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THEORY OF MIND: AN OVERVIEW AND BEHAVIORAL PERSPECTIVE

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Theory of mind (ToM) refers to the ability of an individual to make inferences about what others may be thinking or feeling and to predict what they may do in a given situation based on those inferences. Discussions of ToM focus almost exclusively on inferred cognitive structures and processes and shed little light on the actual behaviors involved. In this article, I (a) selectively overview the literature on ToM, (b) suggest that the behavioral relations referred to by ToM scholars can be described and explained parsimoniously within the theoretical framework of behavior analysis, (c) argue that the verbal behaviors that define most ToM tasks are acquired as a function of the language environment of the young child, and (d) point out that B. F. Skinner (1945) proposed what amounts to a ToM more than 60 years ago.

In the last chapter of *The Selfish Gene*, Richard Dawkins (1976) introduced the term *meme* to refer to a unit of cultural replication analogous to the biological unit of replication—the gene. Examples of memes include tunes, ideas, and catchphrases. According to Dawkins, "Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process, which in the broad sense can be called imitation" (p. 206). Although some may quarrel with Dawkins' understanding of imitation, the term *meme* has attained a certain level of descriptive currency.[1]

I mention memes because an excellent example of a meme is the construct of "theory of mind." Salzinger (2006) recently wrote, "'Times they are a-changin',' as Bob Dylan succinctly put it. . . . When you enter *theory of mind* in PsycINFO, it returns 2,176 entries—books, book chapters, and journal articles. Not only that, its frequency of use is such that it has been awarded an acronym, namely, ToM." Since the term *theory of mind* was first used by

1 Describing ToM as a meme implies that it confers some favorable advantage on those who talk about it. Understanding the favorable advantage, however, means understanding the social and professional contingencies responsible for individuals using the term and studying whatever behaviors are said to reflect it. Thus, an ontogenetic-selection analogy based on established principles of learning better explains the popularity of a term than a phylogenetic-selection analogy does.

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Premack and Woodruff (1978a), research and scholarly writing on the subject has mushroomed into a vast literature. Recently, ToM has found its way into the popular culture, having been mentioned by numerous authors. In addition, some authors claim that lacking a ToM, which is sometimes referred to as "mind blindness," is a defining feature of autism (e.g., Baron-Cohen, 2001). Talk of ToM, it seems, is everywhere these days.

Defining and Studying Theory of Mind

ToM in Nonhuman Primates

The phrase *theory of mind* was introduced by Premack and Woodruff (1978a), who, writing about chimpanzees, defined it as the ability to impute mental states to oneself and others. Their article sparked a debate about whether nonhuman primates have a ToM (see Heyes, 1998; Seyfarth & Cheney, 2000). Of course, the debate really boils down to what one means by "imputing mental states to oneself and others" and what evidence is necessary and sufficient to make such an inference. In one experiment, Premack and Woodruff (1978a; see also Premack & Woodruff, 1978b) showed videotapes of a human encountering several problems (e.g., trying to escape from a locked cage or reach inaccessible food) to a chimpanzee named Sara and then stopped the videotape before the solution was reached. The experimenters then showed Sara two photographs placed beside the video monitor, only one of which depicted the human solving the problem. The authors stated that Sara consistently chose the correct photograph, indicating to them that she attributed mental states to the actor, that is, that she had a ToM (see Savage-Rumbaugh & Rumbaugh, 1979, for a critique, and Premack and Woodruff, 1979, for a reply). According to Heyes (1998), nonmentalistic accounts of Premack and Woodruff's experiment, as well as many other presumed experimental demonstrations of higher mental capacities in nonhuman primates, are possible. Heyes and others (e.g., Seyfarth & Cheney, 2000) have concluded that nonhuman primates probably do not have a ToM, if that means possessing mental states such as self-awareness and beliefs. Seyfarth and Cheney wrote:

