

# MODELING IMMANENT DURATIONAL ACCENT IN MUSICAL RHYTHM

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## Background

A durational (or IOI) accent can be either immanent (evident from the score) or performed (expressive), and either predurational or postdurational. Performed durational (agogic) accents occur when an event is lengthened or delayed relative to schematic or veridical expectation. Regarding immanent accents, predurational accents precede long IOIs and mark downbeats (e.g., a half-note preceded and followed by quarter-notes), and postdurational accents follow long IOIs and mark phrase/group beginnings. Predurational accents predominate at fast tempi and within phrases, postdurational at slow tempi and between phrases.

## Aim

To clarify the psychological nature of durational accents and their quantitative dependency on the IOI preceding and following each event, and to incorporate the result into a quantitative model of rhythm perception.

## Main contribution

Predurational accent depends on echoic storage, the short-term “memory” for speech syllables (duration around 1 second). Postdurational accent depends on the psychological present or working memory, necessary to comprehend a linguistic phrase (duration several seconds). In a quantitative

model, these two accent types combine to produce an overall estimate of durational accent, and further combine with phenomenal accentuation due to changes of loudness or timbre. The resultant temporal pattern of accents is then put through a pattern recognition algorithm that is confined to the psychological present (plus hysteresis). The output is a set of implied pulses, perceived metres, and metrical accents, all with continuously varying salience.

## Implications

A suitable quantification of durational accent and periodic pattern recognition enables the cyclic model of Parncutt (Music Perception, 1994) to be adapted for real-time application and to systematically account for grouping accents. The model also links the dominance region of pulse perception (centred near 600 ms) to the functional relationship between pulse salience and durational accent.