

Supporting Theory of Mind Development

Considerations and Recommendations for Professionals Providing Services to Individuals With Autism Spectrum Disorder

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Theory of mind (ToM) difficulties represent a core deficit underlying the social, behavioral, and communicative impairments characteristic of autism spectrum disorders (ASD). This article provides a developmental perspective on ToM that can serve as a framework for understanding and addressing ToM deficits characteristic of individuals with ASD to assist in education planning. Popular methods for assessing ToM are reviewed and the use of social stories and comic strip conversations to facilitate ToM understanding is described in a case vignette, which provides preliminary evidence for the feasibility of this type of intervention for encouraging ToM development in children with ASD. Professionals who provide services to individuals with ASD are encouraged to incorporate assessment and intervention procedures that acknowledge the importance of ToM in their program plan and to consider the connections between ToM and communicative and behavioral functioning. **Key words:** *assessment, autism, intervention, social stories, theory of mind*

THEORY OF MIND (ToM) may be broadly construed as the ability to reason about the thoughts, feelings, and intentions of the self and others. Over the last 2 decades, ToM has become one of the most energized and prolific areas of research in the field of autism spectrum disorder (ASD). As a result, there is now broad consensus that there are autism-specific deficits in ToM. Indeed, individuals with ASD generally perform poorly compared with their age- and language-matched peers on tests designed not only to assess their ability to attribute false beliefs (Baron-Cohen, 1995) but also to infer others' beliefs and emotions in a variety of social and situational con-

texts (Happe, 1994; Perner, Frith, Leslie, & Leekam, 1989; Prior, Dahlstrom, & Squires, 1990). This has led some to argue for what is known as the ToM hypothesis of autism. From this perspective, ToM represents a core deficit underlying the social, behavioral, and communicative impairments characteristic of ASD (Baron-Cohen, 1995; Baron-Cohen, Leslie, & Frith, 1985).

Professionals in health and education (including speech-language pathologists, social workers, case managers, special educators, psychologists, teachers, and others) commonly provide services to individuals with ASD. Despite the theoretical importance of ToM, experience suggests that ToM is rarely considered in decision-making processes surrounding the health and education of individuals with ASD (e.g., when developing goals for therapy, drafting individual education plans [IEPs], or selecting measurable outcomes). Several reasons may account for considerations of ToM being overlooked.

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One reason undoubtedly involves heavy reliance on intensive interventions, such as applied behavior analysis (Lovaas, 1987), TEACCH language and communication curriculum (Watson, Lord, Schaffer, & Schopler, 1989), “Floortime” and the Developmental Individual Difference, Relationship-Based approach (Greenspan & Wieder, 1998), and Pivotal Response Training (Koegel & Koegel, 2006; Koegel, Koegel, & Carter, 1998). Each of these approaches has been evaluated as having some empirical support for remediating the behavioral, communication, and social deficits associated with ASD (National Research Council, 2001; Prelock, 2006). Other reasons that ToM-focused intervention may be overlooked involve difficulties surrounding the interpretation of results from traditional ToM assessments and a failure to develop interventions that support ToM development and more optimal social interaction routines among children with ASD.

Nevertheless, ASD-specific deficits in ToM continue to challenge providers, and they have important implications for behavioral, language, and social outcomes. The aim of this article is to provide a developmental perspective on ToM that can serve as a framework for understanding and addressing the ToM deficits characteristic of ASD within more traditional educational programming. Popular methods for assessing ToM are reviewed and a promising approach to facilitate ToM understanding is described in a case vignette. Recommendations are offered for professionals who provide services to children with ASD.

THE STUDY OF ToM

What is ToM?

Theory of mind has been widely used to describe a range of abilities inherent to the development of social understanding. Despite the common practice of focusing on particular aspects of ToM for describing knowledge or performance such as false beliefs, researchers largely agree that ToM is most appropriately conceptualized as a broad and

multifaceted construct (Astington, 2005). In a recent attempt to describe the breadth of ToM, Hutchins, Bonazinga, Prelock, and Taylor (2008) offered a candidate list of related constructs that may be subsumed under ToM or closely connected to it. These included the ability to engage in or understand false-beliefs, pretense, deception, desire and intention, appearance-reality and mental-physical distinctions, affect recognition and the causes of emotion, the notion that seeing leads to knowing, second-order thinking (e.g., understanding what Tiffany thinks Patty thinks), visual perspective taking, empathy, and the understanding and production of mental state terms and speech acts. To this list should be added, appreciation of humor, knowledge of the links between traits and behavior, understanding metaphorical and nonliteral uses of language, the distinction between lies and jokes, and the ability to engage in moral reasoning (Hutchins et al., 2008). Considering that this inventory is not expected to be exhaustive, it is clear that ToM is a term that “refuses to be corralled” (Astington, 2005, p. 6).

ToM development: Difficulties and considerations

Given the range of mental states and conceptual understandings embodied in the term “ToM,” charting its developmental course remains a topic of debate. To complicate matters, few studies have examined longitudinally the development of ToM of individuals with ASD. Holroyd and Baron-Cohen (1993) reported no change in false-belief task performance among 17 children with ASD over 7 years. Similarly, Ozonoff and McEvoy (1994) observed no change in false-belief or more advanced ToM abilities among 17 adolescents with ASD over 3 years.

In contrast, using a more sensitive developmental battery of ToM abilities, Steele, Joseph, and Tager-Flusberg (2003) observed significant improvements in ToM scores of fifty-seven 4- to 14-year children and adolescents with ASD over a 1-year span. Moreover, advances in ToM knowledge were represented

relatively equally across the age range surveyed, challenging the view that individuals with ASD show no improvements in ToM over time. Because individual variation characteristic of the autism spectrum far outstrips variation related to age, the development of ToM in ASD is tied not to chronological timetables but rather distinguished along dimensions of relatively early emerging, simple, or basic skills to relatively late emerging, complex, or advanced skills. This is evidenced most clearly in attempts to develop a range of ToM tasks (Happé, 1994; Hutchins, Prelock, & Chace, in press; Muris et al., 1999; Steele et al., 2003) as discussed further below.

