

# Individual perception of diatonic scales predicts perceived tonal fit in octatonic and hexatonic contexts

Fabian C. Moss,<sup>1</sup> Steffen A. Herff,<sup>2</sup> & Martin Rohrmeier<sup>3</sup>

<sup>1</sup>*Digital and Cognitive Musicology Lab, Digital Humanities Institute, École Polytechnique Fédérale de Lausanne, Switzerland*  
<sup>1</sup>fabian.moss@epfl.ch, <sup>2</sup>steffen.herff@epfl.ch, <sup>3</sup>martin.rohrmeier@epfl.ch

## Background

Fundamental insights on mental representations of musical structure have been gained using the probe-tone paradigm, where listeners rate the fit of probe tones following a musical context. While this area of research has covered various musical cultures, such studies often presuppose a certain cultural homogeneity that may not do justice to the stylistic diversity within a musical culture. For instance, it is commonly assumed that the major and minor modes sufficiently cover the stylistical range of tonal structures in Western classical music. Whether such frequently tested contexts carry implications for less-studied contexts, such as octatonic and hexatonic scales, is unclear. Octatonic and hexatonic scales exhibit a plethora of structural characteristics different from the major and minor scales. For example, diatonic scales repeat themselves only at the octave, whereas the hexatonic and octatonic scales repeat themselves at all multiples of major and minor thirds, respectively. While these symmetric scales are arguably less common, they nonetheless do occur in late-Romantic music, Jazz, and film music.

## Aims

We test whether music-theoretical models of extended tonality as well as probe-tone responses given in a diatonic context predict participants' probe-tone responses in an octatonic and hexatonic context.

## Method

Forty listeners provided perceived-fit responses towards twelve pitch-classes following a diatonic, hexatonic, or octatonic scale context. We draw on music-theoretical accounts to model participants' responses (Lerdahl, 2001; Haas, 2004). Moreover, we introduce a novel procedure that imposes limited transposition to diatonic scales, testing whether listeners' ratings of stability in octatonic and hexatonic contexts can be modeled by symmetrized versions of the major and minor scales. Using a Bayesian mixed-effects model, we compare how well each model individually as well as linear combinations thereof predict the rating data, and compare them to a baseline-model that accounts for the presence of a probe tone in the context.

## Results

Individuals' responses obtained in a diatonic context carry great predictive value for responses given octatonic or hexatonic contexts. Furthermore, both music-theoretical models carry incremental predictive value compared to the baseline-model, so that linear combinations of several models lead to overall higher prediction accuracy.

## Conclusions

Our results suggest that structural properties of musical contexts impact listeners' responses to musical stimuli. Specifically, it seems that symmetrical transposability of hexatonic and octatonic scales is implicitly recognized by participants and utilized when generating a percept of the stimulus. This motivates future research on the perceptual relevance of these structural relations.

## References

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Haas, B. (2004). *Die neue Tonalität von Schubert bis Webern: Hören und Analysieren nach Albert Simon*. Florian Noetzel.

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