Supporting Theory of Mind Development

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As pediatric audiologists working with infants, toddlers, and children with hearing loss, we are in the business of helping build the brains of our smallest patients. Developing robust brain architecture (a term used by the Center on the Developing Child at Harvard[1]) in a child with hearing loss requires specific strategies and an awareness of vocabulary, morphology, syntax, conversational competence, and social language (pragmatics) development. Social cognition is at the heart of a child's ability to get along with others and see things from another point of view. Social interactions promote children's understanding of self and of others as beings who have thoughts, feelings, desires, and beliefs that determine the way they respond. Theory of mind (ToM) refers to the understanding of people as mental beings, each with his or her own mental states of belief, intention, wants, and memory.[2] We use ToM to explain our own behavior by sharing what we think and want, and we interpret others' statements and behavior by considering their thoughts and wants. Basically, ToM is the ability to put oneself in another person's shoes. When children acquire a ToM, they become capable of predicting and explaining what's on their mind and perhaps how another person might act based on a differing mental state.

Researchers have found evidence of a strong connection between language and ToM. They have also determined that ToM has several dimensions, each with different neurological underpinnings:

- Cognitive theory of mind: thinking about thoughts, knowledge, beliefs, and intentions
- Affective theory of mind: thinking about and experiencing emotions
- Interpersonal theory of mind: thinking about the thoughts and emotions of others
- Intrapersonal theory of mind: thinking about one's own thoughts and emotions[3]

One significant aspect in ToM development of children between 4 and 5 years old is the development of false belief. These common tasks are used to measure false belief:

1. Show the child a Band-Aid box and ask what he or she thinks is inside the box. He or she will likely respond "Band-Aids."

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2. Open the box and show the child that there is actually a piece of candy and say, "Let's see...it's really candy inside," then close the box.
3. Now, as you bring out a toy figurine boy who has been hidden up until that point, say, "The boy has never ever seen inside this Band-Aid box. What do you think the boy thinks is in the box? Band-Aids or candy?"

A child who has developed ToM false belief will understand that the boy figurine holds a different understanding than he or she does because he did not see what's in the box. The child will respond that the boy figurine thinks Band-Aids are in the box. For a child who has yet to develop ToM, he or she will likely respond that the boy figurine thinks there is candy in the box, mistakenly assuming that the boy figurine holds the same belief that he or she does.

ToM IN CHILDREN WITH HEARING LOSS

Historically, children with hearing loss have demonstrated a delay in ToM development, likely secondary to reduced auditory access to the conversations around them. Children with typical hearing enter kindergarten with basic ToM, while many children with hearing loss do not. As a part of the longitudinal Outcomes of Children with Hearing Loss (OCHL) study,[4] Elizabeth Walker, PhD, and colleagues found that children with

hearing loss demonstrated significant delays in false belief understanding relative to children with normal hearing. They concluded that the delay in understanding others' beliefs has consequences for a child's social interactions and pragmatic communication. The likely suspects for the cause in delayed ToM development in children with hearing loss center around audibility and limited access to conversations happening around them. A large body of research has also demonstrated that the extent to which caregivers attend to and discuss mental states has an impact on ToM development. These delays in key ToM skills can have a significant negative impact on the development of social relationships and academic achievement.

For children with hearing loss, many early developmental milestones can be reinforced to help prevent delay in the development of ToM. As more children with hearing loss are fitted with hearing aids and cochlear implants at younger ages, it is imperative that clinicians provide families with the necessary tools to make sure that language connection and ToM development are emerging at the developmentally appropriate time to prepare children for school entry. Here are 10 tips to guide and coach families as they help their children develop a robust ToM.

1. Broken record: eyes open, ears on. Thanks to the OCHL study, we know that children who wear their hearing aids for 10 or more hours per day achieve better language outcomes than children who wear their hearing aids for less than 10 hours per day, and children with greater use of hearing aids achieve faster growth in language skills across time compared with their peers who do not use hearing aids during all waking hours. Additionally, children who use their hearing aids for more hours each day typically have higher parent ratings of auditory skills and better speech recognition.[5] Redundancy is good for growing brain architecture, so we will repeat that pediatric hearing health care professionals should proactively educate families about the importance of "eyes open, ears on" hearing aid and cochlear implant use.