For our purposes, it is important to describe current thinking about the general order in which certain aspects of ToM or ToM-related abilities emerge. Although this article deals with how to support the development of ToM of children with ASD, understanding typical ToM development can facilitate educational planning by determining what may be children's ToM strengths and challenges and identifying where children's functioning lies in relation to typical ToM achievements. This is not to say that the pathways and developmental processes operating in the development of ToM of typically developing children and children with ASD are equivalent. There is, in fact, accumulating evidence to the contrary (Frith, Happé, & Siddons, 1994; Happé, 1995; Tager-Flusberg, 2000). Nonetheless, the ToM challenges faced by individuals with ASD may be best understood, explained, and responded to through awareness of the form of typical ToM development.

Why false beliefs are not the whole story

Typically developing children are unable to attribute a false belief to another person until approximately 4 years of age, and this result persists after the effects of a number of task variables have been statistically removed (Wellman, Cross, & Watson, 2001). Although false-belief understanding represents an important component in the development of ToM and has generated much excitement and theorizing in the field, preoccupation with

false beliefs has obscured the importance of other ToM achievements (Carpendale & Lewis, 2006). This is evidenced by a tendency to describe earlier achievements as simple precursors or prerequisites foundational to the more sophisticated ToM characterized by false-belief understanding (Tomasello, 1995). In a related vein, investigations of the development of ToM in typically developing children beyond the age of false-belief acquisition are scarce (Barr, 2006). Thus, comparatively little is known about the development of mentalizing in middle and late childhood and adulthood (Happé & Winner, 1998). This gives the erroneous impression that few or unimportant ToM developments occur after the mastery of false-belief tasks and leads to descriptions of developmental timetables (Barr, 2006; Miller, 2006) that are artificially truncated.

ToM and language relations

Much empirical evidence exists that ToM and language competencies are strongly related in typically developing children, but even more so for children with ASD (Happé, 1995; Prior et al., 1990; Yirmiya, Solomonica-Levi, Shulman, & Pilowsky, 1996). It makes sense that language and ToM would be closely associated. Language provides the means by which children become aware of unobservable mental states, and successful communication requires an understanding of others' minds. The links between language and ToM are complex and are not, for the most part, theoretically disentangled in this discussion. It is appropriate to acknowledge, however, that developments in language are expected to parallel those in ToM because this has implications for ToM assessment and treatment planning.

Although the nature of ToM development has been debated (for a review, see Carpendale & Lewis, 2006), social constructivists emphasize the importance of guided participation and joint attention and argue that children acquire a ToM by internalizing the meanings that are co-constructed during language-mediated social interaction (Hutchins, Bond, Silliman, & Bryant, in press).

In accordance with this view, we conceptualize ToM development as a continuous and coherent process of social-cognitive development (Chandler & Hala, 1994) and reject the view that false-belief understanding is the most interesting or important ToM developmental milestone. Given the unwieldy number of studies in this area and the goals of this article, we describe some general trends in typical ToM development by selectively reviewing the literature most commonly cited to describe ToM development in young childhood while extending our description beyond 4 and 5 years of age. Developments in language are known to accompany developments in ToM, and these links and their implications for understanding ToM in ASD are elaborated upon when relevant.

ToM development in typically developing children

Early ToM development

Perhaps, the earliest manifestation of ToM develops around the 9th month of life and involves understanding intentionality or the ability to construe others as intentional agents who have concrete goals or motives, which drive their behavior (Tomasello, 1995). Although not without controversy, the understanding of intentions may be foundational to another skill that develops at around the same time—that is, the ability to participate in episodes of joint attention (Tager-Flusberg, 2000; Tomasello, 1995). Although gaze following, pointing, and the use of communicative gestures accompany and facilitate joint attention, it is not established when two persons merely coordinate their eye gaze. Rather, joint attention is established when each individual is aware of and monitors simultaneously the other's attention to an outside entity (Tomasello, 1995). This often includes shared enjoyment or shared affect (Prizant, Wetherby, Rubin, Laurent, & Rydell, 2004). The ability to establish and respond to bids for joint attention is involved in every aspect of ToM, from basic symbol learning, as evidenced in the acquisition of children's first

words, to the use of appropriate language in a range of communicative contexts. For example, the relatively advanced understanding of one's own utterances in the social and situational context is framed by a speaking partner's current knowledge and attention (Tomasello, 2003). Thus, an impaired ability to understand others as intentional agents and to participate in episodes of joint attention is believed to be causally linked to significant delays in language, which is a defining feature of ASD (Baron-Cohen, Baldwin, & Crowson, 1997; Tager-Flusberg, 2000).

The understanding that others can have desires different from one's own is typically demonstrated in toddlerhood. Repacholi and Gopnik (1997) showed that 18-month-olds are able to engage in behaviors to satisfy an adult's desire even when the desire conflicts with their own. Consistent with this observation, children at 2 years of age are able to communicate using desire-state terms (e.g., *want*) spontaneously and appropriately during conversation (Bartsch & Wellman, 1995).

By 3 years of age, children begin to make reference not only to desires but also to beliefs (e.g., *think*, *know*) in explaining action (Bartsch & Wellman, 1989; Wellman & Bartsch, 1988). This age is also characterized by an emerging ability to distinguish mental from physical entities. Thus, a child knows, for example, that an actual puppy and not a thought of a puppy can be fed, and, conversely, that a thought of a puppy and not an actual puppy can be transformed in size (Wellman & Estes, 1986). Around this same time, children also come to understand that seeing leads to knowing. For instance, most children can now understand that if one person lifts a box and another person looks inside a box, only the person who looked inside will know the contents of the box (Pratt & Bryant, 1990).

