Non-Nutritive Suck and Voice Onset Time: Examining Infant Motor Speech Coordination
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Introduction
- Voice onset time (VOT) is a temporal acoustic marker of stop consonants that reflects motor speech skills.
- VOT is developed during childhood, as children learn to coordinate upper vocal tract and laryngeal gestures with precise timing.
- Variability of VOT decreases during childhood, as children learn to coordinate upper vocal tract and laryngeal gestures with precise timing.
- Voice onset time (VOT) is developed during childhood, as children learn to coordinate upper vocal tract and laryngeal gestures with precise timing.

Hypothesis: We expect to see a correlation between NNS and VOT measures, because both have been suggested to be linked to subsequent childhood motor and language abilities.

Approach
- These data are from a larger ongoing study examining the interplay between sucking, feeding and vocal development.
- Infants completed the study in their home at 3 and 12-months of age (+/- 2 weeks), and were compensated with an Amazon gift card.
- During the study, the infant sucked on our custom sensorized pacifier to generate a suck pressure waveform, and wore the Language Environmental Analysis (LENA) device to record vocalizations.
- The infants’ most valuable (or vocal) hour of LENA data was analyzed in Praat to calculate measures of mean VOT and coefficient of variation (CoV) of the VOT for each infant.
- Suck waveforms were analyzed to find amplitude (CmH2O), and the number of cycles per burst.
- 60 12-month infants (26 male) were evaluated for participation, but only 28 (14 male) met the study requirement of having at least 10 stop consonants (e.g., p or b) within 20 minutes and were therefore included in the study.

Results

<table>
<thead>
<tr>
<th></th>
<th>3-month NNS Amplitude</th>
<th>3-month NNS Cycles/Burst</th>
<th>12-month NNS Amplitude</th>
<th>12-month NNS Cycles/Burst</th>
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<tbody>
<tr>
<td>Mean VOT</td>
<td>rs(28) = -.069, p = .727</td>
<td>rs(28) = -.083, p = .674</td>
<td>rs(21) = -.236, p = .302</td>
<td>rs(21) = -.008, p = .971</td>
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<tr>
<td>CoV of VOT</td>
<td>rs(28) = -.246, p = .206</td>
<td>rs(28) = -.424*, p = .025</td>
<td>rs(21) = -.518*, p = .016</td>
<td>rs(21) = -.265, p = .245</td>
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Table 1. Spearman correlations for VOT and NNS measures. 3-month cycles/burst and 12-month amplitude are significantly correlated with CoV for VOT, *p<.05.

Impact
- Spearman correlations found that 3-month cycles per burst and 12-month suck amplitude were negatively correlated with variability of VOT at 12 months.
- This correlation suggests that infants who have less active and weaker suck patterns have more variable VOT, suggesting a positive relationship between the development of these two oromotor skills in the first year of life.

References

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