Abstract:

Even with the most advanced Cochlear Implant (CI) systems today, recipients still experience distorted pitch & timbre of individual tones in music, and this critically affects perceived consonance of tone combinations, such as intervals and chords. Recent experimental evidence suggests that judgements of chord consonance made by CI users, significantly differ to those of Normally Hearing (NH) listeners, but there is growing evidence that CI users are somewhat able to recognize various consonance/dissonance classes in music. The purpose of this study was to identify key dimensions that underlie perception of musical consonance/dissonance in CI users, and compare these to those of NH individuals. It was further intended to determine which particular timbral or perceptual features of a sound mostly associated with each one of these dimensions, and within each group separately. Methodology & Theoretical Orientation: Ratings of perceived consonance/dissonance of twelve chords played on the piano were obtained in a group of CI users (N = 79), and a group of NH adults (N = 47). Analysis of participants' ratings was based on a combination of multidimensional scaling techniques, computational feature-extraction algorithms, and principal component analysis. Findings: Compared to NH listeners, results suggested that consonance rating and classification of chords is quite different in CI users. Most important, while the pitch structure of a chord was shown to be the primary determinant of perceived consonance in NH listeners, timbral properties of the sound appear to strongly affect judgements of chord-consonance in CI users. Conclusion & Significance: Patterns of associations between spectral or structural descriptors of chords, and CI users' perception of musical consonance obtained in this study, provide useful insights for further improvement of sound processing strategies for CI systems.

Biography

Georgios Papadelis, PhD, is an Associate Professor at the School of Music Studies, at the Aristotle University of Thessaloniki in Greece. His field of expertise is on Musical Acoustics, Psychoacoustics, and Music Cognition. He has a longstanding research interest on Music Perception in Cochlear Implant (CI) users, with a focus in the development of assessment tools for screening music listening abilities in CI users, and how we can improve their listening experience through structured music-based rehabilitation and training.

References (With Hyperlink)

1. Loeb GE (2005) Are cochlear implant patients suffering from perceptual dissonance? Ear Hear. 26(5), 435–50.
2. Brockmeier SJ, et al. (2011) The MuSIC perception test: A novel battery for testing music perception of cochlear implant users. Cochlear Implants Int. 12(1), 10–20.
3. Papadelis G et al. (Under review) Perception of Music with the Fine Structure Processing (FSP) Strategy in Adult Cochlear Implant Users: A Multi-center Study. Int J Audiol.
4. Macherey O, & Delpierre A (2013) Perception of musical timbre by cochlear implant listeners: a multidimensional scaling study. Ear Hear. 34(4), 426–36.
5. Lartillot O, & Toiviainen P (2007) A Matlab Toolbox for Musical Feature Extraction from Audio. International Conference on Digital Audio Effects, Bordeaux.

Organization / University Logo

Aristotle University of Thessaloniki, GREECE