

Relationships Among Early Language Supports and Later Cognitive and Language-Based Outcomes in Children with Cochlear Implants

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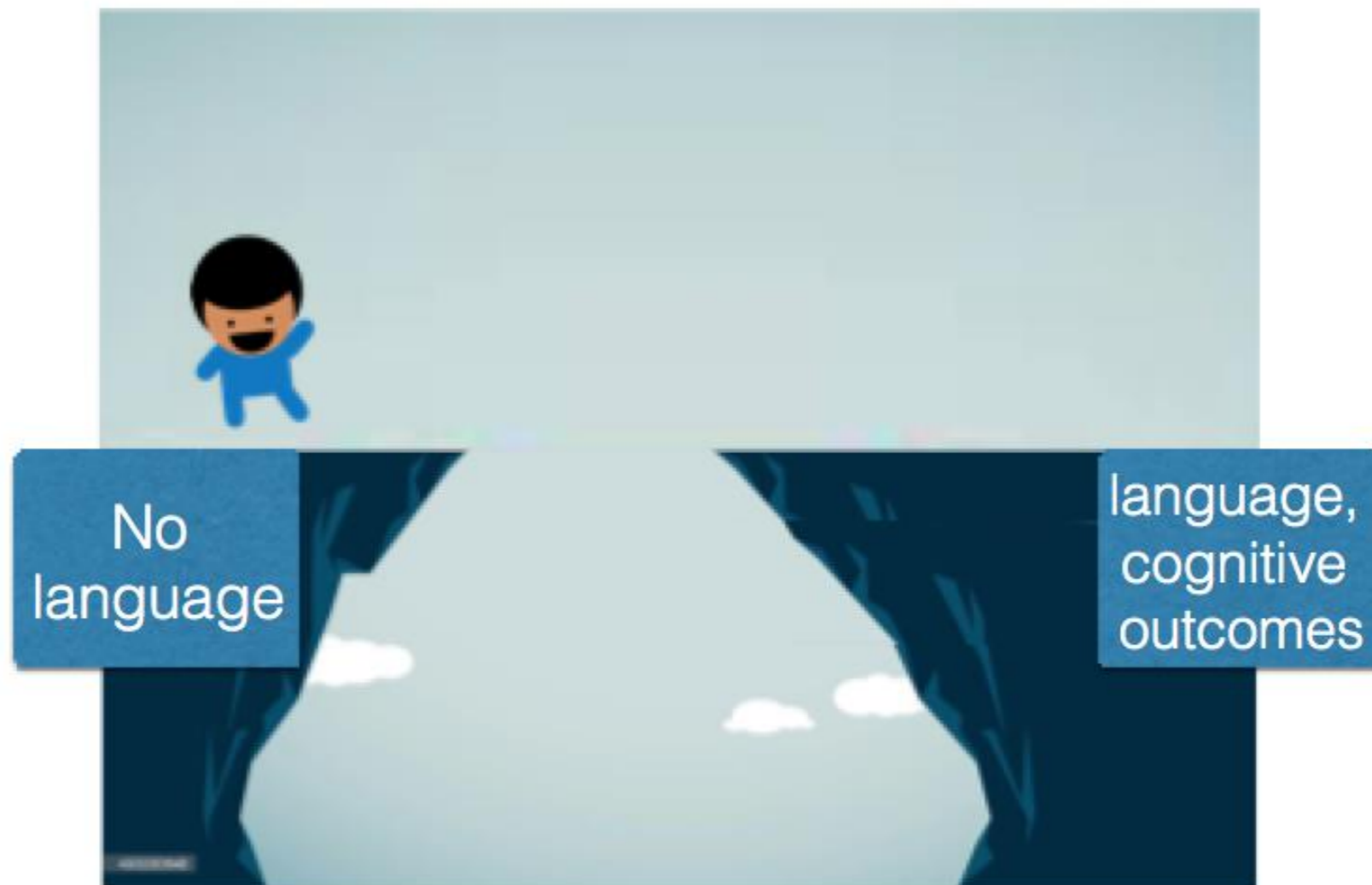
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Deaf children face a challenge



Many DHH children do not achieve typical outcomes

- Language measures (oral)
 - Niparko et al. (2010); Geers et al (2016); etc.
- Literacy
 - Traxler (2000); Qi & Mitchell (2012); etc.
- Cognitive development
 - Figueras et al. (2008); Beer et al. (2014); Castellanos et al. (2014); Beer et al. (2014); Kronenberger et al. (2014); etc.
- Academic success
 - Antia et al. (2009); Marschark et al. (2015); etc.
- Note: High variability in these measures

Do early sign language supports help?



