

The effects of blindness on the development of articulatory movements in children

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INTRODUCTION

It has recently been shown that adult speakers with congenital visual deprivation produce smaller displacements of the lips (visible articulator) than their sighted peers (Ménard et al., 2013). As a compensatory maneuver, blind speakers move their tongue more than sighted speakers. Furthermore, when vowels are produced under narrow focus, a prosodic context known to enhance distinctiveness, blind speakers mainly alter tongue movements to increase perceptual saliency, while sighted speakers alter tongue and lip movements (Ménard et al., 2014). However, from a developmental perspective, not much is known about the role of blindness in speech production. The objective of this paper was therefore to investigate the impact of visual experience on the development of the articulatory gestures used to produce intelligible speech.

METHOD

Eight congenitally blind children (mean age: 7 years old; range: 5 to 11 years) and eight sighted children (mean age: 7 years old; range: 5 to 11 years) were recorded while producing repetitions of the French vowels /i/, /a/, and /u/ in a /bVb/ sequence in two prosodic conditions: neutral and under contrastive focus. The prosodic contexts were used here to manipulate distinctiveness and elicit hyperarticulation. Lip and tongue movements, as well as the acoustic signal, were recorded using a SONOSITE 180 ultrasound system and a video camera. The current paper focuses on acoustic measures and lingual measurements. Formant frequencies, fundamental frequency values, and tongue shapes (Li et al., 2005) were extracted at vowel midpoint. Measures of curvature degree and asymmetry (tongue shape) were extracted following Ménard et al.'s (2012) method.

RESULTS

Preliminary analyses of the data show that blind children move their tongue to a greater extent than their age-matched sighted peers. Trade-offs between lip and tongue displacements, inferred from acoustic measurements, are discussed. Overall, our results show that blindness affects the developmental trajectory of speech.

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