The traditional hallmark achievement characteristic of 4 years of age is the ability to consistently pass the standard false-belief and Smarties tasks (Wellman et al., 2001), which are described more fully in the subsequent text. A number of other ToM

accomplishments are usually demonstrated at this time, which undoubtedly contributes to the notion that this age represents a major ToM developmental milestone. For example, by asking children to talk about objects that have misleading identities (e.g., a candle fashioned to look like an apple), Flavell, Green, and Flavell (1986) demonstrated that this age is characterized by the ability to distinguish appearance from reality (e.g., by reporting that the apple-shaped candle *looks* like an apple but is *really* a candle). Age 4 also is cited as the age at which children can explain emotions on the basis of beliefs (Harris, Johnson, Hutton, Andrews, & Cooke, 1989), distinguish mental state (e.g., *think*, *dream*, *pretend*) from nonmental state (e.g., *run*, *jump*) terms (Baron-Cohen et al., 1994), and monitor and report on their own intended versus unintended outcomes (Phillips, Baron-Cohen, & Rutter, 1998). By age 4, children also begin to take an interest in and engage in deception (Sodian, Taylor, Harris, & Perner, 1992), although they do so rather clumsily and unsuccessfully.

Later ToM development

A more mature understanding of mind requires thinking about what other people are thinking (Carpendale & Lewis, 2006). This is known as second-order false-belief understanding, which is estimated to emerge between 5½ years (Sullivan, Zaitchik, & Tager-Flusberg, 1994) and 6–7 years (Perner & Wimmer, 1985) of age depending on the complexity of the task and the language used. Of course, mastery of even second-order false-belief understanding is not adequate. Sophisticated social understandings are more complex and involve, for instance, the knowledge that two people whose experiences are identical may nevertheless arrive at different interpretations. For example, two people who watch the same movie may have dissimilar interpretations of the plot or impressions of the characters.

In examining the ability to construe others as interpretive agents, Pillow (1991) demonstrated that between 5 and 8 years of age, chil-

dren generally understand that prior expectations and biases can influence interpretation of an ambiguous event, but it is not until 7 or 8 years of age that children can adequately justify their responses. Similar results exploring children's ability to attribute a variety of interpretations to others have been observed using ambiguous visual stimuli (Carpendale & Chandler, 1996; Lalonde & Chandler, 2002). In a related vein, 7–8 years of age is associated with the ability to understand humor on the basis of lexical ambiguity (McGhee, 1979). Consider the following joke: "Time flies like an arrow. Fruit flies like a banana." Although children 5 and 6 years of age usually demonstrate knowledge of the two meanings of the word *like* in isolation, they are unable to appreciate the humor in a pun such as this because, unlike 7- and 8-year-olds, they cannot negotiate the dual-word meanings simultaneously (Carpenter & Lewis, 2006).

Other aspects of social understanding involve the intimate connection between ToM and communicative competence. "Almost every aspect of pragmatics involves sensitivity to speaker and listener mental states, and hence mindreading" (Baron-Cohen, 2000, p. 13). Given the range of speech acts and the contexts (including physical, social, and situational contexts) in which they are embedded, tying communicative competence to specific developmental timetables for the present purposes is not helpful. The point here is that abilities to use language appropriately (e.g., to take turns or maintain a topic of conversation) and to understand language appropriately (e.g., to interpret metaphor and sarcasm) are viewed as relatively advanced skills that are contingent upon the understanding of others' minds within the larger context (Happe, 1995; Tager-Flusberg, 2000).

ASSESSMENT OF ToM

Traditional ToM assessment procedures

Assessment of ToM has been dominated by what has come to be known as the standard false-belief (Wimmer & Perner, 1983)

or Sally-Anne (Baron-Cohen et al., 1985) task and the Smarties task (Perner, Leekam, & Wimmer, 1987), which have come to serve as general markers of ToM competence (Astington, 2001; Wellman et al., 2001). The traditional false-belief task involves telling a story in which an object is moved from an old location to a new location without the knowledge of the main protagonist. The observing child is then typically asked either a thinking question (“Where does Sally think the chocolate is?”) or a looking question (“Where will Sally look for the chocolate?”) and a memory control question (“Where is the chocolate really?”). Children who answer the test question(s) with the new and incorrect location fail the task, whereas children who answer with the old and correct location pass the task, presumably by demonstrating their appreciation that others’ thoughts or actions are guided by a false belief.

Concern that the Sally-Anne task may be unnecessarily difficult because it does not directly involve the young child as a participant prompted the development of the Smarties task (Perner et al., 1987). The Smarties task involves presentation of a container that is revealed to hold surprising contents (traditionally a Smarties candy box that contains pencils). The child is typically asked a test question that requires predicting what a naive subject (i.e., someone who has not looked inside the box) will say or think is in the box along with a memory control question (“What is really in the box?”). Thus, the Smarties task is similar to the false-belief task in that it requires inference of another’s false belief, but it differs by involving the child more centrally as the protagonist who becomes aware of the unexpected contents.

Although false-belief and Smarties tasks (and their variants) are the most commonly employed indices of ToM, tasks have been developed to tap other aspects of mental state understanding such as those described above (e.g., the mental-physical distinction, the notion that seeing leads to knowing, and the appearance-reality distinction to name just a few). Thus, a variety of assessment proce-

dures exist for evaluating a range of ToM competencies (for a review of additional selected methodologies, see Baron-Cohen, 2000).

One limitation relevant to this discussion inherent in each of these procedures may be best illustrated through examination of the false-belief task, which has been the most widely used, but also most scrutinized, measure. False-belief task performance is traditionally assessed on a dichotomous pass-fail basis, leading to the impression that ToM is something that one does or does not have. That is, the ToM literature “often equates performance on a false-belief task to the presence or absence of a theory of mind, reducing what should be a rich, complex, unfolding mentalistic conception of people to a categorical capacity” (Tager-Flusberg, 2001, p. 178). In fact, much previous research has shown that although more able individuals with ASD and Asperger’s disorder often pass first- and second-order false-belief tasks, they nonetheless demonstrate ToM deficits in more naturalistic situations (Happé, 1995; Klin, 2000). Theory of mind is most appropriately conceptualized as lying on a continuum of competence, and the inability of false-belief tasks to quantify developing competency often masks ToM deficits (Klin, 2000) or abilities (Tager-Flusberg, 1999).

