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Short Communication

Theory of Mind experience sampling in typical adults



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ABSTRACT

We explored the frequency with which typical adults make Theory of Mind (ToM) attributions, and under what circumstances these attributions occur. We used an experience sampling method to query 30 typical adults about their everyday thoughts. Participants carried a Personal Data Assistant (PDA) that prompted them to categorize their thoughts as Action, Mental State, or Miscellaneous at approximately 30 pseudo-random times during a continuous 10-h period. Additionally, participants noted the direction of their thought (self versus other) and degree of socializing (with people versus alone) at the time of inquiry. We were interested in the relative frequency of ToM (mental state attributions) and how prominent they were in immediate social exchanges. Analyses of multiple choice answers suggest that typical adults: (1) spend more time thinking about actions than mental states and miscellaneous things, (2) exhibit a higher degree of own- versus other-directed thought when alone, and (3) make mental state attributions more frequently when not interacting (offline) than while interacting with others (online). A significant 3-way interaction between thought type, direction of thought, and socializing emerged because action but *not* mental state thoughts about others occurred more frequently when participants were interacting with people versus when alone; whereas there was an increase in the frequency of *both* action and mental state attributions about the self when participants were alone as opposed to socializing. A secondary analysis of coded free text responses supports findings 1–3. The results of this study help to create a more naturalistic picture of ToM use in everyday life and the method shows promise for future study of typical and atypical thought processes.

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1. Introduction

Individuals capable of reasoning and making attributions about their own or another's beliefs, desires, or intentions are said to possess a Theory of Mind (ToM) (Premack & Woodruff, 1978; Wellman, Cross, & Watson, 2001). The development of this higher-order cognitive ability and its relationship to other areas of cognition has been the topic of much research. A great deal of the ToM literature has been devoted to its function and development, particularly focused on the age at which ToM abilities arise. The capacity to represent false beliefs—mental states containing content contrary to reality—has been widely considered a marker of ToM abilities in children (Wimmer & Perner, 1983). Proponents reason that to arrive at correct

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predictions or explanations of other people's behavior, it is necessary to understand that mental states are sometimes independent of reality and may misrepresent the state of the world. Wimmer and Perner's classic Sally-Anne task and others like it have demonstrated that the ability to understand false beliefs and thus the possession of ToM consolidates around the age of 5 years. However, experiments examining visual perspective taking and those utilizing anticipatory looking paradigms to test false beliefs suggest the possibility of ToM understanding in children as young as 15 months (Baillargeon, Scott, & Zijing, 2010; Brooks & Meltzoff, 2002).

ToM has been understood as a key component of humans' intricate social lives, contributing to the ability to understand irony, tell and detect lies, and participate in positive social interactions (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). It is thought that such a skill is crucial for social adequacy and overall normal cognitive development. For this reason, deficits in ToM have been linked to social dysfunction seen in disorders such as schizophrenia and autism. Many individuals with schizophrenia display deficiencies in areas such as emotional perception and attribution that may be reflective of a ToM deficit. They also perform more poorly than non-affected subjects when trying to "read between the lines" (i.e., identifying what a given individual is thinking or feeling) (Penn, Sanna, & Roberts, 2008; Pickup & Frith, 2001). Children with autism often fail to develop proper social relationships and appropriately interpret social cues. Baron-Cohen, Leslie, and Frith (1985) hypothesized a link between the social deficits of individuals with autism and a deficit in ToM. Using the Sally-Anne task, Baron-Cohen et al. compared performance of subjects with autism to that of controls and children with Down's syndrome. Results revealed that even when the mental age of children with autism was higher than that of the controls, they failed to attribute beliefs to others. This has been replicated using variations of the Sally-Anne task (see Grant, Grayson, & Boucher, 2001 for review), including a non-verbal adaptation (Colle, Baron-Cohen, & Hill, 2007). While this is a well-replicated finding, ToM impairment likely does not cause autism, and some high-functioning individuals with autism pass ToM tasks (Boucher, 2012). Nonetheless, understanding why many with autism fail ToM tasks may reveal something fundamental about this disorder.

In recent years, a number of researchers have stressed the importance of naturalistic – as opposed to laboratory-based – studies of social cognition. Ickes, Stinson, Bissonnette, and Garcia (1990) explored the overt behavior and covert thoughts and feelings of pairs of subjects during a period of unstructured interaction to examine "empathic accuracy". More recently, Malle and Pearce (2001) asked participants to report on their thoughts and speculate about those of their partner during a dyadic interaction. Importantly, both methods required subjects to make perceptual judgments based upon their memory of previous interactions and *not* within the moment. Frith, Happe, and Siddons (1994) explored the ecological validity of ToM tasks with respect to parent-teacher reports of the everyday social interactions of individuals with autism.

However, most ToM research to date involves studies in highly controlled laboratory settings. In the lab, tasks are explicitly designed to elicit ToM attributions. Tailoring tasks towards a mentalizing state of mind may lead to a greater number of mental state attributions. A lack of naturalistic social distractions may also allow more time to make ToM attributions given research which demonstrates that ToM is cognitively taxing (Apperly, Back, Samson, & France, 2008; Malle & Pearce, 2001). In addition, experimental settings that do not mirror life's complexities could lead to an inaccurate record of the type and target of thought attributions. Support for this notion comes from research conducted by Malle and Pearce (2001) hypothesizing that attentional bias motivated by the complex nature of social interactions leads a person to focus on and recall their own inner states over their actions and another's actions over that person's inner states.

The goal of the present study was to explore the extent to which typical adults make ToM (mental state) attributions and under what conditions in everyday life. One approach to doing so involves experience sampling variants such as those used to study the default mode network and the role of mind wandering (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Schooler et al., 2011). Therefore, to examine ToM attributions in a more ecologically valid manner, we adopted the experience sampling method to randomly query subjects about their thoughts throughout the day (Larson & Csikszentmihalyi, 1983). Similar to the Electronically Activated Recorder (EAR) (Mehl & Robbins, 2012), this methodology allowed us to gather information from a day in the life of the participants as they choose to live it, filled with the intricacies of the human experience that are difficult to replicate in laboratory settings.

As a starting point, we hypothesized that ToM attributions might occur relatively infrequently outside the lab, and that ToM might not prominently figure into immediate social exchanges under most circumstances. This hypothesis is based largely on a conceptual consideration of the socio-cognitive abilities of humans and nonhuman primates. Non-human primates are capable of producing a variety of behaviors during social interactions that mimic those of humans, including deception, reconciliation, and gaze following (see Marrus et al., 2011; Povinelli, 2000; Watts, 2002). However, Povinelli and Giambrone (2001) argue that chimpanzees may not reason about the mental and perceptual states that appear to be fundamental for ToM attributions. If social interactions amongst chimpanzees occur despite lack of the higher-order representational ability Povinelli and colleagues claim is necessary for ToM (see Penn, Holyoak, & Povinelli, 2008; Penn & Povinelli, 2007), it is plausible that humans may also rely primarily on underlying cognitive and perceptual abilities to interpret and react to behaviors and only secondarily on ToM, lending to infrequent ToM attributions. Furthermore, given that everyday social interactions in humans draw on a multitude of cognitive resources, and such resources are more readily available in the absence of social "distractions", we predicted that when ToM attributions do occur, they will happen more frequently outside of social interactions.

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