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## Cognitive Development



# Mental state language and quality of conversational experience in deaf and hearing children



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### ARTICLE INFO

#### Keywords:

Deaf

Social cognition

Conversation

### ABSTRACT

Deaf children of hearing parents show a protracted delay in performance on 'theory of mind' measures that suggests they encounter difficulties in acquiring knowledge of false beliefs and other mental states. Considerable evidence indicates that children's early experience of adults' mental state talk predicts their later social-cognitive development. However, no previous study has analyzed very young deaf children's access to conversation about mental states. We compared the conversational turn-taking and input of hearing parents to deaf and hearing children aged 17–35 months in the UK and Sweden. Mothers of hearing children used far more cognitive mental state language with their infants and their conversations were characterized by more communicatively effective turn-taking than mothers of deaf children. Across two different cultures, these findings indicate that conversations differ significantly in these aspects of interaction thought to be crucial for later social-cognitive development.

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<sup>2</sup> We wish to dedicate this paper to Michael Siegal, who passed away February 20th, 2012, for his support and encouragement in our research and wider lives.

## 1. Mental state language and quality of conversational experience in deaf and hearing children

Exposure to mental state language and interaction with adults are crucial factors in the early development of social cognition. Caregivers' attunement to their infants' thoughts and feelings – their so-called “mind-mindedness” (Meins et al., 2002) – predicts children's subsequent social-cognitive and social-emotional development, including performance on verbal elicited-response Theory of Mind (ToM) tasks. Similarly, Ruffman, Slade, and Crowe (2002) and Taumoepeau and Ruffman (2006) have reported that mothers' references to mental states directed at children during the second year of life are correlated with their children's later mental state language and emotion understanding. At the same time, the connectedness of the conversations between caregivers and infants is important. Ensor and Hughes (2008) coded video transcripts of observations of family interaction for quantity, connectedness, and content of mothers' and children's talk. Mothers' connected turns (i.e., utterances semantically related to the child's prior utterance) and mental-state references within connected turns with their 2-year-olds were independently associated with measures of children's social-cognitive understanding.

These findings indicate that early interaction including the mental state content of conversations and the quality of the interaction between child and adult are some of the environmental contributions to children's social cognitive development. An extreme illustration of the importance of such factors comes from studies of children born deaf but raised by hearing parents who themselves are not fluent users of sign language. In the early stages of social-cognitive development these children, even with early cochlear implants, might experience a different quality of conversation and interaction while their parents adapt to their infant's deafness. Many previous studies have reported that deaf children age 4 and older from hearing families who do not use sign language effectively display a protracted delay in Theory of Mind (ToM) reasoning on explicit tests (Courtin & Melot, 2005; Figueras-Costa & Harris, 2001; Meristo, Hjelmquist, Surian, & Siegal, 2012; Morgan & Kegl, 2006; Peterson & Siegal, 1995, 1999, 2000; Pyers & Senghas, 2009; Schick, de Villiers, de Villiers, & Hoffmeister, 2007; Woolfe, Want, & Siegal, 2002).

It is not the case that deaf children from hearing parents have an impaired ToM like that identified in children with autism. Instead, the typical trajectory of development is delayed, with children acquiring the false belief concept several years after their hearing peers, although there may be an upper limit on this delay (Marschark, Green, Hindmarsh, & Walker, 2000; Morgan & Kegl, 2006).

Methodologies exploiting spontaneous visual preferences measures and anticipatory gaze have demonstrated that children as young as 13 months behave consistently with the hypothesis that they understand false belief in other minds (Baillargeon, Scott, & He, 2010; Surian & Geraci, 2011). Consistent evidence is also provided by studies on infants' spontaneous pointing gestures and helping behaviour (Buttelmann, Carpenter, & Tomasello, 2009; Southgate, Chevallier, & Csibra, 2010). Using eye tracking methods with deaf infants from hearing parents, a recent study reported more difficulties understanding false belief in 2-year-old deaf children compared with 2-year-old hearing children (Meristo, Morgan, et al., 2012).

The ToM delay may be related to deaf children's difficulties in conversational understanding (Surian, Tedoldi, & Siegal, 2010), but it does not extend to other areas of cognitive development and does not affect deaf children from deaf families who are exposed to a signed language from birth that provides continual access to a language environment (Meristo, Hjelmquist, & Morgan, 2012; Meristo, Morgan, et al., 2012; Rimmel, Bettger, & Weinberg, 2001; Siegal & Peterson, 2008). So why do deaf infants with hearing parents show early signs of delay in social-cognitive development? Performance on elicited-response theory of mind tests in both typically developing hearing and deaf children around 4–5 years of age is influenced by language development (Milligan, Astington, & Dack, 2007; Schick et al., 2007). Thus, language skills may be the crucial ingredient for explicit ToM assessments, but as recent studies of spontaneous ToM abilities have shown, social-cognitive abilities can be observed several months before children use language. Therefore, it is possible that more general features of early communication play a role in the first stages of social-cognitive development rather than the child's language skills.

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