> All the evidence gathered to date suggests that monkeys cannot attribute mental states to others and are unaware of their own knowledge. . . . The inability to examine their own knowledge or to recognize the mental states of others (what Premack and Woodruff (1978) termed the lack of a "theory of mind") means that, when monkeys interact with other group members, their understanding of those individuals' social relationships and behavior derives primarily from what they have observed those individuals do in the past. Monkeys can use this information to predict another animal's behavior, but they have little understanding of the motives, belief, or knowledge that caused it to occur. . . . Similarly, if knowledge of self and knowledge of others develop in parallel, then monkeys' apparent ability to place themselves within a social network may also derive primarily from learned behavioral contingencies. Although monkeys may behave as if they recognize their own relative ranks and kin

> relations, they are probably not aware of the knowledge that allows them to do so: they do not know what they know, cannot reflect on what they know, and therefore cannot become the object of their own attention. (p. 908)

Critics of the claim of ToM in nonhuman primates, such as Seyfarth and Cheney (2000), appeal to the principle of parsimony, suggesting that a variety of complex behaviors in nonhumans can be explained more simply in terms of basic learning processes. Of course, another conclusion was summarized in Baum's (1998) reply to Heyes:

> The question, "Does the chimpanzee have a theory of mind?" is logically identical to the question, "Does the chimpanzee have a soul?" It is a peculiarity of our culture that we talk about anyone having a mind, and such talk is unhelpful for a science of behavior. . . . The problem is not empirical but logical. Premack and Woodruff's (1978) question "Does the chimpanzee have a theory of mind?" is neither intriguing nor important. It only begs the question of whether it is helpful for a science of behavior to use concepts like "theory of mind" at all. If it were helpful, then it would make sense to discuss what the criteria would be for deciding the question, but first one must decide whether such a concept advances our understanding of behavior at all. (p. 116)

It is not my purpose in the present article to join in the discussion of ToM in nonhuman primates. The ongoing debate over ascribing a ToM to nonhumans, however, is instructive for a discussion of a ToM in children because, as we will see, that discussion also requires an appeal to parsimony.

ToM in Humans

Since Premack and Woodruff's (1978a) initial experiments, research on ToM has increased exponentially, as have the number of definitions of the term. Consider the following examples.

> Theory of mind refers to the ability to represent, conceptualize, and reason about mental states. In its fully mature stage, theory of mind is a domain-specific conceptual framework that treats certain perceptual input as an agent, an intentional action, a belief, and so forth. . . . Theory of mind arguably underlies all conscious and unconscious cognition of human behavior, thus resembling a system of Kantian categories of social perception. . . . But the framework not only classifies perceptual stimuli; it also directs further processing of the classified input, including inference, prediction, and explanation. (Malle, 2002, p. 267)

> As young children mature, they develop an understanding of themselves and other people as psychological beings who think, know, want, feel, and believe. They come to understand that what they think or believe may be different from what another person thinks and believes. They also learn that much of our behavior is motivated or caused by our knowledge and beliefs. (Schick, de Villiers, de Villiers, & Hoffmeister, 2002, p. 6)

> Throughout the early years, children become more aware of their own minds and the minds of others, as well as how to mediate between the two. Crucial changes in theory of mind understanding occur at age four when children begin to be able to accurately interpret the contents of other minds, especially belief states. . . . At this point, children demonstrate that they understand that the mind is a representational system, which does not simply reflect reality. Much of the emphasis of developmental research has been on this aspect of theory of mind: What brings about the changes at this stage that allow the child to understand and reason about human action in such a fundamentally new way? (Hale & Tager-Flusberg, 2003, p. 346)

> [Theory of mind is] being able to infer the full range of mental states (beliefs, desires, intentions, imagination, emotions, etc.) that cause action. In brief, having a theory of mind is to be able to reflect on the contents of one's own and other's minds. (Baron-Cohen, 2001, p. 174)

