



Morphological Development in Bimodal Bilingual Children with Cochlear Implants

Corina Goodwin
University of Connecticut



INTRODUCTION

- ◆ Monolingual children with cochlear implants (CCIs) show deficits in their morphological development (Guo et al., 2013).
- ◆ Svirsky et al. (2002) found that unlike typically hearing children and children with SLI, CCI order of morpheme acquisition depended on perceptual salience (Leonard, 1989)

Perceptual Salience Predicts:

Acquisition	Morpheme
Fewer Errors	uncontractible copula & aux progressive <i>-ing</i>
More Errors	3rd present & plural <i>-s</i> , contractible copula/aux

- Bimodal bilingual (bi-bi) CCIs of Deaf parents are exposed to sign language from birth and therefore experience no period of language deprivation. They learn spoken language after implantation.
- Why study bi-bi CCIs? They can help disentangle the effects of language deprivation from those of hearing through a CI.
- Davidson et al. (2014) found that these bimodal bilingual (bi-bi) CCIs perform as expected for their chronological age on standardized language tests.
- Do bi-bi CCIs have a morphological deficit that the standardized tests used in Davidson et al. (2014) missed?
- If bi-bi CCIs do have a morphological deficit, is it based on perceptual salience?
- To control for bilingualism effects (Unsworth, 2013), normal hearing bimodal bilinguals will serve as the comparison group.

PARTICIPANTS

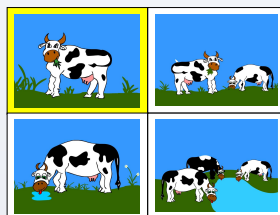
- ◆ Seven hearing children and five deaf children with CIs participated in this study. All children had Deaf, signing parents.
- ◆ Groups were matched on chronological age, but not hearing age.
- ◆ All of the children with CIs were implanted before the age of three years.

Group	Chronological Age (SD)	Age of Implant Activation (SD)	Hearing Age (SD)
Hearing	5;07.21 (0;05.26)	N/A	5;07.21 (0;05.26)
CCI	5;05.12 (0;10.05)	1;09.24 (0;07.16)	3;07.18 (1;04.28)

METHOD

Analyzed children's speech during two tasks:

1. Verbal Morphology task – the children described the picture in yellow so that an experimenter could find its match in an array of pictures without the yellow box.



2. Narrative

- a. The children watched a video and then narrated the events to an experimenter who had not seen the video.
- or
- b. The children saw a series of pictures and then described them to an experimenter who could not see them.

ANALYSIS

- ◆ Coded for presence and accuracy of morphemes in obligatory contexts
 - ✦ Verbal Morphology: 3rd present *-s*, regular and irregular past, copular *be*, auxiliary *be*, *do* and *have*, progressive *-ing*
 - ✦ Nominal Morphology: plural *-s* and irregular plural
- ◆ MLU calculated based on 50 utterances (25 from each task)
- ◆ All morphemes contributed to overall error levels
- ◆ Errors were categorized as omission, over-regularization, commission or other
- ◆ Minimum of four obligatory contexts required for morphemes that were compared separately

RESULTS

- ◆ There were no significant differences in MLU between groups, whether measured in words or morphemes ($p = .867$ and $p = .676$, respectively)

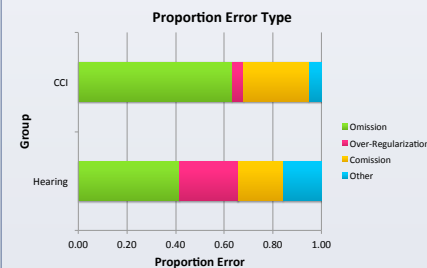
Group	MLUw (SD)	Range	MLUm (SD)	Range
Hearing	4.81 (.55)	3.7-5.36	5.68 (.51)	4.62-6.22
CCI	4.75 (.67)	4.16-5.86	5.54 (.65)	5.04-6.66

RESULTS (continued)

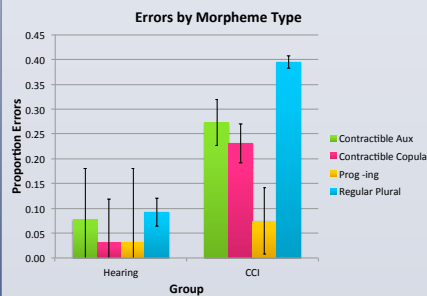
- ◆ CCIs made significantly more morphological errors overall ($p < .05$)

Group	Mean Proportion Error (SD)	Range
Hearing	.06 (.04)	0-.13
CCI	.18 (.12)	.08-.38

- ◆ Although CCIs tended to make errors of omission more and over-regularize less than the hearing group, these were not significant differences ($p = .147$ and $p = .122$, respectively)



- ◆ Only four morphemes met the requirement of four obligatory contexts in all subjects (auxiliary, copula, progressive *-ing*, plural *-s*)
- ◆ Overall pattern of errors is remarkably similar between groups
- ◆ CCIs made significantly more errors than hearing controls with copulas and regular plural *-s* ($p < .05$ and $p < .005$, respectively)



CONCLUSIONS

- ◆ Even though these CCIs experienced no period of language deprivation, they have morphological deficits in their spoken language that standardized tests were not sensitive enough to detect
- ◆ No evidence that bi-bi CCIs perform worse than monolingual CCIs (using different methodology, Guo et al. found a mean error rate of 17.12% in 5 y.o. CCIs)
- ◆ There is a tendency for CCIs to omit morphemes more frequently and over-regularize less
- ◆ The perceptual salience hypothesis is partially supported: better performance on *-ing* than *-s*, but similar order of acquisition is found in typical monolinguals

Morpheme	Brown (1973) order of acquisition
progressive <i>-ing</i>	1
plural	4
contractible copula	13
contractible auxiliary	14

FUTURE DIRECTIONS

- ◆ Compare bimodal bilingual CCIs with monolingual CCIs.
- ◆ Investigate morphological acquisition in bimodal bilingual CCIs in a longitudinal study.
- ◆ Finally, it is important to compare bilingual CCIs with bilingual hearing children, especially in those areas of language development that have been found to be delayed in bilingual children

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