Opinion

Mind Reading Across the Lifespan

Current Themes and Future Challenges

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After almost 40 years of studying how we come to understand others' desires, beliefs, and emotions – so-called theory of mind (ToM) – there is still much to be uncovered. The papers in this topical issue add to our understanding of the factors that contribute to changes in ToM across the lifespan (Derksen, Hunsche, Giroux, Connolly, & Bernstein, 2018; Lagattuta, Tashjian, & Kramer, 2018), the abilities that are related to ToM (Rafetseder & Perner, 2018), and how other fields, such as human-robot interaction, can inform our knowledge of ToM (Marchetti, Manzi, Itakura, & Massaro, 2018). In this commentary, I highlight two themes to make the argument that: (1) there is still relatively little known about affective ToM in comparison with cognitive ToM and (2) studying individual differences in ToM in older adulthood is a promising direction to understand differing trajectories of this ability in the later years of life.

Although much is known about the development of false belief understanding and factors that affect its development during childhood (e.g., Wellman, Cross, & Watson, 2001), much less is known about the development of affective ToM. Many researchers have studied the development of our understanding of emotions using tasks such as the Apparent-Real Emotion task (e.g., Wellman & Liu, 2004), Mind in the Eyes (e.g., Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997), and Cambridge Mindreading Face-Voice Battery (Golan, Baron-Cohen, & Hill, 2006). While studies indicate that affective ToM develops later than desire and belief understanding (Wellman & Liu, 2004) and that affective ToM peaks in early adulthood and declines in old age (Henry, Phillips, Ruffman, & Bailey, 2013), this area is limited by the tasks currently available to measure affective ToM. Importantly, it is unclear whether many of the tasks (such as the Cambridge Mindreading Face-Voice Battery) capture the core ability of emotional understanding or rather tap into verbal knowledge, especially in older adults (see Mahy et al., 2014). An important future challenge is to design measures that capture variance in affective ToM across the lifespan without tapping into other related abilities, ideally in a continuous manner (see Bernstein, Thornton, & Sommerville, 2011 for a continuous measure of cognitive ToM).

Two of the papers in this current issue are relevant to studying affective ToM across the lifespan. First, Lagattuta et al. (2018) examined how 4- to 10-year-old children and adults inferred the emotions (in addition to thoughts and decisions) of a character upon seeing a perpetrator that had acted in a positive and/or negative manner previously. Participants used a 6-point scale to rate how worried or happy a character would when re-encountering a perpetrator. By including a question about the character's emotional state and even better, measuring this on a continuous scale, the authors were able to gain insight into children's and adult's emotional understanding. Second, Marchetti et al.'s (2018) review on human-robot interaction also highlights the importance of affective ToM; 12-months-olds' attention is directed by a robot's movement only if it has eyes, and children are more likely to report that a robot has emotive attributes if it has a face. Thus, the presence of eyes and a face seems key in viewing a robot as human-like and ascribing it mental and emotional states. Given that both the face and eyes are two main visual cues used to infer emotional states, these studies reveal that young children rely on these features to infer intentionality.

A second promising area for future work is a more thorough examination of individual differences in older adults' ToM. Derksen et al. (2018), Lagattuta et al. (2018), and Rafetseder and Perner (2018) in the current issue highlight individual differences in ToM ability in children and adults. Early attention, executive function, language development, counterfactual reasoning, and parent and sibling interaction have all been shown to relate to individual differences in ToM in infancy and childhood (see Derksen et al., 2018). Much less work exists in older adults (although for a review see Moran, 2013). Examining individual differences in older adults' ToM is critical for two reasons. First, older adults

Zeitschrift für Psychologie (2018), *226*(2), 134–135
https://doi.org/10.1027/2151-2604/a000329

show different rates of decline in several cognitive abilities (Salthouse, 2004) suggesting that individual differences may play an important role in the maintenance or decline of ToM. Second, stable individual differences present across the lifespan may have a powerful cumulative effect on ToM and may help us understand differing developmental trajectories of older adults' ToM.

In sum, this current issue demonstrates a number of interesting and creative ways to study ToM across the lifespan. I have highlighted two themes representing two major challenges for the field: (1) the relative lack of work on affective ToM and (2) individual differences in older adults' ToM. Additionally, I suggest that a crucial next step is to develop measures that capture variance in ToM across the lifespan. In another 40 years (and at the end of my own career), I am optimistic that the field will have made progress on these challenges.

Acknowledgments

I wish to acknowledge a Discovery Grant (RGPIN-2015-03774) from the Natural Sciences and Engineering Research Council of Canada (NSERC).

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Received December 12, 2017
Revision received December 12, 2017
Accepted December 12, 2017
Published online March 14, 2018

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