Alternative ToM assessment procedures

To address concerns associated with traditional ToM assessment procedures, researchers have developed procedures designed to tap more advanced ToM skills. For example, the “Strange Stories” task (Happé, 1994) was designed to assess the understanding of story characters’ thoughts and feelings through identification of several pragmatic functions (e.g., lying, joking, pretending). More recently, Baron-Cohen, Wheelwright, Hill, Raste, and Plumb (2001) have refined an advanced ToM measure intended to assess the ability to read thoughts and feelings as evident in the appearance of the region of the face surrounding the eyes. This test has been described as a measure of social sensitivity that is one index of how well one can “tune in”

(Baron-Cohen et al., 2001, p. 241) to the mental states of others.

Researchers also have recognized the need for task batteries that assess different components of ToM across levels of complexity on the basis of the rationale that a broader range of tasks allows for more sensitive measurement of ToM ability (Hutchins, Prelock, et al., in press; Muris et al., 1999; Steele et al., 2003). For example, Steel et al. (2003) developed a ToM task battery for assessing the development of ToM of verbal children and adolescents with ASD. The battery progresses from “early” to “basic” to “advanced,” with tasks designed to capture ToM at each level. Mastery of the early level is judged on the ability to engage in pretend play and predict action based on a character’s explicitly stated desire. Basic-level competence is credited when a child demonstrates understanding that seeing leads to knowing, as well as by the ability to pass false-belief and Smarties (what they call an “unexpected contents”) tasks and engage in episodes of deception. Finally, skills reflecting advanced levels of ToM understanding include second-order false-belief understanding, understanding the distinction between lies and jokes, and the ability to predict behavior on the basis of personality traits and engage in moral reasoning. In a similar effort to tap aspects of ToM representing a range of content and complexity, Hutchins, Prelock, et al. (in press) developed a task battery that can be used appropriately and reliably with verbal or nonverbal individuals with ASD. The skills tapped range from easy tasks, such as recognition of emotion, to difficult and complex tasks that require second-order false-belief understanding.

Theory of mind task batteries are important because they reflect growing recognition that there is more to ToM than false-belief understanding and because they have the potential to highlight the specific ToM strengths and challenges that an individual brings to the social problem-solving situation. Of course, task batteries have their limitations as well. As on the false-belief task, performance on more comprehensive batter-

ies may be influenced by attention, memory, linguistic, motivational, and situational factors (Tager-Flusberg, 1999). The impact of these shortcomings varies with the individual and the assessment procedures employed. To avoid these shortcomings, Hutchins et al. (2008) developed a psychometrically sound informant measure (see brief description of the *Perceptions of Children’s Theory of Mind Measure* [PCToMM] in the case vignette described in the subsequent text), which is appropriate for evaluating a range of ToM competencies among ASD individuals who are functioning at verbal and preverbal levels. This tool is particularly attractive because it takes advantage of the persons in the child’s life who know the child best (Hutchins et al., 2008). Although there are notable exceptions (Hutchins & Prelock, 2006), combining quantitative and qualitative approaches to ToM assessment is rare in the ToM literature, which has been highly empirical and theoretical and concerned with group performance and issues of experimental control. However, when considering evaluation and intervention for individuals with ASD, there is a need to complement a selection of more traditional tasks, such as those described above, with qualitative and observational data. These data are important for developing a fuller understanding of the ToM competencies of the individual in question. Not only do they acknowledge the value of collaborative efforts among families and professionals (Crais, 1993; Diehl, 2003) but also, they are natural choices for parents and professionals who have opportunities to gather and reflect on the information such data provide.

In our own work to support the development of ToM of individuals with ASD, we have found a variety of qualitative assessment methods to be useful. These include, but are by no means limited to, two related approaches: (a) observation during naturalistic activities and routines and in more formal and structured testing situations and (b) triangulation to seek the impressions of parents, educators, and other professionals who know the individual best. Because the presence of an

observer may influence behavior, contexts (e.g., the home, playground, classroom, or therapy room) in which the observer (e.g., the parent, the educator, or the therapist) is typically a functioning member of the activity provides an excellent perspective from which to observe behavior in situations that matter to children (Brinton & Fujiki, 2003, p. 167). Parents and professionals have numerous opportunities to observe children's social functioning and form impressions about the nature of children's underlying ToM capacities. In line with this perspective, parents have been found to be remarkably accurate in predicting their children's performance on a series of ToM tasks that require different forms and degrees of understanding of others' mental states (Hutchins et al., 2008). Because parents and professionals typically observe children in different physical settings and communicative contexts, it is preferable to recruit multiple observers (representing multiple disciplines) to contribute to the ToM assessment process and treatment planning. Triangulation of this kind "not only demands seeking different voices, it also requires valuing each of those voices" (Brinton & Fujiki, 2003, p. 167). Such recognition is particularly welcomed from an interdisciplinary perspective in which professionals pool their expertise to better suit the needs of children.

TEACHING ToM

Initial efforts to teach ToM were primarily concerned with whether children could be taught to pass traditional false-belief measures. For example, early studies in this area essentially administered multiple trials and incorporated explicit feedback and teaching of principles (e.g., that seeing leads to knowing), which were believed to be foundational for an understanding of false beliefs (Hadwin, Baron-Cohen, Howlin, & Hill, 1996; Ozonoff & Miller, 1995). Although children with ASD could be taught to pass false-belief tasks, effects of teaching did not generalize either to transfer tasks or to more meaningful and spon-

taneous behaviors. This suggested that participants were generating and applying nonmentalistic rules to pass tasks, as opposed to developing a genuine understanding of others' mental states.

