Theory of Mind Development in Children who are Hard of Hearing: Understanding False Belief

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Presentation Handout

Overview:

- Background – What is Theory of Mind and what do we know about its development in children, including children who are deaf or hard of hearing?
- Research questions, methods, and measures
- Results – cross sectional and longitudinal
- Implications and future directions

Background:

Theory of mind is an aspect of social-cognitive development

- During late preschool, children becoming increasingly aware that they themselves and those around them have feelings, thoughts, beliefs, dreams…this are called internal states….and these internal states guide our behavior and help us understand our social world
- Helps us reason about why people do what they do – If I don't know that my keys are hanging on the hook, I will keep looking for them
- Growing understanding of others helps us take their perspective
- Reading comprehension – we "mind read" all the time to understand what an author intends

Typical stages (Wellman & Liu, 2004)

- Roots in early pretend (~18 months) where children begin to represent two ideas
- Diverse desires – people can want different things (~2-3 years)
- Deception and knowledge/ignorance - ~3-4 years (If they see it, they will know)
- False belief - ~4-5 years – our actions are guided by what we know or believe, even when we have a mistaken belief
- Real-apparent emotion ~5-6 years – people can mask their true feelings (smile to hide the act they are upset)
- Later achievements include advanced abilities (after 6 years; 2nd order False belief, sarcasm/irony, moral reasoning, etc.)

Examples of First and Second Order False Belief:

- Grandmother misunderstanding message that she is a "great grandmother"
    - 1st order "Grandma thought they were praising her." (What one person knows or believes)
    - 2nd order "Julie knew that Grandma thought she was being praised, so she clarified." (Julie's thoughts about Grandma's thoughts – what one believes about another).
- Miss Nelson is Missing
- Garden plot example – how we make sense of the world by reflecting on others' internal states

Factors that Influence ToM Development:

- Child language abilities
- Sibling conflicts and the family talk/reasoning about their resolution
- Family talk about thoughts and feelings
- Pretend play
- Conversational access
- Sharing talk about the past
- Maternal education
- Cognitive skills, like executive function

ToM in Children who are D/HH:

Late Signing Deaf Children (deVilliers, 2005; Peterson, 2004)

- ✓ Marked and protracted delays
- ✓ Due to language delays and limited communication access

Native Signing Deaf Children (Courtin, 2000; Schick et al., 2007; Woolfe et al., 2002)

- ✓ Achieve ToM/False Belief on schedule

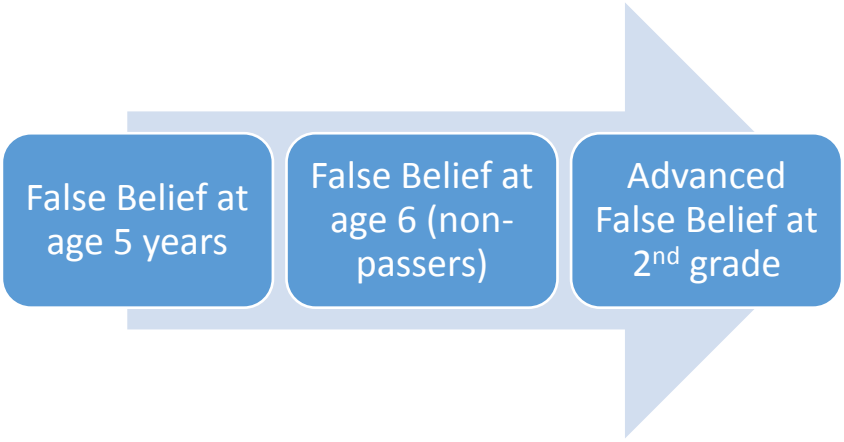
Children with CIs (Ketelaar et al., 2012; Peterson, 2004; Peters et al., 2009, Remmel & Peters, 2006; Sundqvist et al., 2014)

- ✓ Mixed findings
- ✓ Delayed, not delayed, less delayed

Children who are HH (Netten et al. [in press]. Ear & Hearing)

- ✓ Only one study so far (3 – 5 yrs)
- ✓ Lag hearing peers in FB in spite of language match

Focus of the Current Work:



Also, influential factors, including parental talk at age 3 and how it influences False Belief at age 5 years

Research Questions at 5 and 6 years:

1. How do CHH compare to hearing peers in their understanding of False Belief concepts at 5 and 6 years of age?
2. What factors influence children's performance?