Conflicting results

- Some studies report worse performance for children who use some form of manual communication compared to oral-only (Percy-Smith et al. 2010; Dettman et al. 2013)
- Some report null effects (Yanbay et al. 2014)
- Others report positive effects of early sign input (Preisler et al. 1997; Watkins et al. 1998)

Recent indications of positive outcomes with signing children

- Language
 - Yoshinaga-Itano (2016)
- Literacy
 - Clark et al. (2016)
- Cognitive development
 - Hauser & Contreras (2016)



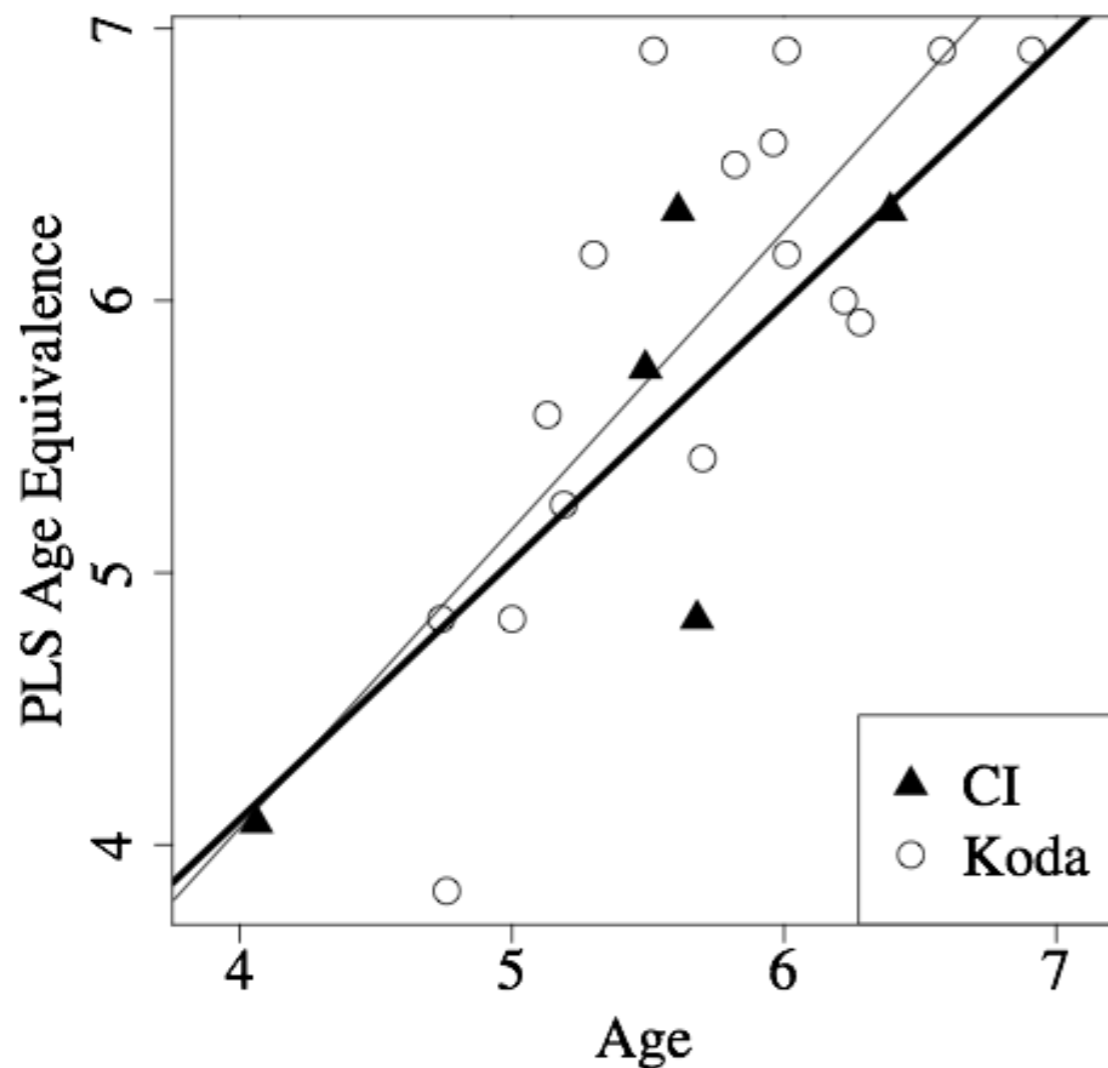
Native Deaf signers with CIs: Bimodal Bilinguals



