

Children use coarticulation cues during spoken word recognition

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During spoken word recognition, adults use coarticulation cues to anticipate upcoming phonemes (Dahan et al., 2001; Beddor et al., 2013), but knowledge on how children use such cues is limited. Studies have shown that children are able to perceive coarticulation cues and use them to distinguish between ambiguous syllables (Fowler et al., 1990; McMurray and Aslin, 2005) and during spoken word recognition (Zamuner et al., 2016), but how this phenomenon emerges through development and how it happens in real time is not yet fully documented. This is relevant for models of spoken word recognition such as TRACE, which posits that word recognition occurs through a process of target activation and competitor inhibition (McClelland and Elman, 1986), and to understand the processes of language development and word learning in general. The goals of this study were to explore whether children are able to use coarticulation cues for word recognition, and how they resolve lexical competition caused by mismatching nasal cues, as previous work found that young children (2-3 years old) are sensitive to coarticulation, but have difficulty resolving lexical competition (Zamuner et al., 2016). In order to document the developmental course of coarticulation perception, we investigated 4-8-year-old children, to see whether older children are able to resolve lexical competition.

The stimuli were six minimal pairs, such as *boat* [bōʊt] and *bone* [bōʊn], where one member of the pair contained a vowel followed by a stop, and the other a nasal consonant with the same place of articulation. Minimal pairs were same-spliced by removing the vowel from a token of *boat* and replacing it with the vowel from another token of *boat*, and were cross-spliced by replacing the oral vowel in *boat* with a nasal vowel from *bone* = *boat*. Targets thus contained a fully oral vowel in the SAME-SPLICE condition (*boat*) or a nasalized vowel in the CROSS-SPLICE condition (*boat*). Participants saw pairs of cartoon colour images of similar size and animacy on a screen (e.g., image of a *boat* and image of a *bone*) and heard a target word in either condition. They were instructed to look at the target (e.g., ‘Look at the *boat*’ or ‘Look at the *boat*’) while eye movements were measured with an EyeLink 1000 eye tracker, sampling 500 Hz.

The data were analyzed by comparing the time spent looking at the target to the time spent looking at both images on the display in 100 ms time bins. Results revealed that children aged 4-8 years (n=8) consistently looked to the target in the same-splice (*boat*) trials: they looked towards the *boat* image. In the cross-splice (*boat*) trials, participants fixated towards the competitor and shifted their gaze back towards the target when the final consonant was presented: they looked towards the *bone* image, then switched and looked towards the *boat* image. This suggests that coarticulation cues are used by older children during spoken word recognition, and that, similarly to adults (see Zamuner et al., 2016), they are able to resolve the competition between the target (*boat*) and the competitor (*bone*) despite the fact that the vowel is nasalized. However, they seem to be able to do so later than adults.

A possible explanation of children’s delay in resolving lexical competition could be their different weighting of phonetic cues: children may give more weight to the vocalic nasal cue, resulting in less effective target activation and competitor inhibition than adults who give more weight to the final consonant. Research has yet to show the exact point in development at which children use coarticulation cues in an adult-like manner and resolve competition effectively. Studies using older samples of participants and languages with different subphonemic cues will take us a step further in understanding the development of the linguistic system.

Works Cited

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