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Universal dynamics of musical phrase structure in ~10,000 melodies from across the world

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Preferred presentation format

Oral

Abstract

Recent years have seen an interest in identifying cross-cultural universals across large musical corpora (Savage et al., 2015; Mehr et al., 2019), sometimes relating these to pre-existing cognitive and biological biases (Ravignani, Delgado & Kirby, 2016; Tierney, Russo & Patel, 2011). For melodic phrase structure specifically, research has demonstrated widespread predilections for short phrases, small intervals, and arched or descending contours (Huron, 1996; Savage et al., 2015). Yet, these commonalities merely amount to so-called "statistical universals" that are present in many, albeit far from all musical cultures. Based on empirical findings that low-probability events tend to mark phrase boundaries (Pearce, Müllensiefen, & Wiggins, 2010) and that entropy explains phrase completeness ratings and dwell-times in self-paced listening (Hansen, Kragness et al., 2021), I propose here that underlying expectancy dynamics may present a stronger candidate for universal phrase structure than the culturally specific surface structures that they give rise to.

To test this hypothesis, listeners' culturally situated expectations were simulated on a note-by-note basis with estimates of entropy (*uncertainty*) and information content (*surprise*) from the *Information Dynamics of Music Model* (Pearce, 2018). Melodic phrases with cardinalities of 2-20 notes were sourced from 7,562 German, French, Yugoslavian, Swiss, Austrian, and Chinese folksongs from the *Essen Folksong Collection* (Schaffrath, 1995), 1,638 Native American folksongs from the *Densmore Collection* (Shanahan & Shanahan, 2014), and 170 Portuguese fados from *O Livro dos Fados* (Klarlund, Huron, & Hansen, 2024), comprising >55,000 phrases in total.

The results show equisized entropy declines in phrases of different length with steeper declines in shorter than longer phrases. Whereas phrase-final notes are unsurprising, they generate peaks in entropy followed by relatively surprising phrase beginnings. The commonality of underlying expectancy dynamics in musics from three continents suggests that the interplay of entropy and information content may underlie the cognitive dynamics of phrase segmentation.

(300 words)

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