Available online at www.sciencedirect.com

ScienceDirect

Lingua 139 (2014) 68–79

Lingua

www.elsevier.com/locate/lingua

The production of Dutch finite verb morphology: A comparison between hearing-impaired CI children and specific language impaired children

Annemiek Hammer [a,b,*], Martine Coene [a,c], Johan Rooryck [d], Paul J. Govaerts [c]

[a] Vrije Universiteit Amsterdam, Boelelaan 1105, 1081 HV Amsterdam, The Netherlands
[b] Utrecht University of Applied Sciences, Institute for Sign Language, Linguistics and Deaf Studies, Padualaan 97, 3584 CH Utrecht, The Netherlands
[c] The Eargroup, Herentalsebaan 75, B-2100 Antwerpen, Deurne, Belgium
[d] Leiden University Centre for Linguistics, Witte Singel-complex, van Wijkplaats 2, 2311 BX Leiden, The Netherlands

Received 5 October 2011; received in revised form 23 August 2013; accepted 18 November 2013
Available online 15 January 2014

Abstract

Background: This study compares 4- to 7-year-old cochlear implanted (CI) and specific language impaired (SLI) children in the production of finite verb morphology and mean length of utterance (MLU). It has been hypothesized that, due to reduced exposure to grammatical elements in the ambient language, both groups are delayed in their acquisition of morphosyntax.
Method: Spontaneous language samples were analyzed for Dutch monolingual CI ($N = 48$) and SLI children ($N = 38$) on MLU, number of finite verbs, and number of errors in the target-like production of verbal agreement. CI and SLI children were compared on their linguistic profiles, including MLU and finite verb production, using the norms of typically developing (TD) children.
Results: Statistical differences between CI and SLI children were found only for finite verb production at ages 5 and 6, in the direction of better outcomes for CI children. Both groups produced significant numbers of verbal agreement errors. Weak linguistic profiles were found for 75% of the SLI children and 35% of the CI children.
Conclusion: CI and SLI children show both weak performances on the target-like production of verbal agreement. Nevertheless, CI children produce more finite verbs and have stronger linguistic profiles as compared to SLI children.

Keywords: Cochlear implantation; Specific language impairment; Finite verb morphology; Morphosyntax; Perceptual salience

1. Introduction

In the neurolinguistic theory of language development proposed by Locke (1997), it is argued that the acquisition of language can be broken down into four interdependent developmental stages. The acquisition of morphology and syntax crucially depends on the storage of lexical items and unanalyzed utterances and the subsequent analysis of this linguistic material. During the so-called analytical stage, the stored utterances are decomposed into smaller lexical and functional units, leading to morphological and syntactical acquisition. Importantly, this particular stage of language development is claimed to be triggered or reinforced by the pressure of the expanding vocabulary as well as by maturational advances.

* Corresponding author.
E-mail address: annemiek.hammer@hu.nl (A. Hammer).

0024-3841/$ – see front matter
http://dx.doi.org/10.1016/j.lingua.2013.11.010

Under such a view, failure to store sufficient lexical items and utterances will delay analytical mechanisms from turning on and, consequently, morphological and syntactic acquisition will be delayed. Morphosyntactic delays are typically observed in specific language impaired children (henceforth SLI) (e.g. Hansson and Leonard, 2003; Leonard et al., 1992; Wexler et al., 1998). In general, such language delay cannot be explained by hearing loss, neurological damage, or mental retardation. Instead, their language delay has been attributed to limited processing abilities, such as reduced speed of auditory information processing (Benasich and Tallal, 2002; Tallal and Piercy, 1974, 1975) or limited working memory capacity (Baddeley et al., 1998; Ellis-Weismer, 1996; Ellis-Weismer et al., 2000). The underlying idea of these accounts is that there is a limited amount of resources available for human information processing. If task demands exceed this amount of resources, it will have a negative effect on the processing and storage of linguistic material (Ellis-Weismer, 1996:34). As such, lexical and grammatical information conveyed in the auditory speech input needs to be encountered numerous times in order for SLI children to adequately store it in their linguistic system (Leonard et al., 2007; Locke, 1997). This results in reduced effective exposure to linguistic material, which, at its turn, will eventually lead to protracted language development.

Although different in nature, reduced effective exposure to linguistic material in the speech stream also arises in the case of hearing loss. The majority of children diagnosed with profound hearing loss receive auditory speech input via the cochlear implant (henceforth CI) that electrically stimulates the auditory nerve through electrodes placed in the cochlea. In comparison with classical hearing aids, CIs provide qualitatively improved auditory speech input that gives profound hearing-impaired children better opportunities to develop oral language skills (Svirsky et al., 2000). Nevertheless, CI children are not normal hearing listeners, the CI signal yields a temporally and spectrally reduced auditory signal as compared to the signal provided by the normal functioning cochlea (Moore, 2003). As such, CI children can be taken to develop morphosyntax with reduced auditory speech input.

Although the underlying cause of the reduced exposure to auditory speech input is clearly distinct between SLI and CI children (cognitive vs. auditory respectively), it is hypothesized that this reduced input will have similar effects on the acquisition of morphosyntax, i.e. it will result in a morphosyntactic delay in both groups of children (Locke, 1997:282). Therefore, similar outcomes in morphosyntactic development are expected for both CI and SLI children. To test this hypothesis, we compare the production of finite verb morphology by age-matched Dutch-speaking CI and SLI children. By taking this perspective we are able to increase our understanding of the role of auditory speech input and processing in the development of morphosyntax.

The remainder of the paper is organized as follows: in section 2 we give a concise state-of-the-art on morphological development in CI and SLI children. In section 3 we will outline our research aims and hypotheses. The research method is given in section 4, followed by the results in section 5. The results are discussed in section 6 and conclusions are drawn in section 7.

2. Grammatical development in CI and SLI children

2.1. CI children

Currently practice is that most children who are diagnosed with a profound bilateral hearing loss (i.e. a hearing loss > 90 dB HL in the best ear) receive a CI. Research has shown that approximately 40–50% of the children with CIs implanted at or before the age of 2 are able to achieve age-appropriate scores on expressive and receptive language (Geers, 2004; Geers et al., 2003, 2009). In addition, regression analysis has shown that children who received their implant before the age of 2 are more likely to enter preschool in mainstream education (Nicholas and Geers, 2007). The improvements in oral language development can be directly related to the type of hearing device itself. It has been established that CI children develop language at a faster rate as compared to children with similar hearing losses who use classical hearing aids (Svirsky et al., 2000; Tomblin et al., 1999). Secondly, thanks to neonatal hearing screening programmes, hearing losses in newborns can be diagnosed right after birth, which enables early intervention. It has been shown that early intervention has beneficial effects on later language development in the hearing-impaired (Yoshinaga-Itano et al., 1998). Also in the CI literature it has been frequently shown that earlier ages of implantation lead to better language outcomes (e.g. Coene et al., 2011; Hay-McCutcheon et al., 2008; Kirk et al., 2000; Tomblin et al., 2005).

However, fewer than 50% of the CI children reach age appropriate scores on the production of bound morphology. This can be due to the suboptimal acoustic input offered by the CI, which is likely to affect the acquisition of low salient linguistic elements, such as grammatical morphemes (Svirsky et al., 2002). A close inspection of the CI literature reveals that they produce fewer bound morphemes (Geers, 2004; Nicholas and Geers, 2007; Young and Killen, 2002) and omit free morphology (e.g. articles, verbs) more often as compared to typically developing hearing peers (henceforth TD) (Caselli et al., 2012) In addition, CI children perform poorly on tests assessing their receptive knowledge of grammatical