

Development of cue weighting in children's speech perceptionCatherine Mayo¹, Alice Turk¹, and Jocelynne Watson²

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Studies of perception of fricative contrasts (e.g. /sV/-/ʃV/, /sV/-/stV/, /Vs/-/Vʃ/) have shown that young children make more use of syllable-internal formant transitions (relative to other available acoustic cues) than do older children and adults (e.g. Nittrouer, 1992; Nittrouer and Miller, 1997; Nittrouer, Miller, Crowther and Manhart, 2000). There are two prevalent explanations for why such a difference should exist. Nittrouer and colleagues have proposed the Developmental Weighting Shift model, which claims that children's perception is initially both global and inflexible, focused on acoustic properties that correspond to units roughly the size of a syllable or mono-syllabic word (i.e. they rely more on transitions). As children gain linguistic experience, it is claimed, their perceptual strategies become more flexible and their perceptual representations more analytical, detailed or focused on phone-sized units (e.g. Nittrouer, Miller, Crowther & Manhart, 2000). Other researchers have suggested that the differences seen in the perceptual behaviour of adults and children are due to the fact that children have a higher threshold of auditory sensitivity than adults. Studies have found that children (generally aged 3 through 6 years, though in some cases older) have poorer thresholds of detection for pure tones than do adults, and that sensitivity for most frequencies continues to develop into late childhood. This has led some researchers (e.g. Sussman, 2001) to suggest that the reason for the speech perception differences between young children and adults is that children rely on the most acoustically salient cue (e.g. the longest or loudest cue, or the one with the most spectral information) when identifying contrasts.

This study contrasts these two hypotheses by examining the flexibility of children's weighting of acoustic cues in various phonetic contexts: /ni/-/mi/, /no/-/mo/; /da/-/ta/, /di/-/ti/; /saɪ/-/ʃaɪ/, /faɪ/-/θaɪ/; /do/-/bo/, /de/-/be/. In particular, we examine children's weighting of transitions in contexts where they are relatively more or less salient. For example, formant transitions are relatively less salient in a /ni/-/mi/ contrast than in a /no/-/mo/ contrast. The Developmental Weighting Shift model predicts that children should show greater perceptual preference for transitions than adults, in all contexts. The alternative acoustic hypothesis predicts that children should be flexible in their cue weighting, giving most weight to the most salient cue in any given context.

Preliminary results from a study of 3-year-olds suggest that both the above hypotheses may be partly correct. Three-year-olds appear to have a perceptual predisposition to weight transitional cues more heavily than other cues, compared to adults. However, they can also be flexible in their cue use, as adults are. We will discuss the development of cue-weighting strategies for 3-, 5- and 7-year-old children. [Supported by the Wellcome Trust.]

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