Music, Language, and Computational Modeling: Lessons from the Key-Finding Problem

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Abstract

Recent research in computational music research, including my own, has been greatly influenced by methods in computational linguistics. But I believe the influence could also go the other way: Music may offer some interesting lessons for language research, particularly with regard to the modeling of cognition.

In this talk I will focus on an important problem in music cognition: the problem of key identification. I will argue that this problem is in some ways analogous to the problem of syntactic parsing in language. I will present a simple Bayesian model that performs well at the key-finding task. I will then consider some implications of the model for other issues. The model represents moment-to-moment changes in key over time and captures "reanalysis" effects in key perception. The model can be used to estimate the tonal ambiguity of a musical passage, and can also be used to estimate the probability of note patterns (just as a probabilistic grammar can be used to estimate the probability of word strings). An interesting question here concerns expectation: In forming expectations for the next surface element (note or word), do we consider all possible structures (syntactic structures or keys) or just the most probable one? Finally, the model sheds light on the concept of "information flow." It has been suggested that language reflects a tendency towards uniform density of information, in that less probable elements are spread out or elongated; I will suggest that the same may be true in music.

Slides for the talk will be available at my website, <www.theory.esm.rochester.edu/temperley>.