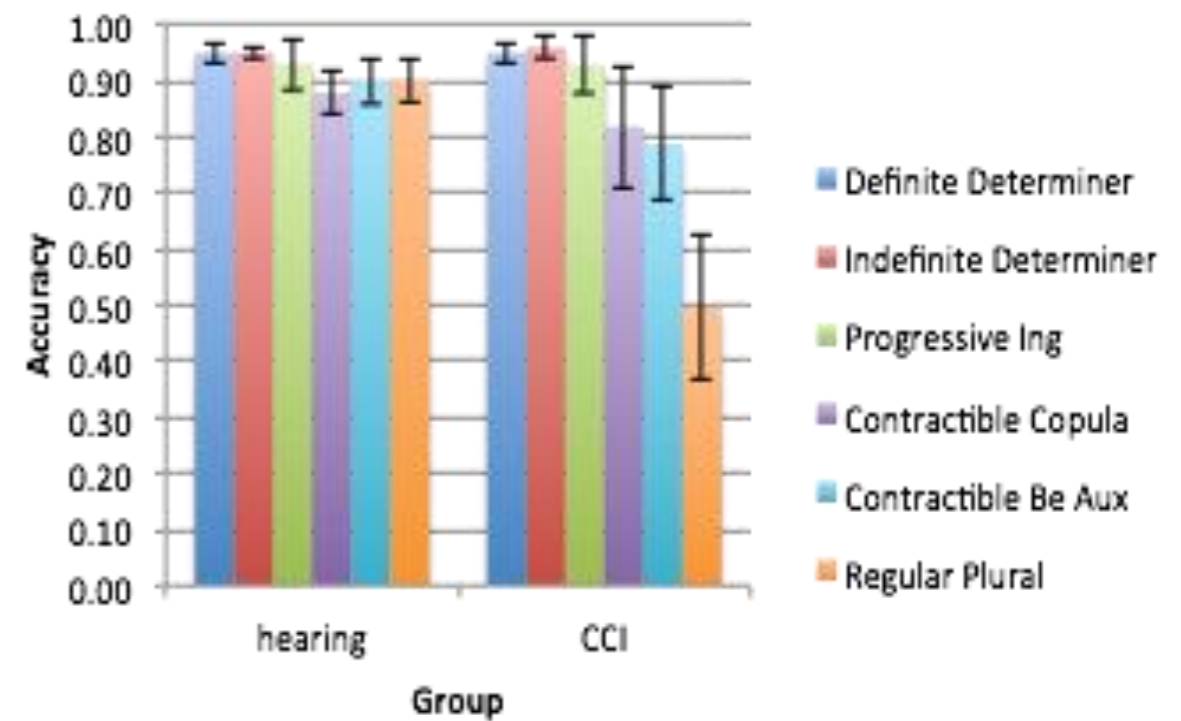
- Optimal sign linguistic input - Deaf, signing parents
- CI (before age 3) and speech training
- Comparison: Hearing children with Deaf, signing parents (Kodas)
- Deaf native signers with cochlear implants perform no different from Kodas on a range of language tests (Davidson et al. 2014; Cruz et al. 2014; Kozak et al. 2016; Goodwin in prep)

Spoken language

Preschool Language Scales

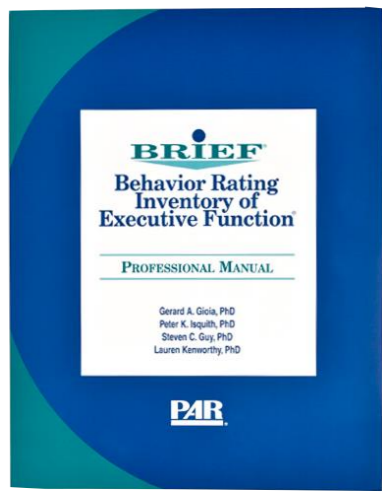


Accuracy by Morpheme in Order of Perceptual Salience



Native Deaf signers: Cognitive development

- Executive Function - Attention, Planning, Memory, Inhibitory control
- Parent questionnaire (Behavior Rating Inventory of Executive Function)
- Native deaf signers: $n=44$ (8;03); Non-signing CI users: $n=24$ (8;08); Hearing : $n=45$ (8;04)