What makes such definitions problematic for behavior analysts is that ToM researchers almost never identify what children actually do and the circumstances under which they do it, a tack not likely to pique the interest of theorists interested in "tapping children's conception of mind" or understanding "that the mind is a representational system, which does not simply reflect reality" (Hale & Tager-Flusberg, 2003, p. 346). Unfortunately, however, only a handful of behavior analysts have addressed the topic of ToM (e.g., Layng, 2005; LeBlanc et al., 2003; McHugh, Barnes-Holmes, & Barnes-Holmes, 2006; McHugh, Barnes-Holmes, Barnes-Holmes, & Stewart, 2004; Okuda & Inoue, 2000; Salzinger, 2006; Schlinger, 2006, 2007; Spradlin & Brady, 2008). Because even fewer behavior analysts have experimentally investigated behaviors related to ToM, we are forced to mine the standard developmental literature for studies that support a general behavior-analytic account of ToM. In order to do that we first need to understand how researchers have tested for ToM in children.

Tests for ToM in Children

According to Baron-Cohen, Leslie, and Frith (1985), "The ability to make inferences about what other people *believe* to be the case in a given situation allows one to predict what they will do" (p. 39). There are many ways of testing such inferences and predictions. Success on most of these tests requires that the child take the perspective of someone (a protagonist) who has been privy to certain conditions that differ from those available to the child. Although researchers have used several methods to study ToM, the acid test has become the false belief task (Ruffman, Slade, & Taumoepeau, 2004). This task, first developed by Wimmer and Perner (1983),

> involved a character, Maxi [a puppet], who places some chocolate in a particular location and then leaves the room; in his absence the chocolate is then moved to another location. The child is then asked where Maxi will look for the chocolate on his return. In order to succeed in this task, the child must understand that

> Maxi still *thinks* that the chocolate is where he left it—the child must understand that Maxi has a false belief, in fact. (Caruthers & Smith, 1996, p. 2)

The false belief task is so named because it supposedly tests the child's *belief* about what another person will do, as opposed to the child's prediction about what that person will do. According to several authors (e.g., Bloom & German, 2000; Dennett, 1978), this is an important distinction because a child can often predict what another person will do "by simply observing the actual state of the world" and without understanding another person's mental states (Bloom & German, p. B26). The false belief test presumably assesses the child's ability to predict the behavior of someone else "based on an inferred mental state that differs from reality" (Bloom & German, p. B27). Or, as Hale and Tager-Flusberg (2003) put it, "The false belief task dissociates belief from reality, tapping children's conception of mind as opposed to their reporting of reality" (p. 346). Note, however, that this interpretation is really nothing more than a description of a child's verbal report about where someone would look for a hidden object that was moved and thus is not very parsimonious.

Evidence suggests that children younger than 4 years of age, signing deaf children from hearing families, and children diagnosed with autism do not succeed well on false belief tasks (Peterson & Siegal, 1998, 1999). Because success on these tasks requires that children discriminate between the stimuli available to them and those available to a protagonist, one obvious and parsimonious interpretation of the failure by these particular groups of children is that they lack the learning experiences that are available to typical children (Spradlin & Brady, 2008). However, the standard interpretation of the failure on false belief tasks is that children lack a ToM or, "in more colorful words, cannot read other peoples' minds" (Salzinger, 2006). Although we may describe children who succeed on the false belief task as having a ToM or as "mind reading" (see Baron-Cohen, 2001), more parsimonious, though less captivating, ways of understanding the behavior of children are available, just as they are with nonhuman animals. One way to view the behavior is in terms of operant stimulus control (Okuda & Inoue, 2000; Salzinger, 2006; Spradlin & Brady, 2008).

