

Language transfer in ASL/English Bimodal Bilingual children with CIs

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Research question

- Children all over the world successfully acquire two or more languages, including signed and spoken languages
- In contrast, children with cochlear implants are often encouraged to focus solely on spoken language to the exclusion of any sign language input

Here we investigate the effect of bimodal (ASL/English) bilingualism on the English speech of **children with cochlear implants** who also have **deaf, signing parents**



Overview

- Background
 - Development of bimodal bilingualism
 - Bimodal bilingual children with cochlear implants
- Our focus in this study: Determiner use
 - Syntax
 - Pragmatics
- New conclusions
 - Positive effect of sign language on children with CIs
 - The development of sensitivity to the linguistic context in older (age 3-6 years) bimodal bilingual children



BACKGROUND



Bimodal bilingualism

Most studies of sign/spoken (“bimodal”) bilingualism involve:

- Hearing CODAs (adults) and KODAS (kids)
 1. Learn a sign language from their deaf parents
 2. Learn a spoken language

But there are also:

- Children who are born deaf, with deaf parents, and who:
 1. Learn a sign language from their deaf parents
 2. Have cochlear implants that provide access to spoken language

We investigate this second group, who have access to full ASL from birth, focusing (here) on how ASL affects their English



Language in children with CIs

- **Typical children with CIs**
 - Have hearing parents, little access to language before implant
 - In U.S. most attend English language programs, and as a group lag behind hearing peers on spoken language tests (Nicolas and Geers 2008, Geers et al. 2009)
- **Bimodal bilingual children with CIs**
 - If lack of access to a language in the first year(s) of life is holding back typical children with CIs, native signing children with CIs may perform better on English tests
 - *Early supporting evidence:*
 - Hassanzadeh (2012) finds children with CIs and deaf parents outperform children with CIs and hearing parents on spoken Persian
 - Davidson et al. (under review) find children with CIs and deaf parents equal to kodus on standardized English tests



Our study focuses on articles:

Prosodically light: Children with CIs may face perceptual challenges

Transferring directly from ASL doesn't lead to target English; there are differences in:

Syntax

ASL does not require overt articles
(like, e.g. Chinese)

English does require overt articles

CAT JUMP

A cat jumped, *the* cat purred

Semantics/pragmatics

ASL uses spatial loci for tracking references

English uses definite/indefinite articles

Noun phrases can corefer if they share the same locus

a, an establish new referent
the identifies unique, given referents



English article acquisition

Syntax

- First production as young as 1;04, but still omitted in required contexts much later
(Brown 1973; Demuth & McCullough 2009; Kupisch et. al 2009)

Pragmatics

- Experiments suggest continuing problems with pragmatically appropriate use of definite vs. indefinite articles up to age 4
(Ionin et al. 2004; Schaeffer & Matthewson 2005)

Few studies of either topic beyond age 4 in spoken or bilingual children



OUR STUDY



Data collection

We analyzed free play sessions (20-55 mins.) at ages:
3 years, 3 years 6 months, 4 years, 5 years, 6 years

From:

- ASL/English bilingual children with CIs (“CI”)
- ASL/English bilingual children with typical hearing (“Koda”)
- Cantonese/English bilingual children (“Spoken Bilingual”)
- Monolingual English children (“Monolingual”)

Language Targets:

- One English target session (with hearing experimenters, family)
- For CIs and Kodas, also: one ASL target session (with deaf experimenters, deaf family)



Distribution of participants

English target sessions

ASL target sessions

Age	English Monolingual	KODA	CI [†]	Cantonese Bilingual*	KODA	CI
3;00	JOY	BEN	ELI	Darren	BEN	ELI
3;06	JOY	BEN	ELI	Janet	BEN	ELI
4;00	Braunwald*	BEN	ELI	Darren	BEN	ELI
5;00		LEX	NIK	Darren	LEX	NIK
6;00		LEX	GIA		LEX	GIA

*Braunwald, Darren, Janet from CHILDES corpus (MacWhinney 2000)

[†]Age of implantation: ELI = 13 mo., NIK = 16 mo., GIA = 19 mo.



