The Effects of Auditory and Visual Stimulation on Exploration in Infancy

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INTRODUCTION

Deafness in infancy can produce developmental delays in language, social, and behavioral development (Marschark, 1993). The majority of research on prelingual deafness explores the effect of auditory deprivation upon language and speech development (Marschark et al., 2000). Thus, studying the actions of infants with hearing loss might reveal the sensory focus of their attention and learning. This exploratory study examined how infants with hearing loss and normal hearing respond to auditory and visual stimulation. The long-term goal of this research is to determine how hearing loss affects the way infants explore their environment.

PURPOSE

The purpose of this study was to determine if infants with prelingual hearing loss demonstrate a preference for visual stimulation over auditory stimulation during play.

METHODS

Participants

All participants were between 12 and 24 months of age with no known additional disabilities or developmental delays. Infants with Normal Hearing:

- passed otoacoustic emission screening, bilaterally
- had no known additional disabilities or developmental delays
- had normal hearing

Infants with Hearing Loss:

- had bilateral, mild-to-moderate sensorineural hearing loss, defined as pure tone average of 0.5, 1, and 2 kHz between 30 and 55 dB HL
- had normal hearing
- had audiometry at 3000 Hz verified via hearing aid test-box measures

Apparatus & Stimuli

The front of the visual stimulus box was made of a clear plastic window, while the auditory stimulus box was opaque on all sides. Inserting a wooden dowel into the circular opening of the stimulus boxes breaks an infrared beam of light and activates a LED display of red and green colored lights inside the visual stimulus box. A 500 Hz tone (70-80 dB SPL) from the auditory stimulus box.

RESULTS

Infants with hearing loss consistently displayed longer looking times at the visual stimulus when compared to infants with normal hearing, regardless of whether the sound was on or off in the auditory box. In general, infants with hearing loss engaged in shorter looking times at the auditory stimulus box.

CONCLUSIONS

Based on our preliminary data, we conclude that:

- Infants with hearing loss displayed longer looking times at the auditory stimulus box than infants with normal hearing.
- Infants with normal hearing showed similar looking times to infants with hearing loss.
- Infants with hearing loss showed a decrease in activation time during the sound-on condition as compared to their own activation time in the sound-off condition.
- Infants with normal hearing showed a similar amount of activation for both the visual and auditory stimulus boxes.

Although data are preliminary, infants with hearing loss may have a preference for visual, versus auditory, stimuli. The decrease in length of activation with the silent auditory stimulus box when compared to the box that made sound suggests that infants with hearing loss have less desire to engage with a toy that provides no auditory feedback.

It is unclear why infants with normal hearing showed similar looking times to the auditory stimulus box in both sound-on and -off conditions. One possibility may be that infants were actively attempting to visually assess the function of the auditory stimulus box during the sound-off condition. Alternatively, infants may have been demonstrating their ability to “solve” the box after experimentation during the training session.

FUTURE DIRECTIONS

Further research is needed to connect environmental exploration with perceptual development. This connection may build the foundation for cognitive development in early infancy. For instance, if environmental exploration for infants with hearing loss is limited, it is possible that cognitive deficits may arise (e.g., planning, working memory, and inhibition) might also arise. Additional data from infants with hearing loss will be collected to determine if these early emerging patterns persist across a larger sample of children.

KEY REFERENCES