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Communication dynamics between mothers and their children with cochlear implants: Effects of maternal support for language production

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ABSTRACT

This study examined (a) the functions and modalities of maternal and child communication during interaction between mothers and children with cochlear implants (CIs), comparing them with mothers and normally hearing (NH) children, and (b) the effectiveness of maternal support strategies in eliciting adequate answers in children with CI. Twenty preschoolers with CIs (M = 40 months) and 40 NH children – 20 matched by chronological age (CANH, M = 40 months) and 20 matched by hearing age (HANH, M = 25 months) – were videotaped during shared book reading and toy play with their mothers. Child and maternal utterances were coded for communicative functions and modalities (vocal, gestural, bimodal), including gesture types; maternal repairs were examined for type of support provided, and child answers for adequacy. Mothers in the CI group and in the CANH group displayed higher proportions of Informative Repairs than mothers of HANH children. However, unlike the mothers of NH children, mothers of children with CIs used bimodal utterances significantly more than vocal utterances. Sequential analysis revealed that maternal Informative Repairs elicited the production of Adequate Answers in both children with CIs and CANH. Interestingly, in the CI group this association was found only when Informative Repairs were accompanied by gestures. These findings offer suggestions for intervention programs focused on parent-child conversation.

1. Introduction

An increasing number of studies in recent decades have shown that the use of cochlear implants (CIs) for children with hearing loss is an important resource for improving language skills (Archbold et al., 2008; Ching et al., 2009; Davidson, Geers, Blamey, Tobey, & Brenner, 2011; Tomblin, Peng, Spencer, & Lu, 2008; Uhler, Yoshinaga-Itano, Gabbard, Rothpletz, & Jenkins, 2011). After CI activation children improve speech perception, recognition and production (Baldassari et al., 2009; Spencer & Marschark, 2010). Nevertheless, there is wide variability in the language outcomes of children with CIs (de Hoog et al., 2016; Szagun & Schramm, 2016), even after accounting for age at implantation and duration of implant use (Duchesne, Suttom, & Bergeron, 2009; Niparko et al., 2010). Individual differences are partially explained by family environment and parental linguistic input and support during interaction with these children (Cruz, Quittner, Marker, & DesJardin, 2013; Holt, Beer, Kronenberger, Pisoni, & Lalonde, 2012).

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However, the results are contradictory on the contribution of both individual variables (see Spencer, Marschark & Spencer, 2011 for a review) and contextual variables (Caselli, Rinaldi, Varuzza, Giuliani, & Burdo, 2012; Goldin-Meadow, & Saltzman, 2000; Guasti et al., 2014; Moeller, 2000; Quittner et al., 2013; Richter, Eissele, Laszig, & Löhle, 2002; Szagun & Stumper, 2012; Yoshinaga-Itano, 2003a, 2003b).

In particular, a range of studies have investigated the quality of interactions between parents and their children with CIs and its impact on children's language development.

Within a social interactionist perspective on language development (see Chapman (2000), and Hoff (2006) for reviews), several studies conducted with both typically developing children and children with language impairment, including children with hearing loss, have shown that maternal sensitivity is a significant predictor of growth in oral language (Niparko et al., 2010; Pressman, Pipp-Siegel, Yoshinaga-Itano, & Deas, 1999; Quittner et al., 2013; Tamis-LeMonda, Bornstein, & Baumwell, 2001). Maternal sensitivity, or responsiveness, has been defined as the mother's ability to produce "prompt, contingent and appropriate reactions" to child behavior (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008) and it has been analysed by means of a range of measures. For instance, Tamis-LeMonda et al. (2001) focused on maternal contingent verbal responses (e.g., vocal imitations, expansions) to child's vocalizations; they found that contingent replies predict the timing of the achievement of basic language milestones. Other studies have stressed other pragmatic characteristics of maternal communication, such as the number of information-salient utterances (D'Odorico, Salerni, Cassibba, & Jacob, 1999), supportive (vs. intrusive) directiveness (Masur, Flynn, & Eichorst, 2005), vocal and gestural support for meanings of rare words (Weizman & Snow, 2001), conversation-eliciting questions (Hoff-Ginsberg, 1986), and repairs, that is, any utterance aimed at correcting or expanding a child's incorrect verbal production (Barachetti & Lavelli, 2011). The impact of maternal scaffolding and responsiveness on child language development is even stronger in children with linguistic limitations than in typically developing children (Majorano & Lavelli, 2015). Maternal informative repairs, use of co-speech gestures, and informative and gestural scaffolding when a rare word is embedded in the utterance (Weizman & Snow, 2001), are all related to better lexical outcomes or higher degrees of participation in conversation on the part of children with language limitations (Barachetti & Lavelli, 2011; Lavelli, Barachetti, & Florit, 2015; Majorano & Lavelli, 2015).

