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Predictive processes and linguistic patterns in early language acquisition

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Brain functions depend on recognizing patterns to predict future events (Auksztulewicz et al., 2018; Morillon & Schroeder, 2015). Early in auditory processing, the brain detects repetitions, guiding attention to specific intervals in the auditory stream (Auksztulewicz et al., 2018). Speech perception involves the dynamic sampling of acoustic information across different time scales simultaneously (Morillon & Schroeder, 2015), with timing predictability playing a crucial role in language learning (Kujala et al., 2023). Despite infants having immature auditory systems, they display remarkable ability in speech detection (Cabrera & Gervain, 2020). However, the specific factors enhancing their encoding of natural speech remain unclear (Nencheva & Lew-Williams, 2022). Moreover, since natural auditory scenes are less strictly predictable, the extent to which the brain tolerates variability while still perceiving sounds'sources signals as predictable remains unresolved (Bendixen, 2014). We investigated whether infants' speech sensitivity arises from recognizing temporal patterns. Testing 6-month and 12-month-olds with EEG during natural conversations, we manipulated pause durations: typical (200 ms), overlapping (500 ms), and prolonged (850 ms). We expect 6-month-olds to predict with short and long pauses but falter with overlap. Twelve-month-olds might struggle even with long pauses, mirroring adults albeit with more uncertain responses. Exploring temporal predictability in early language processing, our study sheds light on neural mechanisms during critical language development periods in infancy.

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The ontogenetic necessity to extract information from the auditory environment

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Yes

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