2. Access, access, access. The use of remote microphone technology is a game-changer in improving audibility and making it possible for children with hearing loss to listen in to others' thoughts and opinions. The foundation of ToM is hearing early conversations with mental state words, so it's critical that children with hearing loss hear their mother and father think out loud or hear siblings' conversations as they navigate sharing toys or choosing favorite snacks and why. Research demonstrates that children with siblings have a more well-developed ToM, so we can surmise that the opportunity to hear those conversations early and often is most helpful in preventing any delays in development. Pediatric audiologists and LSL professionals can support families as they struggle to keep technology on their infants and toddlers by sharing tricks of the trade for retention and lots of encouragement in the difficult season of adjustment.

3. Up close and personal. Encourage families to stay close to the infant while talking, singing, and imitating the actions of their baby. Coach family members to make silly faces, blow raspberries, and then wait. Reward with a big smile any attempts the baby makes to imitate. Remind families to pause and give their child time to respond. Games such as peek-a-boo allow the infant to focus on your face. As they see smiles and happy faces, infants begin to anticipate the game. Pediatric audiologists have a lot of up-close and personal time with infants, so maximize your face time by modeling how to use mental state words while you are waiting for an ear impression to be completed, for example.

4. Capture opportunities to build brains. Coach families to put words to the items that their baby is looking at or hearing. Introduce mental state verbs such as, "I think we both heard the dog. I hear the thunder. I wonder if it is going to rain." It is often more natural for family members to label objects, but it is never too early to introduce feeling words. "I think you are sad because your daddy went outside," or "That silly dog barked and scared you." Coach families to get down on the floor when talking or playing with a toddler; this helps the child pay attention to the parent, sibling, or caregiver, and helps parents get a better perspective of what it is like to see the world from two feet off the ground. Practice putting words to their actions. For example, "You are building a tall tower with the blocks. David, you seem to like the red ball. My favorite ball is the blue ball. David, you rolled the ball again. Now you are hiding the ball. Where are you going to put it next? Oh David, you are so sneaky. You put the blue ball behind your back."

5. Promote pretend play. Pretend play is a precursor to ToM because it is an early step toward taking on someone else's perspective.[6] Encourage families to share how they promote play at home, and model the behavior desired from the parents during clinic activities. Only in Oklahoma would this happen, but recently a 3-year-old was dropping balls in a bucket as a conditioning task when the audiologist suggested that the child was Russell Westbrook. The child quickly responded, "No, I'm Paul George." After we recovered from our laughter, the child added, "I like Paul because he shoots three-pointers." It is helpful to give parents pretend play ideas such as tea parties, picnics, or driving a pretend school bus around the house. As children become more sophisticated in playing, they will create scenarios that are creative and detailed.

For example, 3-year-old Wyatt asked his mother to put up a restaurant tent. He dictated a menu and a note to his

customers. "I am Chef Wyatt. You can stay here if you want. I hope you like my pizza." He used a toy airplane to represent the drink listed on the menu and the flashlight to light up the menu. Whether it be pretending to be a Thunder basketball player or a chef in a pizza restaurant, this type of play is laying the groundwork for the development of a robust theory of mind.

6. Mental State Moments: Encourage families to use thinking words or mental state verbs in everyday routines. Mental state verbs are words about thought, for example: think, believe, like, love, hate, imagine, hope, remember, guess, feel, wish, forget, recognize, and learn. Model some statements, such as "I wonder what my silly dog will chew up today" or "Oh man, I forgot to bring the water jar in for the fish. I am so forgetful. I hope I didn't leave it on the table in the preschool classroom." Coach families to describe the feelings of others to children as young as 18 to 24 months old. In the clinic, if a baby is heard crying, explain that she might be hungry and need a bottle or perhaps he doesn't want to leave because he is having so much fun in therapy.

