

# Perceptual, kinematic, and ultrasound measurement of /r/ development in children with phonological delay

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Though studies have shown that North American English approximant /r/ is a difficult phoneme to acquire, many children undergoing therapy nevertheless eventually acquire the sound (e.g. Ruscello 1993). What is less well-understood, however, is the articulatory trajectory that may be followed as a child is transitioning from a poor production of /r/ to a more accurate one. Thus, the primary goal of this longitudinal study was to collect ultrasound and kinematic (lip and jaw movement) data from two phonologically delayed boys between 6 and 7 years of age (SH and CK) who were being treated for misarticulation of /r/.

At the time of the study, SH and CK were receiving traditional therapy for /r/ production; neither child displayed any other articulatory difficulties. Once a month for five (S) or six (C) months, the children were recorded producing carrier sentences containing monosyllables with /r/s in either consonantal or vocalic position (e.g. /ræp/, /bɜ:/). During recording sessions, data from ultrasound, lip and jaw movement, and acoustics were collected. Similar data was also collected from three age-matched normally developing boys. In this talk, we focus on how perceptual ratings of the children's /r/ productions correlate with various categories of tongue shapes, and how tongue shapes change over the recording sessions.

Results for tongue shape changes over time show that at the beginning of the recording sessions, both CK's and SH's productions were primarily undifferentiated tongue shapes without retroflexion or the double articulation often associated with approximant /r/ (Delattre and Freeman 1968, Tiede et al. 2004). In later sessions, CK developed a clear retroflexion strategy, whereas SH preferred bunched articulations. Correlation of the tongue shape with perceptual judgments of the monosyllabic target words indicated that tongue shapes like bunching or retroflexing are better predictors of accurate vocalic /ɜ:/, but not accurate consonantal /r/, both for SH and CK and for the normally developing subjects. The earlier acquisition of accurate vocalic /ɜ:/s by SH and CK is similar to the developmental order reported for younger, normally developing American English speakers (McGowan et al. 2004).

## References

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