

Applying pupillometry to investigate developmental trajectories of attentional engagement toward rhythmic patterns in music and speech across sensory modalities

Wednesday, September 25, 2024 9:00 AM (20 minutes)

First experiences with rhythm occur in the womb, with different rhythmic sources being available to the human fetus. Among sensory modalities, vestibular, tactile, and somatosensory perception (VTS; Provasi et al., 2014) plays a crucial role in early processing. However, a limited number of studies so far has focused on VTS rhythms in language development, due to the difficulties of assessing cross-sensory processing abilities in early development. In this work, we take advantage of pupillometry to assess changes in pupil diameter as a measure of attentional engagement while presenting infants with experimental stimuli across different sensory modalities. Specifically, VTS rhythmic abilities are firstly assessed through a vibrotactile tool for music perception in a cohort of 45 infants (21 females; M age = 661.6 days, SD = 192.6; Experiment 1). In Experiment 2, the link with auditory, linguistic abilities is evaluated by testing phonological and prosodic processing. Discrimination abilities for rhythmic and linguistic stimuli across experiments are inferred from changes in pupil diameter to contingent visual stimuli over time, collected through a Tobii X-60 eye-tracker (Hepach and Westermann, 2016; Mathôt, 2018; Calignano et al., 2023). The predictive effect of VTS rhythmic abilities on linguistic processing and the developmental changes occurring across ages were explored by means of generalized, additive and linear, mixed-effect models. Results are discussed in terms of cross-sensory (i.e., haptic to hearing) and cross-domain (i.e., music to language) effects of rhythm on language acquisition, with implications for typical and atypical development.

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