Binos P, et al., J Otol Rhinol 2018, 7:6
DOI: 10.4172/2324-8785.1000357

Journal of Otology & Rhinology

Mini Review A SCITECHNOL JOURNAL

Auditory Experience against Discontinuity Theory: Review Evidences from Hard-of-Hearing Children

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Received Date: August 16, 2018; **Accepted Date:** September 11, 2018; **Published Date:** September 17, 2018

Abstract

The "Discontinuity Theory" argues for dissociation between infant vocalizations and mature-adult speech. There is a plethora of research data mentioning a recorded simultaneous co-existence of multi-syllable types of early vocals, in individuals characterized as atypical. The aim of this literature review is to present data arguing for a strong relation between early developmental stages of speech. Studies from early cochlear implanted infants seem proper providing the necessary justification for the existence of strong developmental links among early linguistic milestones. Results support a gradual transition from babbling stages into mature, more complex forms of vocalization that we meet on adult speech. Early speech development is rapid during the first post-implant year. Auditory experience provided from cochlear implants is a crucial factor linked to a wide variety of improved outcomes. Speech pathology analyzing the way that auditory experience affects speech production can argue against "discontinuity", since hearing access transforms deaf vocalization.

Keywords: Auditory access; Language development; Speech production; Cochlear implant

Introduction

Jakobson [1] and others [2,3] supported the "Discontinuity Theory" mentioning a dissociation between infant productions and adult speech. The discontinuity theory considered as the established perspective for many decades and surprisingly the core of this theory remains an inspiration for many researchers even today. Their basic argument comes from the deaf studies, mentioning that deaf infants produce vocalization with similar way as hearing infants do. Their conclusion was that infants born with severe to profound hearing loss who experience auditory deprivation vocalize with exactly the same way as hearing peers.

Recent Evidences

Recent papers from infant research revealed that infant's vocal development can provide early evidence for the final outcome of language acquisition. Babbling stage is a precursor for speech development and the onset of babbling appears to be triggered by the use of CI [4-7]. Snow and Ertmer [8] studied prosodic features of children who received a cochlear implant between the ages of 10-36 months and concluded similarly to previous studies that intonation was similar to children with normal hearing showing a parallel interaction between chronological age at device activation and duration of cochlear implant use. Lenden and Flipsen [9] found also no consistent difficulties with pitch or phrasing for their young CIs after 1-3 years of auditory experience. Similarly, another research from Swedish-speaking environment and after 1-6 years of CI use young CIs showed higher accuracy for suprasegmental imitation than segmental [10].

In a recent study [11] the emergence of utterance length measured in words and morphemes for young CIs revealing that as the children gained auditory experience their MLU values appeared to improve relative to children with typical hearing. Auditory experience seems also crucial for another research since their young CIs improved their values for MLU from 1.8 pre-implantation to 4.8 words after 18 months of implant experience [12]. In a longitudinal case study [13] a young CI activated at age 20 months raised her morphemes' MLU from 1.61 to 2.57 respectively. It is worth mentioning that the child received auditory training and oral communication habilitation.

Early implantation providing early exposure to auditory feedback seems beneficial for the development of vocalizations, canonical babbling and expressive vocabulary as well. The recent study of Schramm et al. [14], Bohnert and Keilmann [14] suggested a close link among an on-time auditory feedback and the emergence of vocalizations while similar outcomes came from others as well [15,16]. Auditory experience seems positively affect intelligibility and prosodic utterance production as well, since children with more hearing experience scored better on BIT (Beginner's Intelligibility Test) and PUP_ID (Prosodic Utterance Production) tasks [17].

Deaf Infants

Similar conclusions draw from comparisons among typically developing infants and deaf infants as well. Oller [18], in his infraphonological model, mentioned that early speech production stages of normal hearing infants gradually transit to adult-like vocalizations. Similarly, the study of De Boysson-Bardies and Vihman [19] argued for a strong relationship between first vocals and words based on the frequency of the place and manner of the consonant-like segments to the input language. These outcomes are in contrast with the widespread belief that deaf infants babble just as hearing infants do, since there are fundamental differences in production repertoire among these groups, like the onset of canonical babbling [16,20]. Canonical babbling appeared to be delayed in deaf infants, first emerging at ages over 10 months. Deaf children receiving a cochlear implant on-time (during the first year of life) can have access to speech signal and can exhibit language scores similar to their normal hearing peers.

Conclusion

It is clear from the previous described literature, that auditory experience provided by cochlear implants affects language development in a multi-level way. Despite the fact that, it is not clear from what age hearing affects early speech and language development,

we can expect that lack of hearing access influences vocal development within the first year of life, especially for nowadays young cochlear implant recipients. Current data show that cochlear implants trigger a similar performance radically different from deaf infants described in the past, since auditory perceptual ability affects finally vocal behavior.

Conflict of Interest

The authors declare no conflict of interest.

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