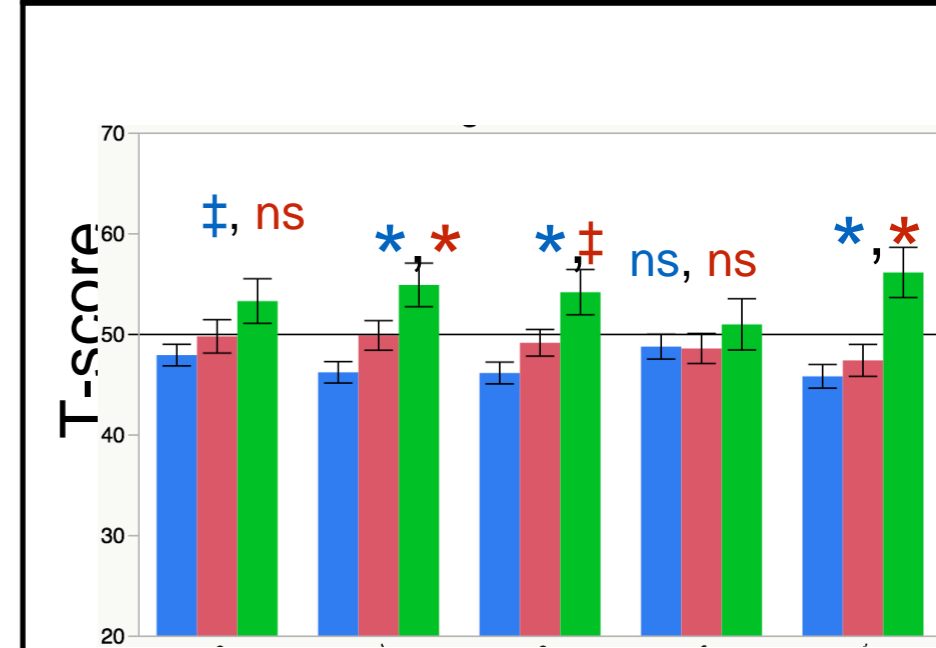
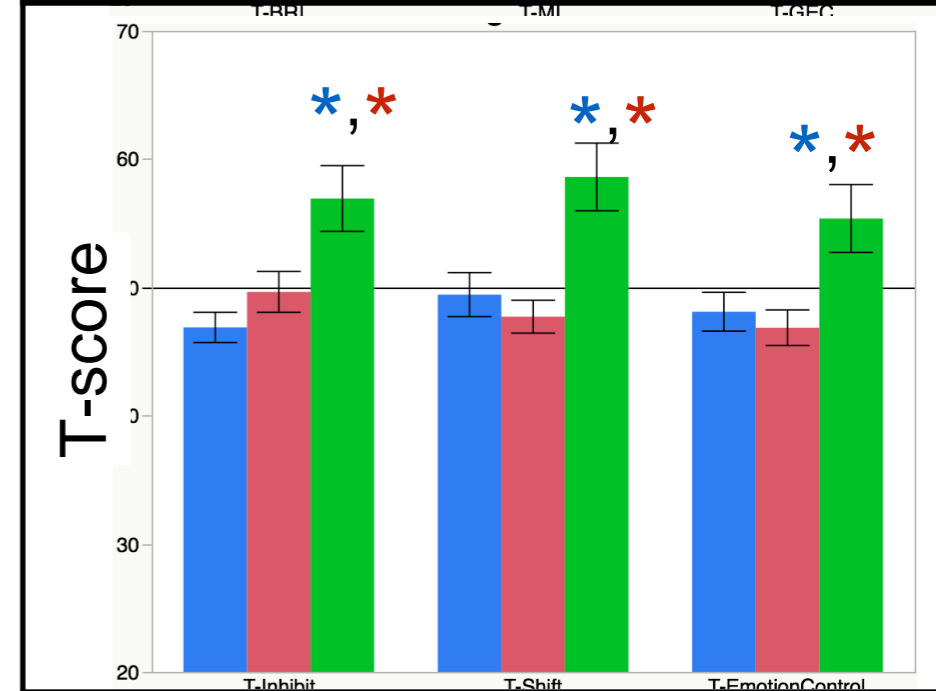
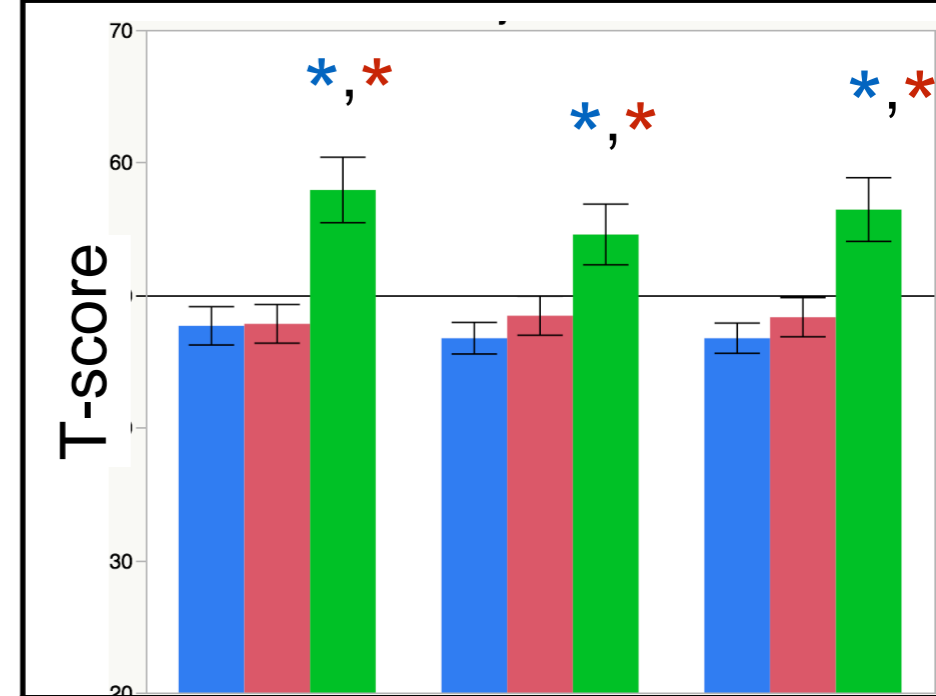