The False Belief Task as a Stimulus Control Problem

Performance on the original false belief task hinges on the child's ability to correctly answer the question, "Where will Maxi look for the chocolate when he returns?" As Salzinger (2006) pointed out, failure to answer this question correctly may represent a fairly simple "example of stimulus control gone wrong." As in all such tests of ToM, in the false belief test, the child must respond differently to the stimuli currently available to her versus those that would be available to Maxi when he returns (Spradlin & Brady, 2008). Even nonbehavioral researchers have acknowledged this stimulus control problem, although not in so many words. For example, Moses and Flavell (1990) noted that the only cue for the child's belief in this task is the fact that Maxi did not observe the chocolate being moved to another location, which is not a very salient cue for young children since Maxi was not present when the chocolate was moved, and a fair amount of time passed between the hiding of the chocolate and asking the child the questions. In short, the child's answer to the question "Where will Maxi

look?" is not determined by the appropriate stimulus—Maxi placing the chocolate in the original location. Instead, the child's answer is determined by the most recent placement of the chocolate in the new location as seen by the child. This situation is the opposite of what has been called the A-not-B error, described by Piaget (1954), which occurs in Stage 4 of the sensorimotor period of development (see Ginsburg and Opper, 1988).

In the Piagetian test, if an object is hidden under a cloth at position A, a young child will lift up the cloth and retrieve the object. The first time the child sees someone place the object under a cloth at position B, however, he will still search for it under cloth A, especially if a delay occurs between rehiding the object and allowing the child to search for it. The child responds in this way because, in the past, looking under A (as a discriminative stimulus) was reinforced by producing the object, thus making it an error only from the experimenter's perspective (Schlinger, 1995). Not until observing the placement of the object at a particular location becomes the condition (i.e., discriminative stimulus) in which searching for the object is reinforced by finding it will the child look in that new location. In the false belief task, the child must be able to say that when Maxi returns he will look for the chocolate in the original location, even though the child saw the chocolate moved from the original to the new location. This task is more difficult because the chocolate is no longer in the location it was when Maxi was present. Therefore, the child must ignore the chocolate in its present location and respond only to the experimenter's question, "Where will Maxi look for the chocolate?"

Spradlin and Brady (2008) listed three requirements for a child to succeed on the false belief task. First, she must observe where Maxi initially placed the object. Second, she must remember where the object was placed. And third, she must have observed that people usually look for objects where they placed them or were seen last. Concerning the last requirement, Spradlin and Brady explained:

> The child from a well organized home will have had numerous opportunities to observe that other people look for objects where they placed them. If the child observes the mother place the jelly jar in the pantry, the mother will generally look for the jam jar in the pantry. Moreover, the child will have had numerous opportunities to place objects and look for them. Most often, looking where one placed the object will be reinforced. Less frequently, a child may have seen someone place an object in one place and have someone else move the object and then observe the first person look for the object where he/she initially placed it. Probably more frequently, the child will have had personal experience in placing an object in one place and having a sibling or parent place the object somewhere else. (p. 345)

When a child fails the false belief task then, the child's answer is most likely determined by the stimuli present at the time the question was asked rather than the stimuli present at the beginning when the puppet was there. This is understandable since the stimulus condition that was present when the puppet was there (i.e., the chocolate in the original location) is no longer present and therefore cannot directly affect the child's behavior. This state of affairs is the reason that cognitive psychologists propose representational systems that aid in remembering.

In general, children who respond correctly on Piaget's A-not-B problem, as well as on the false belief task, do so probably because they have observed adults and other children correctly responding to such problems and have been reinforced themselves for responding correctly in similar situations. Specifically, children can learn to predict what other people will do or say, not necessarily by inferring their mental states or by being aware of or reading their minds, but by experiences in which behaviors that *appear* to take another's perspective are taught. Children acquire these behaviors probably as a result of parents asking them relevant questions and then modeling and reinforcing correct answers. According to Spradlin and Brady (2008), what a child says that another person will do or think in a false belief test depends on what the child has observed other people do or what the child herself has done or thought in similar situations.[2]

As Salzinger (2006) stated, "Such a conceptualization would lead one to study stimulus control in children of various ages and in various situations." Of course, doing so would remove the mystery of the child having a ToM and the mentalistic constructs that often accompany such accounts. Thus, success on the standard false belief test may occur for simpler reasons, which may not involve making inferences about what other people believe or "tapping children's conception of mind" (Hale & Tager-Flusberg, 2003, p. 346). Because predictions in these instances can be made without understanding the mental states of others, most ToM researchers may not consider them to constitute evidence of a ToM.

