Theory of Mind Development and Children Who Are Deaf and Hard of Hearing

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Theory of Mind (ToM)

Theory of Mind (ToM) is the ability to attribute mental states (e.g., beliefs, desires, knowledge, pretending) to one's self and others and to understand that others may have beliefs, desires, and intentions that differ from one's own (Want & Gattis, 2005). A developed ToM allows one to understand that behaviour may be driven by mental states (e.g., beliefs, desires, knowledge). As such, behaviour can be predicted and explained by mental states.

Theory of Mind Developmental Scale

The most widely known developmental sequence proposed by Wellman and Liu (2004) addresses the skills that occur during the preschool years (i.e., 3 to 5 years of age). The following table provides a brief description of each stage within the developmental sequence as well as the common age of mastery for typically developing, hearing children.

Stage	Age of Mastery	Task Description
Diverse Desires	3.0 – 4.0 yrs	Child is given a choice of two snacks (e.g., carrots and cookies). Child picks favorite snack. Another character (e.g., doll) chooses the opposing snack as her favorite. Child is asked what the character will choose to eat. Child must inhibit his desire and choose the opposing snack to score correctly.
Diverse Beliefs	3.0 – 4.0 yrs	Child is given a choice of two locations for a missing cat. Child picks the location where he thinks the cat is hiding. Another character chooses the opposing location. Child is asked where the character will look for the cat. Child must inhibit his desire and choose the opposing location to score correctly.
Social Pretend	4.0 – 4.5 yrs	Child and assessor pretend to paint a blue cup green. Another character not involved in the pretend play enters the situation. Child is asked what color the character thinks the cup is. Child should say the initial color of the cup (i.e., blue) to score correctly.
Knowledge Access	4.6 yrs	Child is shown a nondescript box with a random object inside (e.g., toy dog). Toy is concealed inside the box, and another character (who has not seen inside the box) enters the situation. Child is asked what the character thinks is inside the box. Child must say the character doesn't know to score correctly.
False Belief – Unexpected Contents	5 yrs	Child is shown a recognizable box (e.g., M&M box) and asked what they think is inside. Child should say candy. Contents of the box are revealed. It is something other than what the outside of the box would suggest. (e.g., toy fish). Object is placed into the box and another character enters the situation. Child is asked what the character thinks is inside the box. Child should say candy to score correctly.

Peterson, & Wellman, 2009; Wellman & Liu, 2004

Theory of Mind Development in Children Who Are Deaf and Hard of Hearing (DHH)

Many children who are DHH are delayed in ToM development when compared to their typically developing, hearing peers (Peterson, Wellman, & Lui, 2005; Peterson & Wellman, 2009; Peterson, Wellman, & Slaughter, 2012) with the exception of Deaf children of Deaf parents (Ashington & Jenkins, 1999; Peterson & Siegal, 1999; Wolfe, Want, Siegal, 2002). Why is this? Theorists agree that language and experience play major roles in children's development of ToM. Studies have frequently shown that language ability and access to fluent language models are significant predictors of DHH children's ToM

development (Gonzalez, Quintana, Barajas, & Linero, 2007; Macaulay & Ford, 2006; Meristo & Hjelmquist, 2009; Morgan & Kegl, 2006; Pyers & Senghas, 2009; Tomasuolo, Valeri, Di Renzo, Pasqualetti, & Volterra, 2013; Van Staden, 2010).

Language is a social phenomenon; it is socially adapted and socially driven. Children who are DHH who are unable to adequately access their linguistic environment are typically delayed in their language acquisition and do not routinely benefit from the natural communicative exchanges that influence the development of ToM (Gonzalez et al., 2007; Macaulay & Ford, 2006; Meristo & Hjelmquist, 2009; Morgan & Kegl, 2006; Pyers & Senghas, 2009; Tomasuolo et al., 2013; Van Staden, 2009). Subsequently, their ToM development is impeded.

While the interconnectivity of language and ToM is widely accepted, the precise role of language in ToM development is contested. Studies attempting to explain the effects of language ability on ToM development in children who are DHH emphasize three significant areas:

- comprehension of linguistic structures, specifically sentential complements (e.g., *Stacey thinks that her mother is mad.*, *The boy thinks that his friend is lying*.) (de Villiers, 2005; de Villiers & de Villiers, 2012; Schick, de Villiers, de Villiers, & Hoffmiester, 2007),
- exposure to mental state vocabulary (e.g., *think*, *know*, *don't know, believe*) (Peters, Remmel, & Richards, 2009; Ruffman et al., 2003), and
- engagement in socio-communicative exchanges including shifts in perspective (Courtin & Melot, 2005; Howley & Howe, 2004; Wellman & Peterson, 2013; Ziv, Mier, Malky, 2013).

ToM Intervention Studies with Children Who Are DHH

Current ToM intervention studies (Tucci, Easterbrooks, & Lederberg, 2016; Wellman & Peterson, 2013) have shown that young DHH children can improve their False Belief understanding following a thought bubble intervention and can generalize their understanding to a parallel task (i.e., near generalization measure). Further, training in one aspect of ToM can influence other untaught aspects of ToM as evidenced by movement on the ToM developmental scale (i.e., far generalization measure).

The Importance of Theory of Mind

Theory of Mind is a foundational skill for social cognition and reading comprehension.

- Social Cognition - ToM supports children's ability to engage in appropriate interactions with peers and adults, to learn from others (i.e., social learning, peer learning), and to evaluate one's own knowledge during a communicative exchange and to ask for clarifications or further information when necessary.
- Reading Comprehension - ToM supports children's development and use of metacognitive reading strategies (i.e., the ability to evaluate one's understanding) and children's ability to comprehend narrative passages including: character perspective, character motivation/behaviour, internal and external dialogue, and cause and effect.

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