Acquisition of Perceptual Words by Young Children with Congenital Sensory Impairments

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Background

Children need to learn:

- concrete words (table, ice cream, kiss)
- abstract words (time, copula, love)
  - Language scaffolds learning abstract words[1]

Children born deaf or blind must also learn words less perceptible to them than to others:

- e.g. see/blue for blind children
- e.g. hear/noisy for deaf children

Does access to *perceptual* and *linguistic* information influence the learnability of perceptible vs. imperceptible words?

Participants

English			
Group	**N**	**Age (mo.)**	**Expressive Vocab.**
Blind severe-to-profound visual impairment	35	14-57 M: 31.7	1-680 M: 184
Sighted Matches°	35	16-30 M: 23.4	1-680 M: 184
Deaf severe-to-profound hearing loss; cochlear implant	20	14-49 M: 33.9	1-680 M: 317
Hearing Matches°	20	17-30 M: 23.7	1-680 M: 317
American Sign Language (ASL)			
Group	**N**	**Age**	**Expressive Vocab.**
Deaf ASL from birth from Deaf parents*	103	9-36 M: 24.6	1-486 M: 168

° Data from *Wordbank*[3]
*Data from Caselli, Lieberman, & Pyers, 2020[4]

Methods

Communicative Development Inventory (CDI)

- American Eng. Words & Sentences form[4]
- ASL CDI 2.0[3]
- Parent-report checklist of child's vocab.

Analyzed production of words with varying perceptual content:

English (30 out of 680 words)	
Sense	**Word List**
Visual (10)	black, blue, brown, dark, green, look, red, see, white, yellow
Auditory (10)	cockadoodledoo, grrr, hear, listen, loud, meow, moo, noisy, quiet, vroom
Aperceptual (10)	bad, careful, good, fine, finish, love, nice, pretend, think, wait
American Sign Language (22/28* out of 533 words)	
Sense	**Word List (English gloss)**
Visual (10)	black, blue, brown, dark, green, look for, red, see, white, yellow
Auditory (2)	hear, hearing
Bonus Auditory* (8)	burp, deaf, ear, hear, hearing, hearing aid, radio, talk
Aperceptual (10)	careful, don't like, fine, good, like, love, nice, think, wait, want

**We felt these words were a "stretch" to call auditory, since many can be experienced visually or tactilely.*

Analyses

Mixed effect logistic regression models predicting **likelihood of word production**:

- **Word sense** (visual, auditory, aperceptual)
- **Group** (Blind & sighted matches; Deaf-English & hearing matches; Deaf-ASL)
- **Child age**
- **Word frequency** (English: CHILDES[5] counts; ASL: ASL-LEX Native signer freq. ratings[6])
- **Production difficulty** (English: # syllables; ASL: ASL-LEX phonological complexity[7])
- **Random effect for participant**

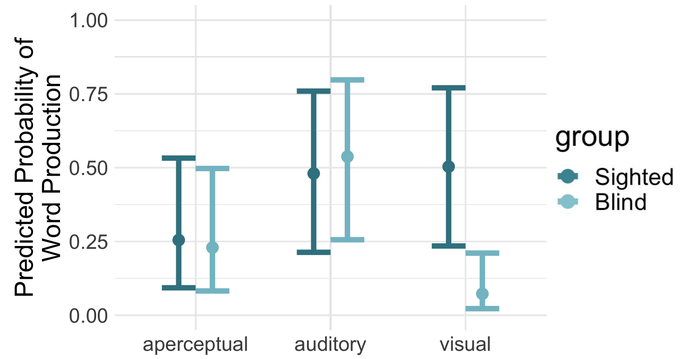
Results

Significant predictors bolded in model formulas below.
N.B: y-axes not directly comparable across graphs due to cross-group differences in age, vocabulary, and CDI form

Model 1: Blind children & sighted matches

Production ~ **Word Sense * Group** + **Age** + log(Freq.) + **Syllables** + (1|Participant)

Blind participants less likely than sighted children to produce visual words, but not other word types

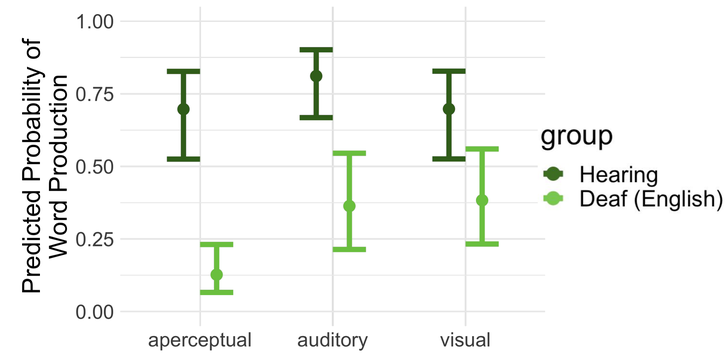


Model 2: Deaf children (English) & hearing matches

Production ~ **Word Sense * Group** + **Age** + log(Freq.) + **Syllables** + (1|Participant)

Deaf participants learning spoken language less likely to produce spoken words than hearing participants

- ***especially*** **less likely to produce aperceptual or auditory words**

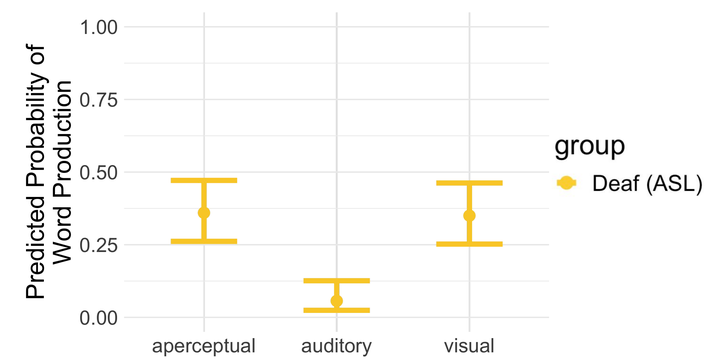


Model 3: Deaf children (ASL)

Production ~ **Word Sense** + **Age** + log(Freq.) + Phonological Complexity + (1|Participant)

ASL participants less likely to produce auditory* words vs. aperceptual / visual

*Same pattern of results for auditory and bonus auditory words



Discussion and Future Directions

- Deaf-English vs. Deaf-ASL group:
  - Why the difference for aperceptual words?
  - Possible ToM differences due to language access
- Do children's semantic representations for these words differ?
- Measuring perceptual information in parental language input:
  - What sensory information is available to children via language?
  - Does this vary by language modality and sensory ability?

Sensory ability **and** early language experience drive word production for perceptible & imperceptible words

References [1]Vigliocco, Ponari, & Norbury, 2018; [2]Frank et al., 2016; [3]Caselli, Lieberman, & Pyers, 2020; [4]Fenson et al., 2007; [5]MacWhinney, 2000
[6]Caselli, Sevcikova Sehyr, Cohen-Goldberg, & Emmorey, 2016; [7]Sevcikova Sehyr., Caselli, Emmorey, & Cohen-Goldberg, 2021

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