Another factor that has been implicated in some children's failure on the false belief task is the phrasing of the questions. For example, in an experiment by Lewis and Osborne (1990), the researchers used a different form of the false belief test, called the false or unexpected identity test. In this test, a child is shown, for example, a candy box and asked what is inside. The child answers candy. The box is then opened to reveal another object, say, a pencil. The child can then be asked a variety of questions based on this situation, including what another child will think is in the box. Obviously, the child is said to have passed the test if she says candy (what she originally thought was in the box) rather than pencil (what is actually in the box). In Lewis and Osborne's study, children were divided into three groups, the standard false belief question group, a When question group, and a Before question group. Children in the standard false belief group were asked, "What did you think was in the box?" (i.e., they were asked about their previous false belief). Children in the When group were asked, "What did you think was in the box *when* the top was still on it?" and children in the Before group were asked, "What did you think was in the box *before* I took the top off?" The children were then asked the same questions about a friend who is brought into the room and asked to examine the candy box. The results showed that younger children (3-year-olds) were more successful (for self-attribution and other-attribution) with the "before I took the top off" question than with the other two questions. The authors explained these results as follows: "Before questions gives a clear indication of the experimenter's intention and enables the young child to understand the task at hand" (p. 1518). Such an explanation,

2 Similar stimulus control accounts of joint attention and social referencing—presumed precursors to ToM—have also been offered (e.g., Dube, MacDonald, Mansfield, Holcomb, & Ahern, 2004; Gewirtz & Peláez-Nogueras, 1992; Peláez, 2009).

however, is circular, in that the evidence for the explanation is simply the result to be explained. Nevertheless, the point of this example is to show that the phrasing of the question, as an additional source of stimulus control, can influence success or failure on the false belief test and, therefore, may offer a more parsimonious explanation of the performances of some subjects. In fact, Lewis and Osborne noted that there is significant variability within and across different studies using the false belief test depending on how the questions are phrased.

Before leaving this section, I should point out that the false belief task is not without its critics (e.g., Bloom & German, 2000; Lewis & Osborne, 1990; Salzinger, 2006). Salzinger, for example, pointed out that the rapid spread of the false belief task "raises a sociology-of-science phenomenon that is worthy of note." Salzinger asked, "What makes a particular experimental paradigm spread so rapidly? Is it because it is such a brilliant prototype, or is it the convenience with which one can use it with so many different populations to test so many varied hypotheses?" Bloom and German went so far as to argue that the false belief task should be abandoned as a test of ToM because the task requires abilities other than a ToM and, conversely, a ToM does not necessarily include the ability to reason about false beliefs.

ToM and Verbal Behavior

According to Ruffman et al. (2004), "There is now abundant evidence that false belief understanding in children is linked to their language ability." Therefore, we should not be surprised to find that many researchers have focused on the role of language in ToM. Obviously, a certain level of verbal fluency is necessary to make an inference about what another person might be thinking, in addition to predicting what he or she might do. This is because the inferences and predictions themselves are verbal responses evoked by the particulars of the situation, including questions by others. Thus, the science of behavior analysis may offer a more parsimonious account than traditional approaches of the verbal behaviors that lead some to speak of ToM. Unfortunately, behavior analysts have conducted little research specifically on ToM behaviors. Fortunately, however, much extant research on ToM supports a general behavior-analytic view that ToM behaviors are acquired as a result of contingencies embedded within the verbal environment.