BRIEF

Means:

- **Oral CI** > **hearing**, 9/11 scales
- **Oral CI** > **native signers**, 8/11 scales

Hall, Eigsti, Bortfeld, & Lillo-Martin (under revision)
Journal of Deaf Studies & Deaf Education



Why are there these discrepancies?

- Many different types of sign language exposure are not differentiated
 - American Sign Language
 - Manually Coded English (MCE)
 - Sign-supported speech (SimCom)
- Variation in important aspects of exposure
 - age of onset (birth, at detection, birth-to-three program, preschool, school entry, later)
 - quantity (a few hours weekly/daily, more or less?)
 - quality (how fluent is the provider)
 - consistency



More variables

- Family factors
 - Levels of acceptance
 - Education, SES
- Social factors
- Biological factors
 - Cause of deafness - possible other associated factors
- Hearing technology

Furthermore

- Studies often vary in the linguistic and cognitive domains studied - comparisons across different studies are difficult
- In some cases, sample size is small, so generalization is limited

Our proposed project

- Retrospective analysis of records from a large database of children with cochlear implants
- Use information about early intervention programs to sort participants (not just oral vs. manual)
- Compare language and cognitive performance based on EI participation



Hypothetical Child 1

- Early-identified profound bilateral deafness
- No accessible input until CI activation at 12mos
- Extensive LSL training & early intervention
- Evaluations:
 - Spoken English: 1yr delay
 - ASL: n/a
 - Cognitive: 1yr delay



Hypothetical Child 2

- Early-identified profound bilateral deafness
- No accessible input until FSLP, 1yr
- Early intervention in TC program, regular exposure to spoken English with and without sign support
- Evaluations:
 - Spoken English: 1yr delay
 - ASL: 1yr delay
 - Cognitive: 1yr delay



