

## Audio-visual speech processing in children with hearing loss

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Many children with hearing loss (HL) achieve functional speech perception via cochlear implants (CIs) and/or hearing aids (HAs). However, even when speech perception is accurate, speech processing may still be slow and effortful (e.g., Hicks & Tharpe, 2002; Holt, Demuth, & Yuen, 2016). This study therefore investigated how speech processing speed and effort may be improved for children with HL.

The addition of visual speech cues (e.g., movements of the speaker's face) is known to improve speech perception *accuracy* in a variety of circumstances. It also improves speech processing *speed* among children with NH and reduces *effort* for some of those children (Holt, Bruggeman & Demuth, under review). We therefore examined whether similar improvements in processing speed and/or effort with the addition of visual speech cues would be found for children with HL.

A phoneme monitoring task with concurrent pupillometry was used: Phoneme monitoring reaction time indexed processing speed and peak pupil dilation indexed effort. Both children with HL aged 7-11 years ( $n = 26$ ; 9 CI, 15 HA, 2 bimodal) and children with NH ( $n = 19$ ; existing data from Holt et al. [under review]) showed faster processing with the addition of visual cues. However, children with HL responded slower than NH peers overall. For effort, no significant differences were detected.

Children with HL therefore seem to exploit visual speech cues to improve processing speed, though they do not use them detectably for effort reduction. This suggests that ensuring visual speech cues are available to children with HL in contexts such as the classroom is critical as it will enable them to process speech input more rapidly, potentially leading to improvements in academic performance. Future work will examine individual variability in performance, to determine which children with HL are likely to benefit most from visual speech information.