Language modality, age 3

	Target language	Total Utterances	Total English Utterances	Total ASL Utterances	Total Bimodal Utterances*
CI 3;00	English	116	97	2	17
CI 3;00	ASL	111	6	8	97
Koda 3;00	English	322	286	3	33
Koda 3;00	ASL	178	16	71	91

**any combination of meaningful sign and speech, including whispering while signing (Guerrera et al. 2013)*



Language modality, age 3

English utterances in ASL target sessions are frequently blended

	Target language	Total Utterances	Total English Utterances	Total ASL Utterances	Total Bimodal Utterances*
CI 3;00	English	116	97	2	17
CI 3;00	ASL	111	6	8	97
Koda 3;00	English	322	286	3	33
Koda 3;00	ASL	178	16	71	91

*any combination of meaningful sign and speech, including whispering while signing (Guerrera et al. 2013)



Coding procedure

Each session was hand-coded in ELAN for each noun phrase:

- Separated out noun phrases that don't require articles (pronouns, bare plurals, names)
- Coded completely Adult-Like (CAL) or Not Adult-Like (NAL)
- NAL noun phrases coded for:
 - ✓ Article omission (**syntax**)
 - ✓ Pragmatic inappropriateness of overt article (**pragmatics**), ruled conservatively

RESULTS



Results: % Omitted Determiners in English Speech

English target sessions

ASL target sessions

Age	English target sessions			ASL target sessions		
	English Monolingual	KODA	CI	Chinese Bilingual	KODA	CI
3;00	0.13	0.20	0.11	0.23	0.79	0.49
3;06	0.02	0.06	0.11	0.35	0.80	0.42
4;00	0.00	0.00	0.00	0.34	0.18	0.33
5;00		0.02	0.04	0.17	0.03	0.27
6;00		0.00	0.02		0.25	0.63
Adult	0.01					



Syntax – Summary

- ✓ In English target sessions, all children omitted determiners at age 3, but in all cases this decreased with age

- ✓ In ASL target sessions at the same ages, more variation
 - ASL influence, not developmental stage (cf. English sessions)
 - As early as age 3, children are becoming proficient at separating English and ASL contexts

- ✓ In English target sessions at every age, the signing child with a CI performed similarly to the Koda



% Pragmatically inappropriate determiners in English Speech

English target sessions

ASL target sessions

Age	English target sessions			ASL target sessions		
	English Monolingual	KODA	CI	Chinese Bilingual	KODA	CI
3;00	0.03	0.06	0.03	0.04	0.01	0.16
3;06	0.02	0.00	0.04	0.02	0.00	0.04
4;00	0.00	0.01	0.06	0.10	0.00	0.00
5;00		0.02	0.01	0.07	0.00	0.06
6;00		0.01	0.00		0.00	0.00
Adult	0.01					



Pragmatics– Summary

- ✓ In English target sessions, all younger children produced pragmatically inappropriate determiners
 - decreasing in frequency with age
 - slower development than article omission
- ✓ In ASL target sessions at the same ages, fewer pragmatic mistakes, likely because few determiners were used at all
- ✓ In English target sessions at every age, signing children with CIs performed similarly to Kodas



General Discussion

Development of bimodal bilingualism

- Young (age 1-3) bimodal children frequently code-blend (Quadros, Lillo-Martin, Koulidobrova & Chen Pichler, earlier), while...
- Older (age 3;6-6) bimodal bilinguals children are acquiring awareness of the linguistic environment: English target sessions look increasingly different from ASL target sessions

Effect of bimodal bilingualism on children with CIs

- Native signing children with CIs perform in English on par with their typically hearing peers
 - We conclude that sign language is not only *not harmful*, but can be *helpful* for English language development (preventing a lag in language development)
 - Supports the importance of language in first year(s) of life



Thank you



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