At 24 to 30 months old, typically developing children will begin to express their own preferences, e.g., "I don't like apples," "I want candy," and "I don't need a nap." Family members must go beyond talking about things and objects, and draw connections between objects and mental state verbs. Coach families to avoid test questions or questions that the asker already knows the answer to, such as "What's that?" or "What color is this?" Instead, when playing with toys or reading a book, introduce concepts by asking "What's your favorite and why?" or "I wonder what Dr. Jace's favorite team is?"

7. Read, read, read, then read again. Using books with characters who share emotions is an excellent strategy for parents and raises the bar in terms of vocabulary. Parents can get in the rut of using only vocabulary they know their child understands, but books create new opportunities for vocabulary development as well as expansions of syntax and ToM development. Children's books offer a great deal of content related to desires and beliefs of characters. For example, Little Red Riding Hood doesn't know that the wolf is dressed up as grandma. Other children's literature featuring ToM concepts are *Goldilocks and the Three Bears, the Rainbow Fish* by Marcus Pfister, and David Ezra Stein's books, *Interrupting Chicken* and *Interrupting Chicken and the Elephant of Surprise*. Encourage families to help the child understand the experiences of the book characters by linking them to the child's own experiences. Encourage the child to make predictions about what might happen next. Much like the tendency to use words that the child is familiar with, parents often get stuck with the need to read every word on a page. Encourage them to talk about the story rather than read it word for word. Asking questions about what the character could be saying or thinking is an excellent way to promote ToM development in a therapy session or more audiology appointment. Lastly, encourage parents to use animated voices when reading books. For children with hearing loss, this brings attention to the character's emotions and makes it easier for them to understand words such as scared, angry, shy, nervous, etc.

8. Past, present, and future. When pediatric audiologists and listening and spoken language specialists work together, they create many opportunities for coaching moments with families. For example, ask the child about his or her previous clinic appointment or previous events using mental state words. Parents introduce diverse perspectives about those events. "Last time you were here, you were going to swim lessons after your appointment. Tell me about your first lesson. Were you nervous or excited? Tell me how you felt. I wonder if your mom was nervous." Then ask the parents, "Mom, how about you? How did you feel?" Encourage families to talk about their child's birth and/or other major milestones and their feelings surrounding those events. A useful resource to help families discuss past and future events is Jamie Lee Curtis' book, *Tell Me Again About the Night I was Born*, which offers opportunities to expand ToM. "Tell me again about the first time you held me in your arms. Tell me again how you cried happy tears."

Engage siblings as much as possible because they can also offer different perspectives. Keep a list of conversation starters available in therapy suites, audiology clinics, and online sources such as Hearingfirst.org. Examples include: "I wonder…", "What do you think?", "You're never going to believe this!", "Help me remember," or "What do you think she meant by cry happy tears?"

9. No need to reinvent the wheel. Many resources are available to parents and professionals regarding ToM development. As mentioned previously, Hearing First has excellent resources, including a list of developmental milestones associated with ToM development. The Hanen Early Language Program offers TalkAbility, a guide for parents of verbal children with autism spectrum to help their kids develop people skills. The program also has excellent blogs that speak to ToM development. Remind families to seek out their public library for useful resources.

10. It never stops. The importance of ToM cannot be underestimated as "effective and appropriate social communication/pragmatic language skills require a communicator to have a theory of mind."[6] It enables one to have meaningful conversations and consider the listener's perspective. Besides communication, deficits in ToM also impact a variety of other domains.[4] ToM development is hard work that will continue throughout adulthood. Importantly, ToM lays the groundwork for empathy, something that can seem lacking in our world today. Author Brené Brown speaks to this issue in her most recent book, *Dare to Lead:* "Children are very receptive to learning perspective-taking skills because they're naturally curious about the world and how others operate in it. Those of us who were taught perspective-taking skills as children owe our parents a huge debt of gratitude. Those of us who were not introduced to that skill set when we were younger will have to work harder and fight armoring up to acquire it as adults." When hearing care professionals support parents in using strategies to develop their child's ToM, we are making a lifelong impact on the next generation.

References for this article can be found online at http://www.thehearingjournal.com.