From "Communication Mode" to "Language Access Profile" When Working with DHH Children

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Introduction

Input matters: No child acquires a language without sufficient input. Clinical and educational interpretation of language assessment is incomplete without considering language input. But currently, we have no good way to measure input.

Why not just use "Communication Mode"?
1. It has no consistent operational definition.
2. It reflects current, rather than cumulative, experience with input.
3. It is unidimensional, whereas DHH children's experience with input is often multidimensional.
4. It often conflates disparate types of input (e.g. ASL, sign-supported speech, manually-coded English, etc.)
5. It conflates input with output.
6. It fails to capture the extent to which a child has lacked direct access to *any* type of linguistically-structured input.

Our goal: develop a better method for describing DHH children's linguistic input during infancy/toddlerhood (0-3).
An optimal method will:
1. Measure the cumulative and multidimensional nature of DHH children's input
2. Distinguish among types of input that are, in fact, different.
3. Consider input as distinct from output or proficiency.
4. Estimate the amount of access that a child has to each type of input.
5. Capture the extent to which a child has lacked direct access to *any* type of linguistically-structured input.
6. Reveal a child's idiosyncratic experiences with input, but also…
7. Identify groups of children whose experience with input is meaningfully similar

Language Exposure Assessment Tool

Calculates relative language exposure based on estimates acquired through a structured interview (De Anda et al., 2016)

Asks parents to report on each conversational partner:
- Type of language input provided to child
- Number of hours of language input per week
- Changes in language input over time

Captures 8 input categories: (definitions provided on poster reprint)
- Indirect Access (i.e., speechreading)
- English without signs
- American Sign Language
- Sign-supported speech
- Manually-coded English
- Cued Speech
- Other spoken language
- Other/Unknown

Method

Participants: 46 parents whose child (age 12 or younger) has a hearing loss known or suspected to have begun before age 3. No exclusions based on type/degree/laterality/etiology of hearing loss, parental hearing status, use of hearing technology, or additional diagnoses. Multilingual families were included, but interviews were offered only in English or ASL.

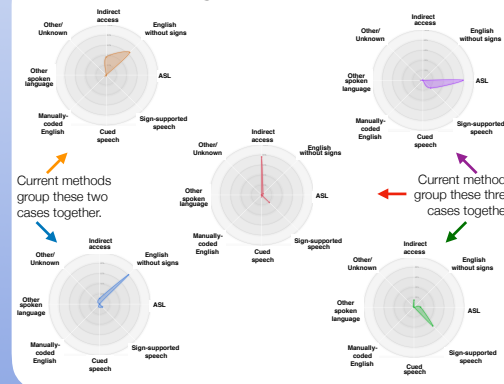**Procedure:** Participants were interviewed by telephone, videophone, or webcam

Part 1: Abbreviated Interview (~10 minutes)
1. Explain "Exposure" (signals sent) vs. "Access" (signals received)
2. Introduce 8 input categories
3. Parents indicate which categories did not apply to their child from birth-3
4. Parents divide 100% across remaining categories, in units of 10%.
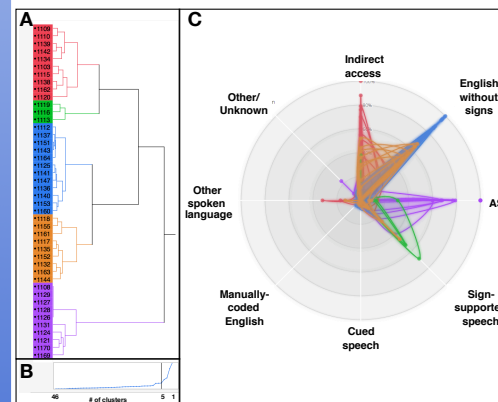5. Repeat Step 4 for year 0-1, 1-2, and 2-3.

Part 2: D-LEAT Interview (~50 minutes)
1. Follow D-LEAT's Excel-based template to generate list of child's regular interlocutors from 0-3.
2. Identify types of input received from each interlocutor, and indicate interlocutor's proficiency (low, medium, high) in each type of input.
3. For each interlocutor, estimate daily/weekly hours of communication time, adjusting as necessary to capture changes over the child's development.
4. During each time window identified in Step 3, estimate the distribution of input across the 8 categories.
5. D-LEAT template's formulas calculate overall distribution of input from 0-3.
6. Complete brief demographic survey.

Capturing Individual Profiles

Current methods group these two cases together.

Current methods group these three cases together.

Identifying Language Access Clusters

Hierarchical cluster analysis: The dendrogram (**A**) identifies which cases (i.e. children) are most similar to one another. The sharp elbow at 5 in the scree plot (**B**) above indicates that there are 5 coherent "clusters" of children with similar experiences to their cluster-mates. (**C**) shows all 46 individual profiles, color-coded by cluster.

Reliability & Validity

Test-Retest reliability: 8 of 9 (89%) fell into the same cluster when interviewed by the same researcher after a minimum 1-month delay.

Inter-Rater reliability: 9 of 12 (75%) fell into the same cluster when interviewed by a different researcher after a minimum 1-month delay.
n.b: Inter-rater reliability has not yet been tested in culturally-Deaf parents; this estimate is likely to increase when they are included.

Convergent validity: Parents were asked to estimate the distribution of their child's input during each year from 0-3. The average of these parent estimates were submitted to cluster analysis, which agreed with the D-LEAT in 84% of cases (Cohen's κ = .80).

Face validity: By distinguishing among different types of input, and considering the extent to which a child lacked direct access to any input, the D-LEAT offers substantial improvement in face validity over current approaches based on "communication mode".

Limitations & Future Directions

Predictive validity: Does a child's language access profile during infancy/ toddlerhood predict language proficiency, cognitive development, social-emotional skills, and school-readiness during the preschool years?

Sampling: Our sample under-represents families with home languages other than English or ASL. Cued speech and SEE were infrequently reported: either these systems are uncommon in the 0-3 window, or our recruitment methods were ineffective at reaching these families. Partnership with EHDI systems would help to ensure representative sampling.

Are retrospective parent estimates reliable? There was no decrease in self-reported confidence as a function of how many years the parents had to think back; most participants report being "pretty confident" or "very confident".

Is cluster analysis the best choice? There are drawbacks to cluster analysis; if you have suggestions for better approaches, let us know!

An hour is a long time… We aim to streamline the procedure so that it's more user-friendly for clinicians, educators, parents, & other stakeholders.

Conclusions

Input matters: We cannot fully understand DHH children's language acquisition without characterizing their input. The D-LEAT represents a novel and necessary advance toward that end.

"Communication mode" doesn't work: It doesn't capture the cumulative, idiosyncratic, and multidimensional nature of DHH children's experience with input. We can do better: language access profiles are a good start.

Language matters: DHH children's cognitive, social-emotional, & pre-academic skills all depend on successful mastery of at least one natural language, whether spoken or signed.

Critical gaps remain: Although there's no "one size fits all" solution, some language access profiles may be more likely to yield language mastery than others. This is a vital target for future research.

Opportunity abounds: We'd love to work with you, the families you serve, and the organizations you represent! Let's find a way to make progress together.

References

DeAnda, S., Bosch, L., Poulin-Dubois, D., Zesiger, P., & Friend, M. (2016). The language exposure assessment tool: Quantifying language exposure in infants and children. *Journal of Speech, Language, and Hearing Research*, 59(6), 1346-1356.

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Acknowledgments