The Problems

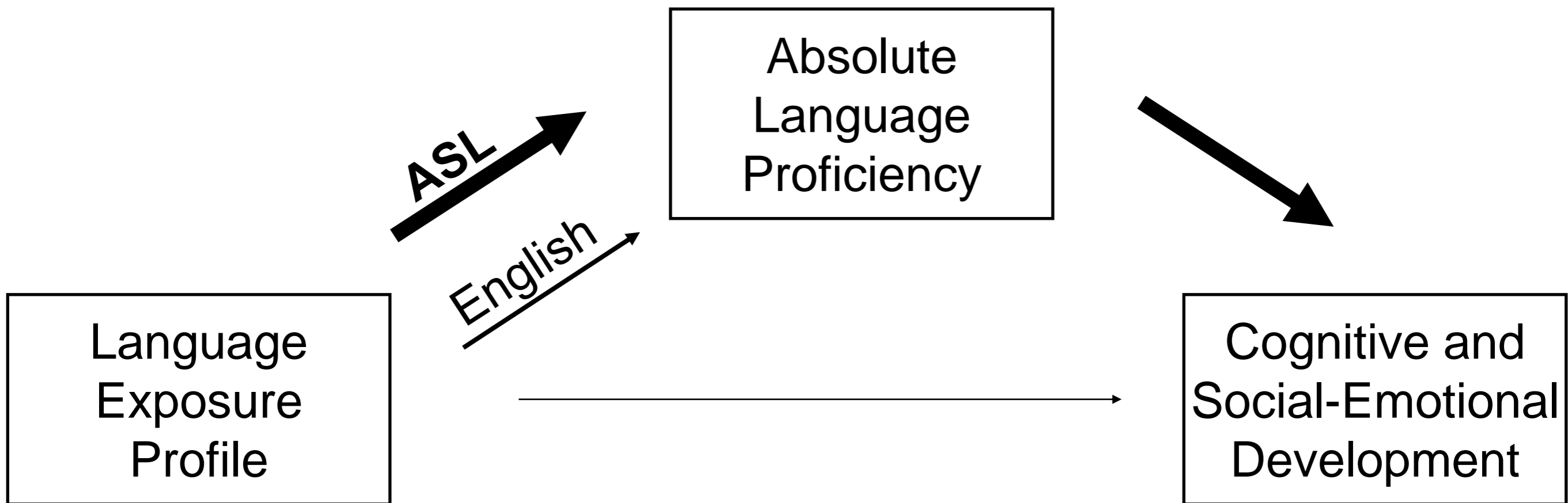
- 108 records matched our inclusion criteria, BUT:
- Comprehensiveness of clinician notes varied
- Test administration varied:
 - Clinician's choice of test is a function of their informal assessment of the child's abilities. Different tests (even within same general domain) not cross-comparable
 - Tests more likely to be administered (and scores recorded) if there's concern: biased sample for research purposes
- EI experience varied across time, impossible to cleanly categorize into tripartite groups. What to do??

Future Plans

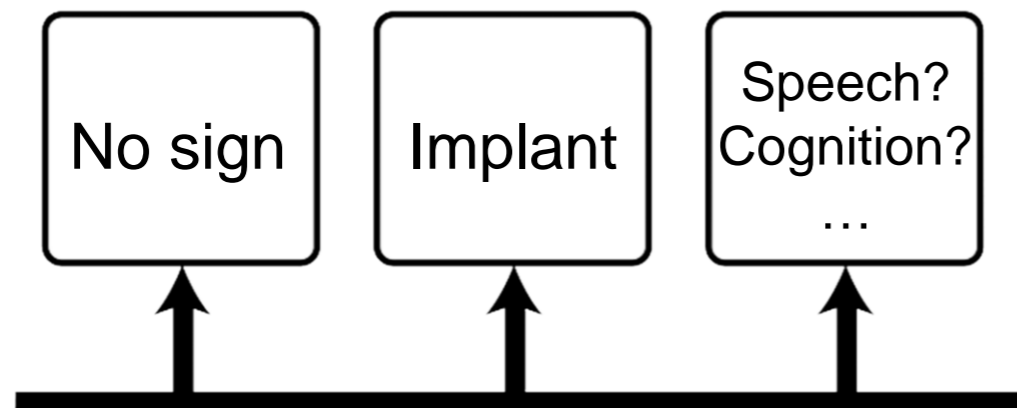
- Prospective, longitudinal
- Uniform assessment battery
 - English
 - *ASL*
 - Cognition
 - Social-Emotional
- “Language Exposure Profile”
- How early experience (including EI 0-3) impacts later outcomes (3-5)