For example, several studies show a positive correlation between early language development and later ToM abilities (e.g., Astington & Jenkins, 1999; Bretherton & Beeghly, 1982; Shatz, Wellman, & Silber, 1983). Not coincidentally, the verbal behaviors comprising a ToM begin to occur in about the second year of life. Other studies show a positive correlation between the child's verbal environment and the occurrence of verbal behaviors said to reflect ToM (e.g., Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Hale & Tager-Flusberg, 2003; Harris, de Rosnay, & Pons, 2005; Ruffman, Slade, & Crowe, 2002). For example, gains in language have been shown to be a predictor of preschoolers' ToM performance (Astington & Jenkins, 1999), as has the style of maternal language used with very young children, especially about what others think, feel, or would do in a particular situation (Harris et al., 2005). One study found that mothers' mental state utterances (e.g., "I think it's a cat," "I don't know whether it's a dog," "I wonder what that is? It could be a cat," including the use of a variety of emotion terms such as "happy," "sad,"

"feel," and physical state terms such as "cry," "smile," "hurt") were correlated with their children's mental state utterances and ToM (Ruffman et al., 2002). Another study compared children with varying conversational backgrounds, including native signing deaf children, oral (speaking and listening) deaf children, signing deaf children from hearing families, children with autism, and typical preschoolers, and found that a child's conversational experience was directly correlated with success on a variety of ToM tasks, including the false belief task. In particular, as already noted, typical preschoolers and fluent-signing and oral deaf children performed much better than children diagnosed with autism and signing deaf children from hearing families (Peterson & Siegal, 1999; see also Woolfe, Want, & Siegal, 2002). These results suggest not only that the amount of conversational experience is correlated with success on ToM tasks but also, in particular, that teaching children to explain others' behavior in terms of their mental states may account for the children's ability to predict the behavior of others. Of course, since another person's mental states are not directly accessible, children can only be taught to explain or predict a person's behavior in terms of public events that may correlate with that person's mental states (i.e., private events).

Some studies provide evidence that specific verbal training procedures can facilitate successful performance on ToM tasks (e. g., Guajardo & Watson, 2002; Knoll & Charman, 2000). The rationale for training children on ToM tasks is that such training, if successful, might illuminate the mechanisms of typical ToM development. Moreover, such a research strategy would be able to shed more light on possible causal relations involved in ToM than traditional cross-sectional or longitudinal studies (Knoll & Charman, 2000). For example, Knoll and Charman presented 3½-year-old children with false belief scenarios in both pictorial and three-dimensional formats in which the children were "asked to report a protagonist's currently held false belief relating to the location of an object, which was changed in the protagonist's absence" (p. 283). Following the presentation of each of the training scenarios, the researchers led discussions in which the children were asked questions about the events that had transpired leading up to the protagonist's false belief. According to the authors,

> The discussion questions were designed to encourage the children to consider and to explain the sequence of events that contribute to the entertaining of a false belief and what consequences false beliefs have on behavior. Namely, why did the protagonist behave in a manner inconsistent with his intentions, for example, looking in the empty drawer for his object? In Part B of the training, rather than focusing on explaining the protagonist's false belief guided behavior, the children were asked to predict the behavior of a protagonist currently holding a false belief. The children were led through the events of the false belief scenarios up to the return of the protagonist who was ignorant of the change of the location of the object. Up to this critical stage the protagonist's intention to keep the object safe in the initial location was highlighted in an attempt to focus on the physical events, which contribute to the entertainment of false beliefs. The children were then asked to predict where the protagonist would look for the object. (pp. 285–286)

As a result of the training, the children were able to pass the false belief task, but the skill did not generalize to related tasks, an outcome that might have resulted from inadequate training procedures. Nevertheless, these results suggest that verbal training can produce success on false belief tasks and may contribute to a ToM. Such results raise the question of just what kind of experiences allow typically developing children or fluent-signing deaf children to take the perspective of another person, that is, to respond correctly when asked about that person's perspective on the environment.