Taking another tack, others have evaluated the use of a "picture in the head" strategy to train ToM to children with ASD (McGregor, Whiten, & Blackburn, 1998; Swettenham, Baron-Cohen, Gomez, & Walsh, 1996). For this method, photographs representing the content of beliefs (including false beliefs) are slotted into a mannequin's or a doll's head to make explicit the contents of another's mind during false-belief tasks. Using a different pictorial analogy, Wellman et al. (2002) explored the usefulness of "thought bubbles," such as those that appear in comics and cartoons, to train ToM. Using these approaches, it was found that children with ASD could understand and make use of the strategy; however, training was usually associated with only modest generalization to transfer ToM tasks. More importantly, transfer tasks were remarkably similar to the training tasks in administration and content and none assessed children's functioning in naturalistic settings in which the problem surrounding the target mental state was not explicitly created and defined.

In summary, previous efforts to teach ToM to children with ASD have failed to demonstrate generalization, particularly in novel social situations that would constitute most real-world applications of ToM knowledge. Several ToM training studies with typically developing children have also focused on a similar narrow set of outcomes operationalized by false-belief task performance. However, research in this area has been useful for identifying factors in typical development that are associated with ToM advances. These factors include more social and pragmatic variables and suggest that rich discourse incorporating explanations of others' mental states facilitates ToM understanding (Appleton & Reddy, 1996; Clements, Rustin, & McCallum, 2000; Guajardo & Watson, 2002). It is important to remember, however, that what works with typically developing children may not work for children

with ASD. The hallmark impairments in language and social cognition among children with ASD have traditionally made this kind of explanatory approach exceedingly unfeasible.

A few possible reasons exist why results from previous efforts to teach ToM to children with ASD have been so disappointing. Chief among them is that they have not focused on what is relevant, motivating, and meaningful in children's lives. Similarly, they have neither been tailored to suit the strengths and challenges of the child in question nor been concerned with clinical insights that have the potential to inform assessment and intervention efforts.

In what follows, we describe the case of a 5-year-old boy named Zach (pseudonym), who is a participant in an ongoing, large-scale, and experimentally controlled study to examine the efficacy of a specific intervention for remediating the core deficits of ASD (Hutchins & Prelock, 2008). Zach's inclusion as a research participant in this study required the use of fixed data collection procedures (described in the subsequent text). Given his strengths and challenges and the priorities of his family and the professionals who worked with him, Zach's case was selected for description here because the assessments and intervention ultimately implemented would be fitting choices in a clinical setting that allowed for great flexibility. Zach also represented a classic case of autism and presented special challenges to our efforts to support his ToM development, making his case most illustrative.

ToM INTERVENTION

Learning about the child and the family

Sound clinical judgment requires enough knowledge about the child's functioning to tailor intervention goals and methods to the child's specific needs. To learn about the child and the family, a detailed personal history was first conducted to understand the nature of the child's current educational setting, as well

as parents' access to and participation in support services. To more fully comprehend the child's functioning in home and school contexts, the child's parent(s) and primary educator(s) participated in in-depth semistructured interviews. Both were asked to reflect on social situations in which the child demonstrated inappropriate behaviors, experienced communicative challenges, and appeared to fail to understand others' thoughts, feelings, and perspectives. As an example, when gathering information about their children's communication challenges, it was explained to parents that children with ASD often experience difficulty asking questions, greeting, initiating/maintaining topics of conversation, etc. Parents were asked to identify a communication skill they would like to see increase in their children. Once they identified a desired communication skill, they were asked to identify specific situations in the home when challenging communication events occurred, who was usually involved, what was said, how their children responded, and what they would like to see happen. This information provided the context for writing a social story for children. Similar information was gathered about each child's problem behaviors and impairments in perspective-taking abilities. Interviewees also were asked to identify their children's strengths and strategies or accommodations that may help children to be more successful in social situations, along with the parents' priorities for intervention.

As stated previously, professionals working with children in other settings also may develop valuable insights and impressions of the children's functioning. A review of relevant and available records (e.g., IEPs, diagnostic evaluations) was therefore conducted to learn about the impressions and clinical recommendations of other professionals involved (e.g., pediatricians, social workers, speech-language therapists, physical and occupational therapists, and psychologists). Finally, standard tests were administered to assess children's social, communicative, and ToM functioning. All of these components are

described in greater detail in the following sections.

Zach

When we met Zach, he was a verbal 5-year-old who had been diagnosed with ASD a few months earlier by a developmental pediatrician. Zach was an only child who lived with his birth parents. He attended an Essential Early Education program (services for children 3–5 years of age) and received services from a special educator three times per week, adaptive physical education once per week, and speech–language therapy three times per week, which focused primarily on communication skills and speech production. He also received one-on-one support for social interactions three times per week.

Interview

When asked to reflect on problem behaviors, communicative challenges, and perspective-taking deficits, one theme dominated interview comments made by Zach's mother and his special educator. Both reported that Zach would often become defiant and aggressive at home and at school and agreed that this behavior represented a clear priority for intervention. They further explained that aggressive behaviors were most likely to occur in situations in which "things don't go the way he wants" and associated with rigidity and difficulties surrounding transitions between activities or a change in plans. Zach's mother and his special educator offered some examples they had recently observed. For instance, his mother reported that when the family went out to dinner a few days earlier, Zach learned that the restaurant was out of apple juice, which was contrary to his desire and expectation. Zach attacked the waitress and tried to hit her saying "You're bad." At school, Zach often enjoyed riding on a small yellow scooter at recess. When the scooter was unavailable, he would lunge at his teachers or other children, grab things and throw them to the ground, or hit, scratch, or kick others while yelling things such as "you are mean" or "you go away." Similar

behaviors were noted when either slight or considerable changes in routine were introduced in the school setting; for example, when exiting through one door rather than another or when the fire alarm at the school was sounded.

Strategies to support Zach's ability to transition from one activity to the next more successfully at home and at school included regular reference to picture schedules of the day's activities and frequent breaks to allow Zach to calm down, count to 10, or take a few deep breaths. He was also encouraged to "use his words" to talk about his thoughts and feelings and told firmly that his aggressive behaviors were "not okay." In the school, social stories (about how to play nicely and ask for toys) were developed and read to Zach, but his mother and teacher reported that they were not used enough. Unfortunately, all of these strategies were characterized as generally ineffective, with fluctuations in effectiveness attributed mainly to Zach's state of mind and whether he was having a "good day or a bad day."

