Early Vocabulary Size and Grammatical Abilities in Young CI Recipients and TD Toddlers

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Introduction

In typically developing (TD) children, strong associations between early lexicon size and later grammatical ability have been observed (Bates et al., 1988). This is especially true for verb lexicons and grammar (Marchman, & Bates, 1994; McGregor & Sheng, 2005).

However, little research has been done on whether children with cochlear implants (CIs) show the same associations as TD children. Recent studies have shown that young CI recipients rapidly developed expressive vocabulary (Ertmer, & Inniger, 2009; Ertmer, & Mellon, 2001) as well as receptive vocabulary (Connor et al., 2006). However, grammatical abilities have been reported as delayed or relatively poor compared to TD children (Szagun, 2000; Nikolopoulos et al., 2004). To-date, there are very few studies of verb development in children with CIs. The purpose of the current investigation was to examine the relationships between young CI recipients’ vocabulary size, and verbs in particular, and their grammatical abilities after 24 months of CI experience.

Research Questions

1. How do young CI recipients with 2 years of robust hearing experience compare with typically developing 2 year-olds in terms of spoken vocabulary size, verb use, and grammar?
2. Is there a relationship between vocabulary size, in particular verbs, and grammatical scores in children with CIs and in those who are TD?

Participants:

(1) 6 young CI recipients
• 24 months of CI experience
• Four girls and two boys
• All received their CIs before their third birthdays (mean age of activation = 15.5 months, SD =4.55)
• Oral communicators from English homes
• No other disabilities
(2) 6 TD children
• 24 months old
• Three girls and three boys
• From English monolingual homes
• No other disabilities

Procedures:

(1) Administration of the MacArthur-Bates Communicative Development Inventories (MCDI; Fenson et al., 1993)
(2) Recording of 20-minute adult-child interactions for each child.

Analysis

(1) Group comparisons
• Vocabulary measures
  • MCDI number of words produced
  • MCDI number of verbs produced
  • Number of verb-types from interactions
  • Number of verb-tokens from interactions
• Grammatical measures
  • MCDI Grammatical scores
  • MCDI MLUs from interactions
(2) Correlations between vocabulary and grammar
• Composite Grammatical scores
  • Formula = mean of MCDI grammatical scores and MLUs from interactions for each child
• Children’s scores were standardized because they were derived using different scales.
  • Formula = (individual participant’s score – minimum score within the variable)/(Maximum score – minimum score within the variables)

Results

The means of vocabulary variables were relatively higher for CI group than the TD group, but only verb size and verb-types reached significance. No significant differences were found in grammatical variable comparisons between the groups.

Correlations between Expressive Vocabulary and Grammar

The Spearman correlation analysis revealed that the children with CIs showed strong correlations between three lexical variables and grammatical composite scores: MCDI words (rho = .812, p < .05); MCDI verbs (rho = .812, p < .05); and verb-tokens (rho = .912, p < .05). The TD children only showed an association between the MCDI words and the grammatical composite scores (rho = .943, p < .005).

Conclusions

Young CI recipients and TD children developed spoken vocabularies of comparable size during their first two years of robust hearing experience. The CI children acquired a significantly greater number of verbs during the same period. Both findings are encouraging because they show that a period of auditory deprivation of less than 2 years had not diminished the children’s language learning potential. The findings also suggest that the grammatical deficits observed in relatively older CI recipients in previous investigations (Nikolopoulos et al., 2004) might eventually be reduced through implantation at younger ages. Strong associations between vocabulary and grammar, and especially verbs and grammar, were also observed during the early phases of language development in young CI recipients. These relationships suggest that young children with CIs may follow the same linguistic developmental paths as TD children. However, given the small number of participants in the study, the role of verbs in post-implantation grammatical development needs to be studied further.

References


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