Participants:

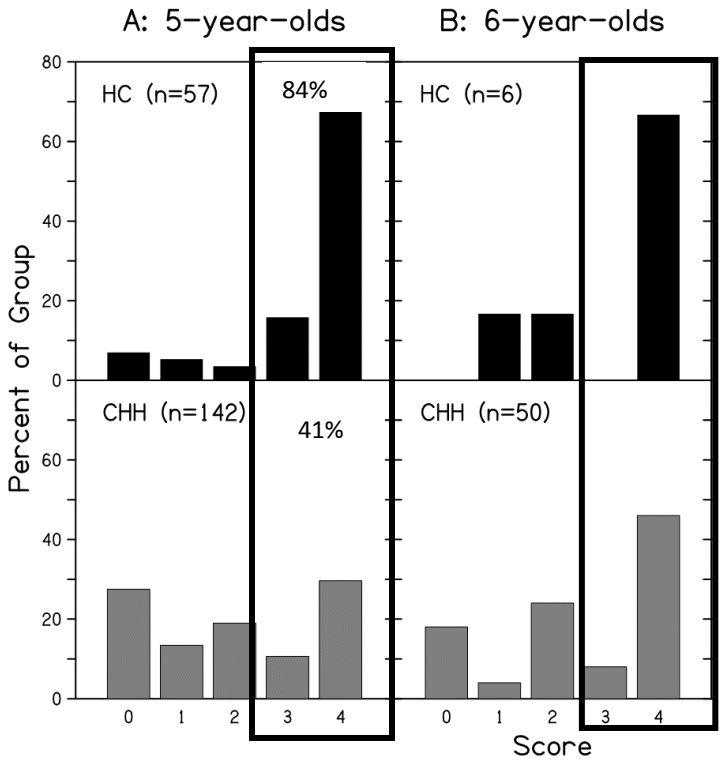
Five-year olds:
- 142 children who are hard of hearing (CHH) with mild-to-severe hearing levels
- 57 hearing children (HC), matched on age and maternal education

Six-year olds (non-passers at 5 who returned at 6 yr)
- 50 CHH
- 6 HC

Measures at Age 5:
- ✓ Hearing
- ✓ False Belief Tasks (4)
- ✓ Language
  - ✓ CELF-4 Word Structure (grammar)
  - ✓ Peabody Picture Vocabulary Test
  - ✓ Preschool Language Assessment Instrument (verbal reasoning)

Measures at Age 6:
- ✓ Hearing
- ✓ False Belief Tasks (4)
- ✓ Language (CASL Syntax)
- ✓ Cognition & Executive Function
  - ✓ Matrix Reasoning – WASI-2
  - ✓ Heads-to-toes Task (Executive function)

Results: Research Q1 & Q2 (see Walker, Ambrose, Oleson, & Moeller, *JSLHR,* 2017)



Age 5 years:

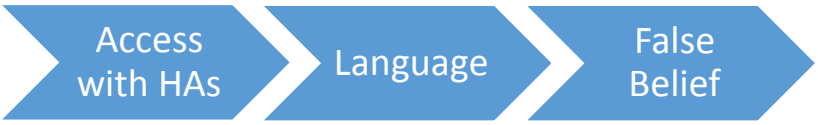
$X^2 = 30.34$, $p < .001$

Age 6 years:

Fisher's Exact = n.s.

But more CHH than HC remain at risk

HC outperform CHH at age 5 years (and also on language measures)
CHH not significantly different from HC at age 6, suggesting a pattern of catch up. However, larger proportion of CHH remain delayed
Predictors: Hearing, Grammar, Verbal Reasoning (47% of variance); not maternal ed or vocabulary



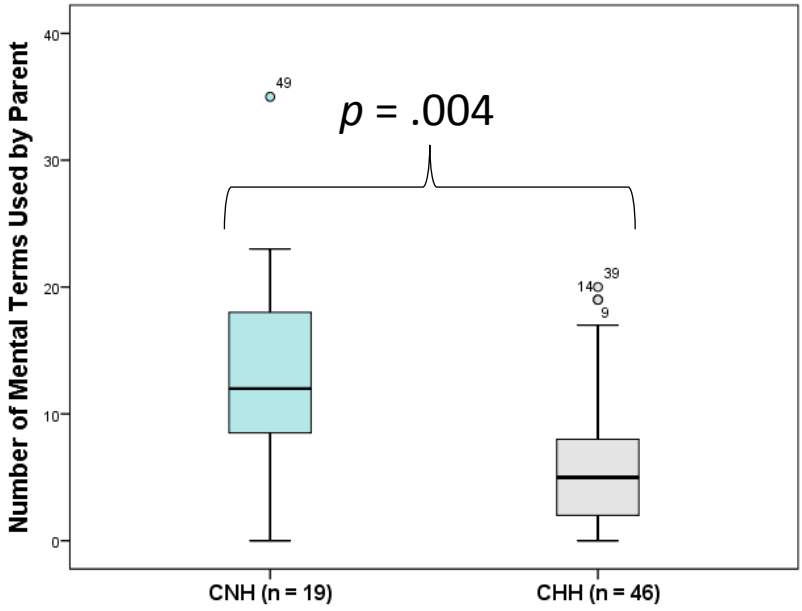
Research Question 3 (longitudinal):