Zach was described as a sensitive and affectionate child who strived to please his parents. One of Zach's greatest strengths was his frequent remorsefulness following his tantrums. He would become tearful and sorrowful following outbursts at home. He could also reliably forecast his mother's approval on one of his "good days" at school when he was eager to share with her how he "didn't throw a fit" for which he received great praise, affection, and high-fives.

Record review

According to a record review, results from a battery of standard tests conducted at an initial evaluation by a social worker, a psychologist, and a developmental pediatrician revealed scores on measures of verbal and nonverbal intelligence that fell almost 1 *SD* below the mean. Of greater concern, however, were suspected significant impairments in social/emotional and behavioral functions. On the basis of informal observations and consistent with the testimony of his mother

and special educator, Zach's aggressive behaviors were characterized as "willful," "oppositional," and "explosive," particularly in novel situations or those requiring adjustment and transitioning. He also engaged in avoidant behaviors such as crawling under the desk, attempting to leave the room, and using fleeting eye contact. Notably, Zach demonstrated some recognition that his difficult behaviors affected his parents, although he seemed unable to communicate accurately these mental states. For instance, following a tantrum, he vacillated in his comments about his parents' probable emotional reactions, stating that "Dad gonna be angry" and conversely "Dad gonna be happy."

ToM assessment

Measures administered to gain insights into Zach's ToM functioning included a parent-informant ToM measure (i.e., the PCToMM; Hutchins et al., 2008) and a ToM task battery (Hutchins, Prelock, et al., in press), both of which were designed to assess ToM skills across a range of content and complexity. The PCToMM was administered first. For the PCToMM, an informant is asked to read several statements and indicate the level of his or her confidence that the target child possesses a particular understanding (e.g., "My child understands that when people get what they want, they will be happy"). Items that scored lowest (i.e., ranked by Zach's mother as "definitely not present") reflected the areas of ToM functioning related to understanding that seeing leads to knowing, intended versus unintended outcomes, false beliefs, second-order thinking, and speech acts (e.g., white lies, deception). Items that scored highest (i.e., ranked by Zach's mother as "definitely present") reflected the ability to appropriately use desire terms (e.g., *want*) and identify emotional expressions (e.g., happiness).

The ToM task battery of Hutchins, Prelock, et al. (in press) consisted of a series of test and control questions across several tasks that progressed generally from easy or basic (e.g., emotion recognition and desire-based emotion, which is the understanding that people

will be happy if they get what they want) to difficult and complex (first- and second-order false-belief understanding), with several degrees in between. Zach was able to maintain attention during this activity with minimal difficulty. Zach passed almost all of the control questions, thus demonstrating sufficient executive and linguistic skills to perform the tasks. That is, he could understand the language used and recall relevant details on even the longest and most complex tasks in this battery. Therefore, it was revealing that Zach failed all but the earliest ToM test questions, which represented the easiest items in the battery. In line with his mother's evaluation of his ToM abilities, he was able to identify emotions on the basis of their visual characteristics (albeit inconsistently) and understand situation-based emotion (i.e., that a boy would be angry when someone did something that he did not like) and desire-based emotion (i.e., that a girl would be happy if she got what she wanted). At the same time, he was unable to pass the more advanced seeing-leads-to-knowing, false-belief, and second-order reasoning tasks, also consistent with his mother's evaluation of his ToM deficits.

In conclusion, the findings from these two ToM measures converged to present a portrait of Zach's ToM development that was consistent with the earliest abilities that emerge in typical development such as the ability to engage in joint attention and understand how desires are (or are not) satisfied. Skills developing around and later than age 3 were not demonstrated. This is not to say that Zach's understanding of others' minds was functionally equivalent to that of a 3-year-old, but the patterns of performance were interpretable in light of typical developmental timetables. They also revealed areas of relative strength and weakness to be considered when designing intervention.

Social stories and comic strip conversations

As noted previously, Zach was a participant in a larger study that was designed to assess the efficacy of an intervention for remediating

the core deficits of ASD. Of particular interest to the current discussion were our attempts to support his ToM development using social stories and comic strip conversations (CSCs; developed by Gray, 1994a, 1994b, respectively). Social stories are short stories developed to help the child reflect on social situations and inform and advise the child on how to be more successful. Social stories are presented in a storybook format and incorporate reading as a major part of the activity (for detailed information on writing effective social stories, see Gray 1995, 1998; Gray & Garand, 1993; Hutchins & Prelock, 2006). Comic strip conversations are similar to social stories because they are both visual systems designed to support the understanding of social situations, but CSCs differ from social stories by relying more heavily on the child who co-constructs (most often by drawing and writing) the conversations.

Social stories and CSCs are designed to minimize factors during social interaction that may be confusing to children with ASD because of impairments in ToM and the more general tendency to engage in detail-focused processing at the expense of global and contextually meaningful processing (Gray, 1998). Social stories and CSCs highlight missing social information, which “establish *social understanding* as an integral and prerequisite component to teaching social skills” (italics added, Gray, 1998, p. 169). Furthermore, they are in line with what is considered best practice for working with children with ASD. For instance, they make use of the visual mode, which is typically an area of strength of children with ASD, and they are written from children’s perspective so that they draw on experiences that are personally relevant and potentially motivating to the child (Gray, 1995, 1998).

Although previous research has documented the efficacy of social stories for decreasing specific inappropriate behaviors (Norris & Dattilo, 1999; Kuttler, Myles, & Carlson, 1998; Swaggart, Gagnon, Bock, & Earles, 1995), evidence is just beginning to emerge suggesting that the use of social sto-

ries and CSCs can be powerful for advancing ToM development (Hutchins & Prelock, 2006). This has important implications because increments in children’s ToM have been associated with more appropriate social and communicative behaviors that can generalize to socially valid outcomes in a range of situational contexts (Hutchins & Prelock, 2006).

