Production of prosodic prominence in the babbles of Cochlear Implanted (CI) and normally hearing (NH) infants.

Children produce traces of adultlike prosodic prominence from early on in development [1][2]. Prominence is realised by manipulation of fundamental frequency (f0), intensity and duration. For infants with CI, the production of prosodic differentiation may pose difficulties, since the implant is limited in adequatly perceiving f0 and intensity changes [3]. Indeed, a recent study on the acoustical realisation of prominence in both babbles and early words has shown that infants with CI produce less f0 and intensity differentiation, even from babbling on [4]. The present study investigates if this acoustical difference in prominence production beween infants with CI and NH infants is also perceivable by listeners.

The stimuli used in this study were disyllabic babbles produced by Dutch-acquiring infants with CI (n=9) and NH infants (n=9). The stimuli (n=527) were presented one by one to adult judges (n=30) in a perceptual rating task. The raters had to indicate the prosodic differentiation by moving a slider on a continuous visual analogue scale presented on a screen. Every babble was visualised by two balls, representing the syllables. When the slider was moved to the left, the left ball enlarged and the right one got smaller (indicating more prominence on syllable 1), the opposite happened when sliding to the right. The experimental output was a number from 0 (extreme left) to 100 (extreme right), indicating the extent and direction of prosodic differentiation. The judges could play an utterance three times. Afterwards, the results were entered in Multi Level Models with groups (NH or CI) and babble type (reduplicated or variegated) as fixed effects.

The first analysis on the entire dataset showed that the babbles of the CI infants were not perceived as having less differentiated prominence. However, a great amount of variance in the results was attributed to raters scoring utterances in a very different way. This was an indication that judging prominence in babbles might be a challenging task due to the immaturity of the utterances. Therefore a second analysis was conducted on the 20% most left and 20% most right ratings per judge. Those babbles at the extremes should have been perceived as having the most differentiated prominence and are rated with more certainty. In this analysis a significant difference between groups was found, indicating that NH babbles were more likely to be rated as having differentiated prominence. Moreover, a supporting analysis showed that the CI babbles were replayed more often than the NH babbles. This underlines the idea that it was more difficult to locate prominence in the CI babbles. Additionally, the second analysis showed that variegated babbles were rated more often at the extremes compared to reduplicated babbles. It is concluded that even in prelexical utterances there is a slight perceivable discrepancy between the prominence production of CI and NH infants, confirming previous acoustical findings [4]. Moreover, as research has shown that CI infants tend to babble less variegated [5] it might be the case that a lower degree of phonemic variation is related to less prosodic variation.

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