Behavior analysts have also contributed to the literature on teaching perspective taking. For example, using a multiple-baseline design across tasks, LeBlanc et al. (2003) taught perspective taking to three children with autism using video modeling and reinforcement. The researchers presented two tasks to the children, a false or unexpected-identity task and a hide-and-seek task. In addition, the researchers presented a false belief (Sally-Anne) task as a pre- and posttest. During testing sessions for each task, the participants viewed a video of an adult both correctly performing the task and explaining his or her strategy for doing so. The experimenter paused the video so that the child could respond to the perspective-taking question, and when the child did so, he or she was given praise or preferred edible items or stickers. Results showed that all three children eventually mastered the tasks, and for two of the children, the training generalized to the Sally-Anne posttest.

The problem of generalization in both the Knoll and Charman (2000) and the LeBlanc et al. (2003) study (for one participant) raises the question of the role of stimulus control and generalization in ToM tasks in experimental settings. Spradlin and Brady (2008) have suggested that the similarities and differences between the home setting of a child and the setting in which a false belief test is administered will determine success on such tests. As they stated, "Observation and descriptions of other people in similar situations and observation and descriptions of one's self in similar situations serve as the basis of accurate prediction on false belief tests" (p. 348). Indeed, many of the variables found to influence success on perspective-taking tasks in experimental settings, for example the phrasing of the questions, may represent differences in stimulus control between the typical social environments of the child and the test situation. Perhaps the broader range of such experiences in typical older children accounts for their better performance in research settings.

B. F. Skinner's ToM

Although the LeBlanc et al. (2003) study described above indicates that perspective taking, at least as defined in terms of the tasks measured, can be taught to children with autism, it sheds very little light on the learning experiences that result in perspective taking or a ToM in typical children. Ironically, Skinner (1945, 1953, 1957) may have provided the beginnings of an answer by describing how the verbal community teaches individuals to respond verbally to (i.e., label or describe) their own private events. The verbal community does this the only way it can, by relying on the public events that accompany the private ones. Once children learn to respond verbally to their private events, they are in a better position to infer others' private events in the same way, that is, by relying on public events that may accompany the private events. For example, we may say that someone is hungry if we know

that they have not eaten in a while or if they begin talking about food because our parents first taught us to say that we are hungry and perhaps to say that someone else is hungry in the face of such evidence. We are then taught to say (i.e., predict) that we or someone else will eat. Based on this analysis, being able to "reflect on the contents of one's own and other's minds" (Baron-Cohen, 2001, p. 174) or to attribute mental states to others may mean simply that a person can report on his or her own private events and then, based on the publicly accompanying events corresponding to that person's private events, can say what another person may be thinking (covert behavior), feeling (private stimuli), or about to do. As such, Skinner may have suggested a parsimonious account of the verbal behaviors said to constitute a ToM long before the construct became a meme (Schlinger, 2007).

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Appendix

Objectives

1. Who coined the phrase Theory of Mind (ToM), how did they define it, and how did they demonstrate it in what subjects?
2. What is problematic about most standard definitions of ToM?
3. What does success on most tests of ToM require and what has become "the acid test"?
4. Be able to describe the false belief task as first developed by Wimmer and Permer (1983) including why it is so named.
5. What does evidence suggest about who will and who will not succeed on the false belief task and what is the standard explanation and a more parsimonious explanation?
6. What does performance on the original false belief task hinge on?
7. How may failure on this task represent a fairly simple "example of stimulus control gone wrong"?
8. How does performance on the false belief task resemble performance on the A-not-B error as described by Piaget and why is the false belief task a more difficult task?
9. In general, what parsimoniously explains why children respond correctly on Piaget's A-not-B problem, as well as on the false belief task?
10. How might the phrasing of the questions on the false belief task affect a child's performance?
11. What kinds of evidence support the contention that ToM behaviors are acquired as a result of contingencies in a child's verbal environment?