Individualizing the intervention

Interviews with Zach’s mother and special educator, reviews of evaluations conducted by a social worker, a psychologist, and a developmental pediatrician, and our own observations of Zach during low- and high-structured testing situations revealed remarkable convergence in assessment. In particular, frequent concerns were raised regarding Zach’s aggressive behaviors, and all parties identified this as a priority for intervention. Thus, remediation of these behaviors was seen as critical to building a successful educational program. Given the frequency and explosiveness of Zach’s tantrums, as well as the diverse situations in which they occurred, we sought to promote Zach’s understanding of the causes and consequences of his own and others’ mental states in hopes of remediating this behavior.

Zach’s social story

Gray (1995) and Gray and Garand (1993) suggested that sentences in a social story be descriptive, perspective, or directive, although sentences in social stories are sometimes categorized using slightly different coding schemes. Zach’s social story comprised several descriptive sentences to provide information about the relevant context and define the setting, people, or activities. Multiple perspective sentences were incorporated to explain the causes and consequences of his tantrums in terms of his own and others’ mental states (e.g., “It makes my mom and dad sad when I throw a fit”). To elaborate on these perspectives, we borrowed from Gray’s description of “thinking stories” (Gray, 1994b) and included “thinking” sentences, which make explicit the thoughts and

feelings of others (e.g., “They might think ‘I wish we could make Zach happy’”). Directive sentences were also included to advise Zach how to avoid tantrums by offering him more socially acceptable behavioral alternatives (e.g., “If I get scared or mad or disappointed, I can use my words to talk to my mom and dad”). In striving to ensure that the language used was meaningful to Zach and responsive to his language level, Zach’s mother reviewed and edited the social story. The social story also was designed to capitalize on Zach’s ToM competencies, which included the ability to engage in joint attention, recognize some facial expressions, and understand situation- and desire-based emotions. Each sentence in the social story was presented on a separate page, with accompanying color illustrations. Zach’s social story is presented in the Appendix.

Zach’s comic strip conversations

Comic strip conversations incorporate drawing, writing, and conversation as major components of the activity, and they use a basic set of symbols (e.g., talking and thinking bubbles) to make explicit what people say and think. The use of CSCs is a dynamic intervention process that allows a child to revisit and elaborate on a recurring problem, highlighting the talking and thinking around different events that lead to behavioral responses and perspective-taking challenges. As Gray explained:

Good opportunities for [comic strip conversations] include situations that are causing difficulty, explaining the responses of others, or preparing for a new situation or unfamiliar event. The content of a conversation is simultaneously illustrated, guided by carefully selected questions that assist a student in sharing information. Each [comic strip conversation] systematically identifies what people do, say, and think. (1998, p. 183).

For Zach, a previous CSC was revisited and elaborated on some days, whereas the need for a new situation was identified by Zach or Zach’s mother on other days. The specific topics of the comic strips surrounded a limited number of settings (e.g., restaurant, doctor’s

office, home) and situational contexts (e.g., no apple juice available at a restaurant, visiting the doctor, losing while playing a board game, or missing a favorite TV show). Each topic was revisited several times over the course of the intervention. An example of one of these CSCs is presented in Figure 1. Because evidence supports the practice of repeated presentations of social stories and CSCs for establishing new and more appropriate social interactions (Hutchins & Prelock, 2006), these were presented to Zach a total of 15 times over the course of 5 weeks (approximately three times per week) by the first author in the family’s home.

Evaluating the effects of intervention

A simple ABA design with a 6-week follow-up was used to assess the effects of intervention. Brief individualized diaries were developed to obtain the mother’s daily and general impressions of the specific behaviors and social understandings targeted in the social story and CSCs. Specifically, Zach’s mother rated her general and subjective impression regarding change by indicating the degree to which she agreed with several statements on a 10-point Likert-type scale anchored by “strongly disagree” to “strongly agree.” The effects of this particular intervention could be reflected in at least three different outcomes. First, effectiveness could be evident in a reduction of aggressive and violent behaviors. We characterized this as the ability “to stay calm” when things did not go the way Zach wanted, when there were unforeseen changes, or when he was required to transition to a new activity. Thus, Zach’s mother was asked to respond to the statement “Based on my judgments today, Zach is able to stay calm in these situations.” Second, effectiveness could be evident in an enhanced ability or tendency to talk about the distressing event, which was one of the strategies emphasized in the social story and CSCs. Zach’s mother was asked to respond to the statement “Based on my judgments today, Zach is able to use his words to talk about these situations more appropriately.” Finally, we were

