

## **The reliance upon temporal modulation cues in consonant and vowel change detection at 6 and 10 months of age**

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The auditory system encodes the phonetic features of languages by processing spectro-temporal modulations in speech, which can be described at two time scales: relatively slow amplitude variations over time (AM, further distinguished into the slowest <8–16 Hz and faster components 16–500 Hz), and frequency modulations (FM, oscillating at higher rates about 600–10 kHz). While adults require only the slowest AM cues to identify and discriminate speech sounds, infants have been shown to also require faster AM cues (>8–16 Hz) for similar tasks. Using an observer-based psychophysical method, this study measured the ability of 6-month-olds, 10-month-olds, and adults to detect a change in the vowel or consonant features of consonant-vowel syllables when temporal modulations are selectively degraded. Two acoustically degraded (vocoder) conditions were designed, replacing FM with pure tones in 32 frequency bands, and then extracting AM in each band with two different low-pass cut-off frequencies: (1) half the bandwidth (Fast AM condition), (2) <8 Hz (Slow AM condition). Results showed that across the three age groups, the proportion of participants able to detect phonetic category change did not differ between the vowel and consonant conditions. However, age-related differences were observed for vowel categorization: while the 6- and 10-month-olds did not differ from one another, they both independently differed from adults. Moreover, for consonant categorization, 10-month-olds were more impacted by acoustic temporal degradation compared to 6-month-olds, and showed a greater decline in detection success rates between the Fast AM and Slow AM conditions. The degradation of FM and faster AM cues (>8 Hz) appears to affect consonant processing at 10 months of age. These findings suggest that between 6 and 10 months, infants show different developmental trajectories in the perceptual weight of speech temporal acoustic cues for vowel and consonant processing, possibly linked to phonological attunement.