1. Is parental talk directed to 3 year olds related to children's FB understanding at age 5 years?

Participants and Methods:

- ✓ Subgroup of 46 CHH and 19 HC
- ✓ Interactive language samples at age 3 (Ambrose et al., 2015) + FB at age 5 years
- ✓ Transcribed and coded for parent use of mental terms (think, know, remember, etc.)
- ✓ Language Measures: CASL basic concepts, pragmatic judgment

Results:



Parents addressing CHH used significantly fewer mental terms than parents addressing HC; not fully explained by language; although maternal talk was not significantly related to FB at 5, there may be indirect influences through language.

- Implications for our work with families – encourage parents to talk about thoughts, feelings
- INSIDE OUT (say and/or sign what you are thinking)
- Use reasons, explanations
- Know the value of pretend play
- Share photos & stories about past

- Provide access to conflict resolution and other family talk

Research Questions: Grade 2

1. How do CHH compare to HC in their understanding of FB concepts at second grade?
2. What factors influence children's performance?

Participants:

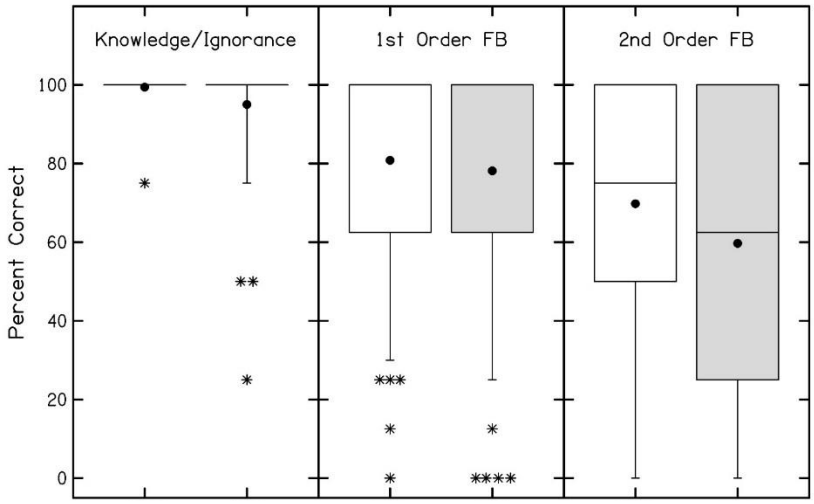
80 CHH
Matched to 43 HC on age and maternal education

Measures:

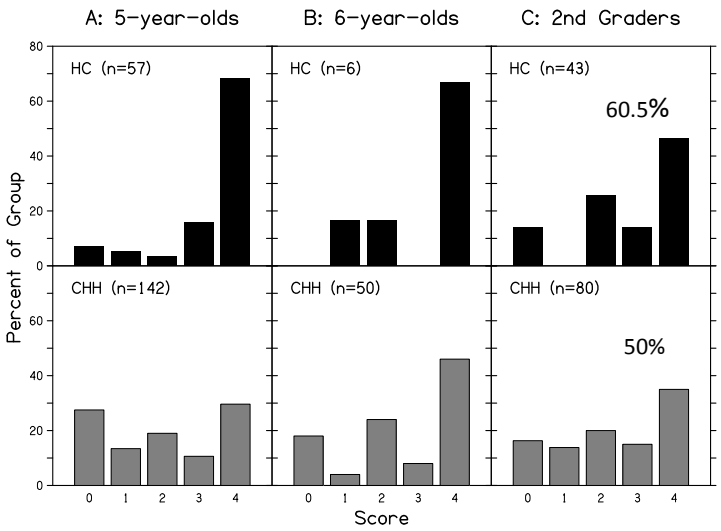
- Advanced FB (Knowledge/Ignorance, 1st order, 2nd order in story) = 16 points

✓ Audiology
✓ Language
  ✓ Grammar (CELF-4)
  ✓ Vocabulary
✓ Working Memory
  ✓ Backward digits

Results:



Groups are not significantly different on any of the subtests or total scores



Summary of False Belief:

- CHH Delayed at 5 years
- Over half CHH resolve delay at age 6
- HC = CHH at grade 2: *2nd Order FB* X^2 =7.38, p = .12 – passing rate not significantly different

These results stand in contrast to protracted delays reported in the literature; however, we only examined one dimension of theory of mind, suggesting the need for additional research

Future Directions:

Irony/Sarcasm study

Implications:

- Results overall are encouraging – There are many malleable factors (these were reviewed)
- Perhaps if these are promoted, delays in social cognition will be minimized or prevented
- Access to language and conversation is KEY!

References:

Note: Information presented in this talk may be found in published version

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