Crosslinguistic Perception of Pitch in Language and Music

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This dissertation investigates the ways in which experience with lexical tone influences the perception of musical melody, and how musical training influences the perception of lexical tone. The central theoretical basis for the study is a model of perceptual learning, Reverse Hierarchy Theory, in which cognitive processes like language tune neural resources to provide the sensory information necessary for the perceptual task; these sensory resources are then available to other cognitive processes, like music, which rely on the same perceptual properties. This study proposes that the tone properties *pitch height*, *pitch direction*, and *pitch slope* correspond to the melodic properties *key*, *contour*, and *interval*, respectively, and this correspondance underlies crossover effects between lexical tone and melody perception.

Specifically, the study asks three questions: (a) whether differences in melody perception between tone and non-tone language speakers, and among speakers of different tone languages, can be linked to specific properties of the languages' tonal inventories; (b) whether melody perception is affected by second language experience with a tone language; and (c) whether musical ear-training leads to enhanced perception of lexical tone.

To address (a), a standardized test of music perception was administered to tone (Mandarin and Yoruba) and nontone (English) language speakers. Tone language speakers demonstrate more accurate melody perception than English speakers; rather than a uniform advantage, however, this effect is limited to those specific properties argued to be shared between language and music. Results indicate that Mandarin speakers differ from English speakers in sensitivity to melodic *contour* and *interval*, but not *key*; this is consistent with the importance of *direction* and *slope* in the tonal inventory of Mandarin. Yoruba speakers differ from English speakers only on sensitivity to *interval*; this finding is more difficult to link with the tonal inventory of Yoruba, but supports the general hypothesis in two ways: (i) tone and nontone language speakers differ in melody perception only in specific ways (they do not differ in sensitivity to *key*), and (ii) speakers of different tone languages do not perform identically, supporting the hypothesis that differences in melody perception are driven by specific properties of the language, and not by tonality generally. The performance of Yoruba listeners suggest the tone–melody mapping must be refined and/or assumptions about the Yoruba tonal phonology revised.

It was hypothesized that learning a tone language in adulthood would improve melody perception similarly to native language experience (b), but attempts to extend these findings to second-language tone experience by administering the MET to adult learners of Mandarin were not successful; however, the limited range of L2 proficiency examined renders interpretation difficult, and a wider sample is necessary before discarding this hypothesis.

The role of explicit perceptual music training (c) was examined by assessing the effects of aural skills training on musicians' perception of Mandarin lexical tones. It was expected that musical ear training would lead to improved perception of lexical tone, because such training targets *contour* and *interval* perception, and includes task characteristics thought to enhance learning, as summarized in the OPERA hypothesis. A Mandarin tone discrimination task was administered to monolingual English-speaking music students before and after musical ear training, and control groups of musicians and nonmusicians without such training. The results reveal that this training did not lead to improvement in the perception of these tones in a similar fashion to native or second language speakers of Mandarin. discrimination of a difficult tone contrast (2 vs. 3) improved slightly for all groups. Changes in response bias by the ear-training group may indicate training-related perceptual changes, but the tone test must be refined and the training paradigm applied to a wider range of participants to control for pre-existing group differences before conclusions can be drawn about these effects.

Taken together, the results partially support the specific proposed mappings between structural properties of language and music, and more generally support a framework for explaining these and other cases of crossover between language and music. These findings have the potential to inform lingusitic questions at the phonetics–phonology interface, specifically the role of features in tone systems. More generally, these findings address questions of cognitive modularity and the relationship between language and music, as well the influence of sensory experience on perception during development and adulthood.

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