Why early sign might help

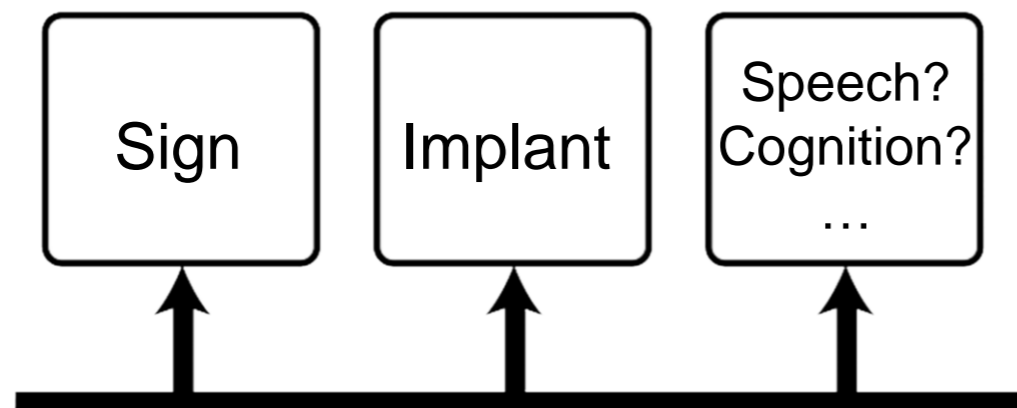
- What is the crucial piece missing for many kids?
 - Sufficient opportunities for vocabulary development?
 - Early exposure to a full phonological system?
 - Early exposure to complex syntax?
 - Complex social interactions with linguistic partner?
- We don't know. Accessible exposure to natural sign language can provide all at once.



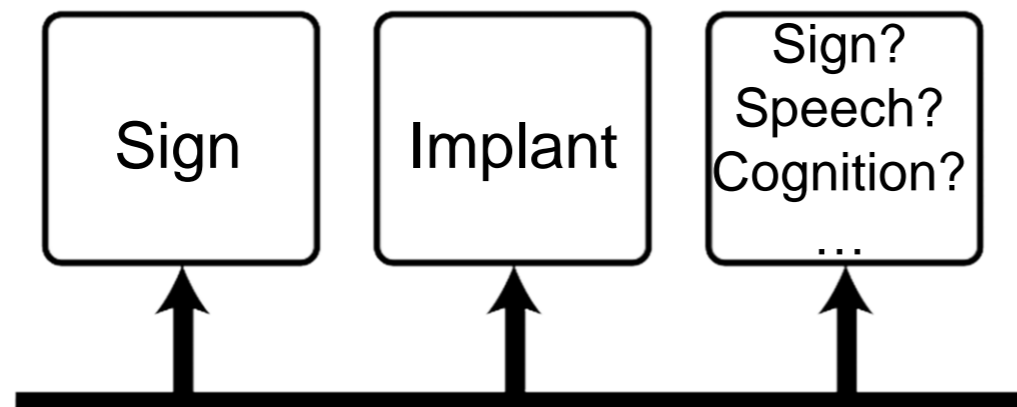
Relationships between early sign exposure and later outcomes



Some advocate no use of sign language before or after an implant



Others accept use of sign language as a bridge before & shortly after the implant



Still others see use of sign language as a permanent part of a deaf child's life

Relevance to EI providers

- Is it true that sign language exposure is harmful?
 - High quality sign from birth leads to consistently good outcomes
 - Even lower quality sign during 0-3 seems to help
- What can we confidently say?
 - Relying on LSL through a CI as the child's only means of language acquisition is risky.
 - A child with exposure to good ASL will learn it, hearing or deaf. Bimodal bilingualism may offer the best of both worlds.

Building the bridge

We *think* intervention should be:

- Accessible, feasible for parents
- Family-friendly
- Aware of differences between different types of language exposure
- Early, often



Research needs

- Need research on effectiveness of such EI programs
 - How to teach parents
 - Examining different types of outcomes
- Comparisons between different types of approaches (random assignment?)
- Taking into consideration the relevant variables

thank you



