology and a music psychology. And lately the field of bidders for musical truth has been enriched with the discipline of neuromusicology, which seeks to study the "soft" problems of musicality, cultural artefacts and musical cognition with the "hard" methodologies of natural science.

Spurned by the fascinating perspectives arising from the possibility of studying the human brain during the performance of musical tasks, neuromusicology has produced an impressive number of data that any sincere student of music is bound to take serious. But, amidst the wealth of interesting data, neuromusicology is still young and emerging, and faces the challenge of developing the necessary foundation for any scientific discipline, including: "an agreed set of central problems; agreed methods for working on these problems; agreed theoretical frameworks in which to discuss them; techniques and theories which are specific to the paradigm; research which is appropriate to the whole range of phenomena in the domain being studied".[1]

So far, the response to this challenge has often been one of *bootstrapping*, where data generate new data in an ongoing attempt to confirm, reject or develop our understanding in a research that is constrained by the possibilities and limitations of the technology involved. This is what I would call a "bottom-up" method for acquiring knowledge, and although it is standard procedure in the natural sciences, it still depends on a firmly developed set of paradigms along the lines mentioned above.

The problem becomes acute when it comes to interpreting the data generated from a neuromusicological approach. In order to interpret data, we need "agreed theoretical frameworks in which to discuss them", we need "agreed methods", paradigm-specific techniques etc. And this argument comes full circle, because in order to ask the right questions, we similarly need a theoretical framework to guide our experiments. We need to know what we are looking for and why, if we want to avoid finding ourselves in a situation like that of Nazruddin, who searched for his wallet under the streetlight, where he could see, rather than in the darkness, where he had lost it.

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[1] Sloboda, John. 2005. *Exploring the Musical Mind*. Oxford: Oxford University Press, p. 97. This quotation is originally part of an assessment of the current state of music psychology.

This introduction does not only serve the purpose of positioning my own research, aspects of which I shall briefly present in a moment, but is also meant to stress the importance of discussion and collaboration in a cross-disciplinary effort like the one we find ourselves involved with. We stand on different methodological grounds; our training is based on different scientific paradigms; we are constrained in our outlook by our respective traditions; but we meet in an attempt to study what we believe to be the same phenomenon: musical cognition.

The project I am currently involved with represents what I would call an analytical or a "top-down" approach to musical cognition. It aims to develop a musical semantics, and asks what is musical meaning? how does music make sense to us? and how can we describe the semantic structure involved? Through descriptive models we strive to correlate neurobiological data with cognitive theory and basic musical science under an analytical paradigm informed by Saussurean semiology.[2]

We all agree that music makes some kind of sense to us, otherwise we would not be gathered here. Semantics can be explained as a cognitive process through which meaningfulness emerges in response to a human artefact that we call music. I suggest that musical semantics is developed from a more general form of semantics, which, according to psychologists, like Daniel Stern and Colwyn Trevarthen, and cognitivists, like Mark Johnson and George Lakoff, is our fundamental, intrinsic way of making sense of the world. It is amodal, meaning that it is not linked to any of the physical senses _ although it does seem to stand closer to the kinesthetic sense _ and it develops in specialized forms in the various modalities, for instance as the semantics of language (traditionally thought of as the contents of language), or as musical semantics. Accordingly, musical semantics and language semantics can be considered to be related, as they rest on common ground. So, the way a modality specific semantics makes sense to us is partly through referring back to a more abstract semantic level, inherent in the structure of the brain. (I should add that such an ontogenetic view on musical semantics is consistent with the Peretz model of domain-specificity as well as Besson's account of neural overlap between music and language in the brain). Because of the kinesthetic dominance at the abstract semantic level, internalized or virtual gesture becomes a key concept in our understanding of music.

When we listen to music, it enters our ears as an auditory stream, is transformed from kinetic to neural energy inside the cochlea, passes along the auditory pathway and emerges as music in our minds. The most important question we have to answer is: how does this transformation take place? It seems that what our ears perceive is simply orga-

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[22] Time does not allow a discussion of the difference between the Peircean sign typology, which normally goes under the name of musical semiotics, and the analysis of the Saussurean sign function as developed by Hjelmslev and Greimas.

nized sound, and that this sound is subjectively turned into music through higher order neural processing.

According to the predictive coding theory, and in consistence with Lakoff and Johnson's theory of image schemas and metaphoric projection, some sort of musical schemas or patterns, preformed in the mind, will be part of our horizon of expectation. In this way, musical cognition is analogical to the cognition of language, where we are unable to perform even a simple parsing of words from an unknown language in the auditory stream. What we perceive is _ to a certain extent _ dependent on what we already know. Or, in other words, the perception of culturally coded sound depends _ even in lower order structures _ on prior acquired knowledge.

Musical meaning is seen as fluid, in the sense that it is composed of stable as well as unstable elements. The stable elements of musical meaning _ the elements that recur from hearing to hearing, from person to person and across cultural barriers _ are of two kinds: one is the simple and consistent aspects of musical sound as timbre and pulse; and the other is certain structural aspects of musical cognition, the stability of which makes it possible to speak of a musical semantics. The process of superimposing already-known features on the musical auditory stream is one of the stable structures.

At this point I wish to introduce an analytical distinction between music as perceived and music as experienced. Music as perceived would not only include such stable components of the auditory stream as timbre and pulse, it would further include all the components that we are able to perceptively decode from the auditory stream like melodic phrases, rhythms, text perhaps, and chord changes. Music as experienced includes the cognitive responses evoked from perceived elements, as well as the further processing of these responses. The final result of the cognitive, semantic process is what we call musical meaning.

If I were to sing or play a fast bebop phrase, those of you who have some familiarity with the idiom would make some kind of sense of the phrase, while others might not be able to respond to it at all. The difference would lie in the number of evoked responses and the intensity of these responses. Granted that we were listening to familiar and well-liked music, if I added more phrases, a harmonic direction and an accompaniment, more cognitive responses would be evoked, not only on the gestural level but also on the emotional level, on the narrative level, etc. Some of these responses would draw on musical expertise or on shared or personal memory structures; others might resonate with schemas of affection, of expressive gesture, or locomotion. Some responses would evoke new responses, others would interact in certain ways, possibly producing musical imagery, and if the experience became rich enough and deep enough, our intrinsic need to build a coher-

ent account of events in the world would prompt us to gather salient aspects of our experience into a meaningful whole.

According to this model of musical semantics, musical meaning is seen as the result of a network of evoked responses working on different levels and drawn together into a gestalt. According to the theory of the action-perception loop, and to Colwyn Trevarthen's theory of the Intrinsic Motive Foundation, we make sense of actions and events in the world through responding to them. Cognitively seen, the mental representation of the musical gesture is a re-action to the perception of a sound-shape, and is probably the main response to musical prompting, potentially spurning new responses, while being interwoven with other forms of response to musical elements like text, rhythm, and meter etc.

Let me briefly touch on the semiotic perspective of this modelization. The Saussurean sign function connects a signifier with a signified. The sign is seen as a whole with three parts: the signifier, the signified and the sign function. The sign function is then that mental operation through which a perceived entity is connected to a cognitive response. But this is precisely what we have been talking about. Returning to the example above, the perceived musical phrase is the signifier, the evoked gestural response is the signified, they are connected through a sign function and together they constitute a musical sign. According to such a semiological analysis of the sign function, musical semantics can be seen as a network of signs constituting one musical semiosis.

In conclusion I would like to say that I hope and believe that the analytical work, of which this has been an example, can interact fruitfully with the empirical in developing more and better predictions that can be tested in the lab.

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