Joint attention (JA) is the ability of two individuals to share attention on an object or event. In normal hearing children, JA emerges within the first year of life and is predictive of language abilities in later childhood (Mundy et al., 2007). Children who are deaf also exhibit JA (Prezbindowski et al., 1998; Nowakowski et al., 2009). Little is known, however, about how JA abilities relate to spoken language outcomes in the subset of children who receive cochlear implants. To address this issue, we have designed a longitudinal study to test the hypothesis that JA skills prior to cochlear implantation predict language acquisition in children following cochlear implant activation. During the interval between cochlear implantation and activation, children are administered the abridged version of the Early Social Communication Scales (ESCS; Mundy et al., 2003), a structured observational measure of nonverbal communication that provides scores on six categories of social communication. This preliminary report reveals that all children exhibit nonverbal communication behaviors, thus validating the ESCS as a measure of JA in children with hearing loss. Data are presented in the context of normative data for age-matched children with normal hearing (Mundy et al., 2007).

**Methods**

Participants: Six (6) children (12-21 months old) were recruited from the Cochlear Implant Program at the Ann & Robert H. Lurie Children’s Hospital of Chicago. 8 children had a normal birth history and no history of visual problems. Participant demographics are in Table 1. Approval to conduct the study was granted by the Institutional Review Boards of Northwestern University and Lurie Children’s Hospital of Chicago.

Method: The Early Social-Communication Scales (ESCS; Mundy et al., 2003) is a structured observation measure of nonverbal communication skills. The experimental setup (illustrated below, left) was used to administer the following tasks during a 20-minute session:

- Object Spectacle Tasks (pictures, right)
- Turn-taking tasks
- Following Commands (modified for children with hearing loss)
- Social Interaction Task
- Gaze Following Task
- Book Presentation Task

Procedure: Children were evaluated in the interim between cochlear implant surgery and device activation, with one exception. Participant 6 was evaluated 2 weeks following activation of her device. Sessions were digitally video recorded and coded offline using the ESCS scoring protocol. The ESCS was administered 2 weeks after cochlear implant surgery and device activation, with one exception. Participant 6 was evaluated 2 weeks following activation of her device. Sessions were digitally video recorded and coded offline using the ESCS scoring protocol.

**Results**

Joint attention (JA) correlated with the number of times the child responds to the “Give it to me!” request. These data suggest that the joint attention abilities of children who are more responsive to joint attention bids are also more responsive to behavior requests (Figure 2B). These data suggest that the development of different types of nonverbal communication skills is related to one another in children with hearing loss. This finding contradicts the observation that developing JA, RJA, IBA, and RBR skills are not correlated in typically developing children (Mundy et al., 2007). Ongoing data collection will allow further investigation of this issue.

The quantity and type of nonverbal communication behaviors are unrelated to the child’s residual hearing and to their auditory skills, as quantified by the IT-MAIS prior to activation of the cochlear implant device. This finding supports the idea that the hearing loss is not a prerequisite for the development of joint attention behaviors. Participant 1 data, however, appears to contradict this finding. The relationship between pre-implant auditory skills and the development of nonverbal communication skills is a current focus of the research.

**Summary**

1. This is a preliminary report from an ongoing longitudinal study that is designed to relate pre-implant neuromotor, auditory, and nonverbal communication skills to post-implant spoken language outcomes in children who are using cochlear implants. Preliminary results show that children with hearing loss have the number of nonverbal communication behaviors at the time of cochlear implant evaluation.

2. These data suggest that the joint attention abilities of children who are more responsive to joint attention bids are also more responsive to behavior requests (Figure 2B). These data suggest that the development of different types of nonverbal communication skills is related to one another in children with hearing loss. This finding contradicts the observation that developing JA, RJA, IBA, and RBR skills are not correlated in typically developing children (Mundy et al., 2007). Ongoing data collection will allow further investigation of this issue.

3. The quantity and type of nonverbal communication behaviors are unrelated to the child’s residual hearing and to their auditory skills, as quantified by the IT-MAIS prior to activation of the cochlear implant device. This finding supports the idea that the hearing loss is not a prerequisite for the development of joint attention behaviors. Participant 1 data, however, appears to contradict this finding. The relationship between pre-implant auditory skills and the development of nonverbal communication skills is a current focus of the ongoing data collection.

**References**


Acknowledgments

We would like to thank the families who have enrolled in this study. The following researchers assisted with the data analyses: Harry M. Mundy, A. K. Prezbindowski, A. K., Block, J., Vaughan Van Hecke, A., Delgadoa, C., Venezia Parlade, M., & Pomares, Y. (2007). Individuals differences and developmental trajectories of joint attention in typically developing children. Developmental Psychology, 43(2), 382-393.