

## Comment

# Multiple varieties of musical meaning

## Comment on “Towards a neural basis of processing musical semantics” by Stefan Koelsch

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Meaning is one of the holy grails of cognitive science, and even for language, scientific understanding of meaning remains elusive [1]. Stefan Koelsch is to be commended for exhorting us to incorporate music in future explorations of “the meaning of meaning” [2]. We also congratulate him and his colleagues for the neuroscientific research program they have unleashed in the last decade, laying the foundations for the study of musical meaning [3]. By bootstrapping the long-known utility of the N400 to index incongruity and surprise, particularly in lexical semantics, and extending this to music, this work provides an important first foray into the vast territory of musical meaning. Here we outline some other possible analyses of musical meaning and syntax, in the hope of extending the range of this excellent body of research.

In linguistics, phonology refers to the arrangement of meaningless units (phonemes) into meaningful ones (morphemes/words), while morphology and syntax denote the processes assembling larger meaningful structures (complex words and phrases) from these meaningful subunits. Because musical notes by themselves have little meaning, there is an analogy between phonology and the musical arrangement of notes into melodic fragments or chords. Phonological rules would then find an analogy in musical scales or rhythmic meter. However, a linguist might point out that a word, standing alone, typically has a rich denotative meaning that such musical fragments lack. Even at this simple level, the mismatch between the clear, lexical meaning of words, and the more connotative, context-dependent ‘meaning’ of musical units, poses a fundamental challenge for attempts to draw further analogies at higher levels.

A different approach, jettisoning any dependence on denotative, lexical meaning, is to consider syntax in purely structural terms, referring to *all* processes of structure building, reaching from phonological forms across to logical forms mapping to semantics. This is a rich field of parallels, where hierarchy, local- and global-structuring, and structural ambiguity all play clear roles in both music and language [4]. From such a perspective, both the N400 and N5 may index intra-musical *structural* ambiguity as much as semantic ambiguity. Much recent research revealing “shared resources” in language and music supports this viewpoint [5]. The structural perspective questions the utility of drawing a clear line between “semantics” and purely structural “syntax” in music.

Finally, we could approach the problem of musical meaning from the top down, by analogy to pragmatics, which for linguists denotes the process by which sentence meaning is interpreted in a larger dialogic and environmental

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context. The social process of building a coherent conversation follows its own rules and conventions, with its own “syntax”. Here we foresee another rich source of parallels with music. In the same way that dialog historically and developmentally precedes oratory or essay-writing, interactive group music making preceded the lone composer generating a piano sonata or writing a symphony. But in both cases, these two generative modes share larger constraints on good form, development, implication and completion. While listeners may often be unaware of these larger scale structures [6], they nonetheless play a role in pragmatic construction. We thus expect that exploration of “musical pragmatics” also has much to teach us about musical meaning.

We conclude that there are multiple levels of analogy to be drawn between meaning in language and music, each with its own virtues and flaws. For any given line of research it is imperative to choose a level, define it, and rigorously explore it. But many aspects of musical syntax and semantics remain underexplored, and we believe their investigation will significantly enhance our understanding of the meaning of “meaning”, both in music and more generally.

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