With regard to deaf children with hearing parents (i.e., the great majority of children who are born deaf), nevertheless, many studies have shown that parent-child interactions are difficult to maintain for at least two reasons: the children's limited access to oral language, and the mismatch of hearing status between parents and children (Mitchell & Karchmer, 2004). Interactions between parents and children are reported to be shorter and frequently interrupted by loss of attention on the part of the child. This requires parents to make big efforts to regain their child's interest (Abu Bakar, Brown, & Remine, 2010; Brown & Remine, 2004). Furthermore, the challenge to adapt their communication to the child's limited access to the hearing signal can lead parents to feel frustrated and guilty (Albertini, 2010; Meadow-Orlans, Mertens, & Sars-Lehrer, 2003). Therefore, in order to compensate for their children's difficulties in understanding language, hearing mothers tend to use more directive and controlling modes of communication with their children than do the mothers of normally hearing (NH) peers (Barker et al., 2009; Holt et al., 2012; Spencer, Erting, & Marschark, 2000; Vaccari & Marschark, 1997). In turn, this could have a negative effect on their children's language development: families with higher levels of self-reported control were found to have children with smaller vocabularies (Holt et al., 2012).

On the other hand, several studies have reported that hearing mothers of deaf children with CIs are able to adapt their communications to the linguistic limitations of their children, especially some time after the CI activation. For example, Fagan, Bergeson, and Morris (2014) showed that mothers of profoundly deaf children with CIs displayed higher frequencies of directives and prohibitions than mothers of age-matched NH children before cochlear implantation; seven months after the CI activation, however, they showed improvements in interactional synchrony and the ability to adapt their language to their children's word use. Similar results are reported by Abu Bakar et al. (2010) in a longitudinal study: they showed that maternal sensitivity (contingency to the child, interactional strategies) with children with CIs had increased nine months after CI activation, particularly with the early cochlear-implanted children. Other studies have identified other aspects of maternal communication revealing that mothers are sensitive to the limited hearing and linguistic experience of their deaf children with CIs. Examples include prosodic characteristics that are typical of the infant-directed speech style (Bergeson, Miller, & McCune, 2006; Kondaurova, Bergeson, & Xu, 2013), use of facilitative language techniques (DesJardin & Eisenberg, 2007; Moeller, 2000), and responsiveness to their children's utterances in both the prelexical and lexical stage (Vanormelingen, De Maeyer, & Gillis, 2015). With regard to communication modalities, the assessment of spontaneous interactions between mothers and their toddlers with CIs and NH showed that the mothers of hearing-impaired children used more gestures and touch than did mothers of NH peers (Lederberg & Everhart, 1998; Waxman & Spencer, 1997), even when linguistic communication was predominant (Lederberg & Everhart, 2000). In addition, the assessment of maternal input to their deaf children during a word-learning task showed that mothers are more likely to make the meaning of novel words more transparent than familiar words, mainly through deictic gestures (Farran, Lederberg, & Jackson, 2009).

However, the majority of these studies focused on the mothers' abilities to adapt their communications to the limited hearing and linguistic experience of their children with CIs, without analysing the effects of maternal behavior on child language learning. Only a small number of recent studies (Cruz et al., 2013; DesJardin, Ambrose, & Eisenberg, 2009; DesJardin & Eisenberg, 2007; DesJardin et al., 2014; Quittner et al., 2013) have focused on the relationship between parental support for language production during interaction with children with CIs, and children's language acquisition. By analysing parent-child communication in different interactive contexts and children's oral language abilities, these studies have shown that three factors are positively related to children's language abilities after implantation. These are: maternal sensitivity (Quittner et al., 2013), specific elements of parental input (number of types and MLU), and high level facilitative language techniques such as open-ended questions and expansions. In particular, DesJardin and Eisenberg (2007) found relationships between the use of recasts and open-ended questions and, respectively, the children's receptive and expressive language skills. Furthermore, the same research group (DesJardin et al., 2009) found an