On the possibility of a place code for the low pitch of high-frequency complex tones

Harmonics are considered unresolved when they interact with neighboring harmonics and cannot be heard out separately. Several studies have suggested that the pitch derived from unresolved harmonics is coded via temporal fine-structure cues emerging from their peripheral interactions. Such conclusions rely on the assumption that the components of complex tones with harmonic ranks down to at least 9 were indeed unresolved. The present study tested this assumption via three different measures: (1) the effects of relative component phase on pitch matches, (2) the effects of dichotic presentation on pitch matches, and (3) listeners’ ability to hear out the individual components. No effects of relative component phase or dichotic presentation on pitch matches were found in the tested conditions. Large individual differences were found in listeners’ ability to hear out individual components. Overall, the results are consistent with the coding of individual harmonic frequencies, based on the tonotopic activity pattern or phase locking to individual harmonics, rather than with temporal coding of single-channel interactions. However, they are also consistent with more general temporal theories of pitch involving the across-channel summation of information from resolved and/or unresolved harmonics. Simulations of auditory-nerve responses to the stimuli suggest potential benefits to a spatiotemporal mechanism.
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