Theory of Mind

Henry M. Wellman (ORCID ID:) 0000-0001-6745-6959

University of Michigan

“Theory of mind” refers to our everyday ability to understand how mental states like beliefs, desires, and intentions shape others’ actions. Each day we construe people as engaging in actions they *believe* will get them what they *want*. Seeing a woman search expectantly through her purse, I think “She wants something (her phone?) and thinks it’s in her purse”; seeing someone do a doubletake at their dinner bill, I think “They didn’t want to pay so much and thought it would less.” These mundane understandings manifest our theory of mind. Developing a theory of mind is an important achievementof childhood. Thus, a key focus of theory of mind research concerns how children develop these understandings.

# History

Asking how people understand mind has a long history in philosophy and psychology. The recent history of developmental science has two notable highlights.. Jean Piaget (1930) influentially claimed young children were realists, only able to think of such internal, immaterial things in concrete ways— dreams were actual pictures displayed to the sleeping eyes; thinking was overt speech.

Later, in a seminal 1979 article David Premack and Guy Woodruff asked, “Does the chimpanzee have a theory of mind?” Primatologists answered “no” and then shelved this query, but it sparked child researchers to ask when children have a theory of mind.

# Core concepts

Consider two basic, everyday understandings of mind. First, there is a mind-world distinction--thoughts and physical objects are two very different things, one nonmaterial and mental, the other physical and tangible (e.g., thoughts about dogs versus dogs: dreams versus pictures). Contradicting Piaget’s claims about childhood realism, even 3-year-olds proved surprisingly good at this nonobvious and abstract understanding (Wellman & Estes, 1986).

Second, there is understanding how agents’ mental states work to produce intentional behavior. Here, an intriguing development appeared between 3- and 7-years revealed in children’s (mis)understanding of false beliefs.

*False Beliefs*

In a prototypic false-belief task, children see Jill put a toy in a drawer. While Jill is gone the toy is moved to a cupboard. When Jill comes back, “Where will Jill look for her toy?” Older children answer correctly. Younger children consistently say Jill will look in the cupboard (where it really is). Several factors make these tasks easier or harder, but nonetheless children go from consistently wrong to consistently correct, typically in the preschool years. This finding is true across cultures. As shown in Figure 1, children everywhere come to understand that a person’s actions depend on what they think, not just what is true..

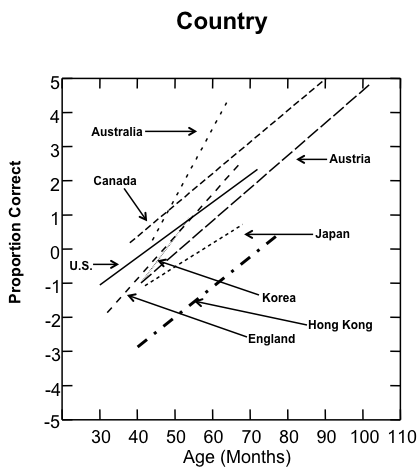


Figure: :Children in different cultural-linguistic communities achieve false-belief understanding somewhat more quickly or slowly, yet in all locales they evidence the same trajectory—from below chance to above chance performance (0=chance in this graph) typically in the preschool years (Wellman, et al., 2011)

Normal variation in when children come to understand false beliefs (see Figure 1) allows investigators to show that theory-of-mind developments have wide-ranging consequences. These include significant impacts on children’s friendships, engagement in lying and deception, game-playing, strategies for persuading others, and transition to school. (e.g., Lecce et al., 2017; Slaughter, et al., 2015).

## Sequences

For belief-desire psychology, clearly, understanding desires is as central as understanding beliefs. And other understandings are important too. Consider those depicted in Figure 2: Understanding that people: (a) can have different desires for the same things (Diverse Desires, or DD), (b) can have different beliefs, even about the exact same situation (Diverse Beliefs, DB), (c) can be ignorant of something (Knowledge-Access, KA), (d) can believe something falsel (False Belief, FB), (e) can feel one way but display a different emotion (Hidden Emotion, HE).

Using such a battery of tasks, studies encompassing hundreds of preschoolers in the North America and Europe evidence a clear and consistent order of difficulty, as listed in Figure 2, with diverse desires easiest and hidden emotions hardest. For shorthand: DD>DB>KA>FB>HE.



Figure 2: Graphical depiction of a progression of theory-of-mind understandings. Tasks testing these concepts were first devised by Wellman and Liu (2004) but since translated into dozens of languages and tested worldwide.

Such progressions of understanding have shed key light on the mechanisms of theory-of-mind development. Here are two examples.

DD>DB>KA>FB>HE characterizes children in the western world. But an alternate sequence characterizes children in China, Japan, Singapore-- DD>KA>DD>FB>HE—where KA and DD are reversed. Differences between individualist versus collectivist cultures makes this divergence sensible as exemplified by China and the US. Back to Confucius, Chinese culture has valued attaining the common knowledge that all right-minded people should know. Individualistic US values put greater weight on beliefs, including belief differences: Individuals may have, indeed have the right to, their own beliefs. Relatedly, parent-child conversations in China emphasize knowing; US parent-child conversations emphasize thinking (Johnstone & Wong, 2002).

Deaf children in the US and Australia follow the same DD>DB>KA>FB>HE their hearing peers do. But deaf children of hearing parents have serious delays in their understandings. Theory-of-mind milestones achieved by hearing preschoolers often take deaf children until adolescence to achieve (Peterson et al, 2005). This too makes sense—deaf children of hearing parents can’t hear their parents speak about other people and their invisible, internal states. This delays their theory-of-mind understandings, which in turn impacts their friendships, peer relations and transition to school. These delays are fading (but still apparent) as more very young deaf children get cochlear implants allowing them to hear speech (Yu, et al. 2021).

# Questions, controversies, and new developments

*Infants*

Year old infants show early understanding of agents’ intentional (versus accidental) actions, diverse desires, and differences in perceptual perspectives (e.g., Woodward, 1998). Some researchers have claimed that infants understand false beliefs (Onishi & Baillargeon, 2005). As most researchers think this is a preschool achievement, infant false belief remains a contentious issue (see, e.g., the many contradictory findings in Paulus & Sabbagh, 2018).

*Apes*

Renewed research with monkeys and chimpanzees (post Premack & Woodruff, 1979) has illuminated some distinctively human theory-of-mind understandings as well as some shared understandings. Apes and monkeys understand the desires and knowledge-ignorance of others, but whether they understand false beliefs remains doubtful (Bettle & Rosati, 2021.) But human-primate research inspires the social brain hypothesis (Dunbar, 1998), which argues that evolutionary increases in social cognition fueled advances in hominid intelligence more broadly.

# Broader connections

The social brain hypothesis exemplifies theory-of-mind connections to other disciplines. Childhood theory-of-mind findings have also inspired debate and revised theorizing within philosophy of mind (Carruthers, 2009). Further, neuroscientists have identified a distinctive theory-of-mind network in the brains of adults (Gallagher & Frith, 2003), That theory-of-mind network is not apparent in infants.Rather it emerges over childhood, apace with progressions found in children’s cognitive understandings (Sabbagh, et al. 2009).

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