Neural Tracking of Audiovisual Speech in 10-Month-Old Infants and Relationship With Vocabulary Development

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In face-to-face interactions, infants are exposed to both auditory speech and visual speech cues, including rhythmic movements of the lips and mouth. Infants' sensitivity to these cues has been well-established; however, there isn't much work on their effect on infants' neural processing of continuous speech. Neural tracking of speech, which refers to the synchronisation of neural oscillations with the speech envelope at multiple frequencies, plays a role in speech processing, and potentially in language development. Visual speech cues, particularly at the syllable rate, may enhance neural tracking through the temporal synchronisation of lip movements and the acoustic envelope. In this study, we investigated whether visual speech cues facilitate infants' neural speech tracking and its relationship with vocabulary development. Ten-month-old Dutch-learning infants watched videos of a speaker reciting passages in infant-directed speech, while EEG was recorded. Half of the videos displayed the speaker's full face (AV-condition), while the mouth region was masked with a static block in the other half (AV-Blocked-condition). Neural tracking was measured using speech-brain coherence (SBC) at stress and syllable rates (1–1.75 and 2.5–3.5 Hz in our stimuli). Using cluster-based permutation, we first compared real SBC to surrogate data, and then tested differences in SBC in the two conditions at the frequencies of interest. Additionally, infants' receptive and expressive vocabulary 10 and 18 months were assessed using the N-CDI. Our findings (N = 34) revealed robust neural speech tracking at both stress and syllable rates. However, no differences were identified between the two conditions, indicating comparable tracking with and without visual speech cues. Moreover, infants' neural speech tracking abilities predicted later vocabulary development at 18 months. This study demonstrates that infants' neural speech tracking is not hindered when visual speech cues are masked, and suggests that it may be a key mechanism in language acquisition.