

Doctoral Dissertations 1911-2013

Off-campus UMass Amherst users: To download campus access dissertations, please use the following link to [log into our proxy server](#) with your UMass Amherst user name and password.

Non-UMass Amherst users: Please talk to your librarian about requesting this dissertation through interlibrary loan.

Dissertations that have an embargo placed on them will not be available to anyone until the embargo expires.

The Effects of Metric Strength on the Allocation of Attention Across Time

[Download](#)

[SHARE](#)

[Ahren B Fitzroy, University of Massachusetts - Amherst](#)

Date of Award
9-2013

Document Type
Campus Access

Degree Name
Doctor of Philosophy

Degree Program
Neuroscience and Behavior

First Advisor
Lisa D. Sanders

Second Advisor
Kyle R. Cave

Third Advisor
Alexandra Jesse

Keywords
Biological sciences, Psychology, Erps, Meter, N1, Rhythm, Selective attention, Timing

Subject Categories
Cognitive Psychology | Neuroscience and Neurobiology

Abstract
Dynamic Attending Theory predicts that attention is allocated hierarchically across time during processing of hierarchically structured rhythms. Event-related potential (ERP) research demonstrates that attention to a moment in time modulates early auditory processing as evidenced by the amplitude of the first negative peak (N1) approximately 100 ms after sound onset. Four experiments were designed to test the hypothesis that hierarchically structured rhythms result in a hierarchical allocation of

Enter search terms:

in this series

[Advanced Search](#)

[Notify me via email or RSS](#)

[Browse](#)

[Collections](#)

[Disciplines](#)

[Authors](#)

[Author Corner](#)

[Author FAQ](#)

attention across time by comparing behavioral responses and N1 amplitudes for sounds presented at times of varying hierarchical strength. Specifically, ERPs elicited by tones presented at times of high and low strength were compared in short melodies (Experiment 2) of salient metric structure (Experiment 1), and in subjective metric hierarchies (Experiments 3 and 4). Experiment 4 also added a level of medium strength in a subjective metric hierarchy. A more negative N1 was observed for metrically strong beats compared to metrically weak beats under nearly all conditions in Experiments 2, 3 and 4, providing strong evidence that attention is allocated preferentially to hierarchically strong times and supporting the central hypothesis. This effect was evident for both stimulus-inherent and listener-imposed metric structure, suggesting it represents ongoing direction of attention to metrically strong times rather than establishment of a metric percept. A patterned distribution of N1 amplitude was evident among metrically weaker times, demonstrating that attention is not allocated to the strongest times in an all-or-none manner. However, this pattern was not fully hierarchical, suggesting that hierarchical rhythmic structure does not modulate early auditory processing in a one-to-one manner. Additionally, a late negativity and late positivity were associated with metric strength under some conditions, indicating that multiple cognitive processes are associated with metric perception. Interestingly, the primary finding of a more negative N1 for sounds presented at hierarchically strong times in musical and pseudomusical stimuli was not modulated by musical expertise, suggesting that it indexes the use of a more general cognitive process that may also be employed to efficiently process other complex auditory streams including speech.

Recommended Citation

Fitzroy, Ahren B. "The Effects of Metric Strength on the Allocation of Attention Across Time" (2013). *Doctoral Dissertations 1911-2013*. Paper 511.
http://scholarworks.umass.edu/dissertations_1/511

This page is sponsored by the [University Libraries](#).

© 2009 [University of Massachusetts Amherst](#) • [Site Policies](#)