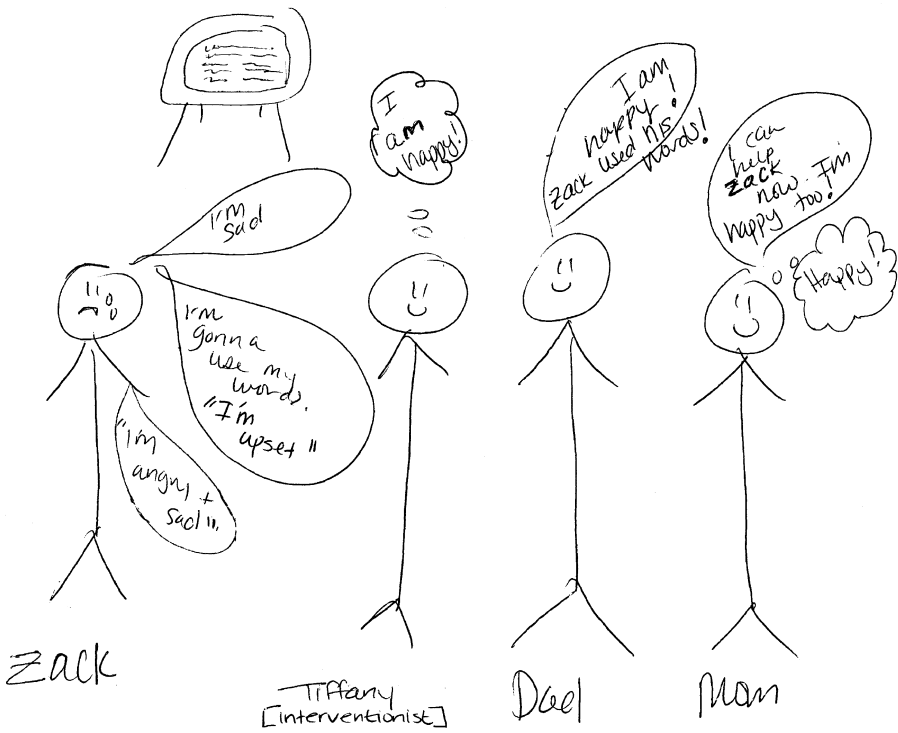
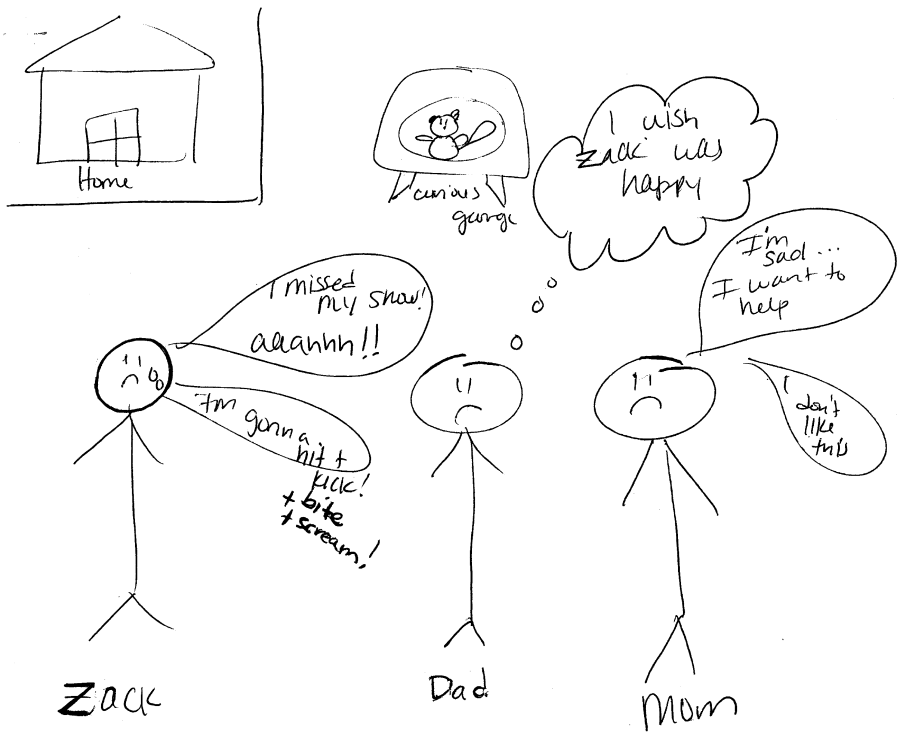


Figure 1. Zach's comic strip conversation.

interested in impressions of Zach's mentalizing ability, which are believed to underlie his social and communicative behaviors. Thus, Zach's mother was asked to respond to the general perspective-taking question. In recognition that such a question could be interpreted with wide variation, the question was phrased as follows:

Based on my judgments today, Zach is able to perspective-take. That is, based on my judgments today, Zach is able to understand that other people have thoughts and feelings that are different from his own. This can be a difficult question to answer. Remember, we are asking for your overall or most general feeling in relation to what you have observed today.

If no opportunities arose to form impressions about the content of the statements on a particular day, Zach's mother was instructed to select a "don't know" response option, which was treated as missing data. She also was encouraged to report any information that would be helpful for understanding the nature, context, and frequency of the behaviors that were relevant to the targets of intervention.

Findings

The ratings of Zach's mother on the outcomes across ABA phases of the study are presented in Figure 2. Clear baseline stability is evident for all three outcome measures. On the 11th day of the intervention phase (at which time the social story and CSCs had been presented five times), change in a therapeutic direction is evident in Zach's mother's subjective ratings of Zach's ability to stay calm and use words to talk about difficult situations. Although there are fluctuations in daily performance (as would be expected), marked changes in level and slope are clear between baseline and intervention phases of the study. High ratings during the 6-week withdrawal phase are maintained and show even more improvement with less variability and more consistent ratings in the higher range. With regard to ratings of Zach's generalized perspective-taking abilities, reliable increases in ratings are

not seen until the final weeks of the withdrawal period during which a modest but consistent rise in slope is evident.

We also asked Zach's mother to elaborate on her quantitative ratings by recounting anything that was different or interesting about her son's behavior, communications, and social understandings, and she provided these on a highly regular basis. These qualitative reports (see Table 1 for selected examples) are important because they reveal more about the nature of the effects associated with intervention. Notable was Zach's nascent ability to use language to negotiate difficult situations. According to maternal reports, Zach was able to engage with others more frequently in significant discussions about his own and others' thoughts and feelings, as well as the causes and consequences of these. Moreover, he did so in multiple settings with a variety of interlocutors (i.e., peers, teachers, parents). Although Zach's emotional reactions remained intense, they were not accompanied by violent and potentially injurious outbursts as they had been. To his mother's surprise, he would now cry and seek dialogue. Not only was this "more manageable" for his mother, but it was also a means for coping that provided opportunities for the language-mediated social interaction so important to the development of ToM.

DISCUSSION

Although we have emphasized the importance of supporting the child's ToM, it is difficult to disentangle the direction of effects between increased use of dialogue and ToM development and to remove the potential bias introduced by Zach's mother's knowing that he was receiving the experimental treatment. Examination of trends in the quantitative maternal ratings reveals that increases in the ability to talk about difficult situations precede later occurring (and modest) ratings of enhanced generalized perspective-taking abilities. These findings are consistent with interpretations offered by previous researchers (Dunn, Bretherton, & Munn, 1987; Dunn,

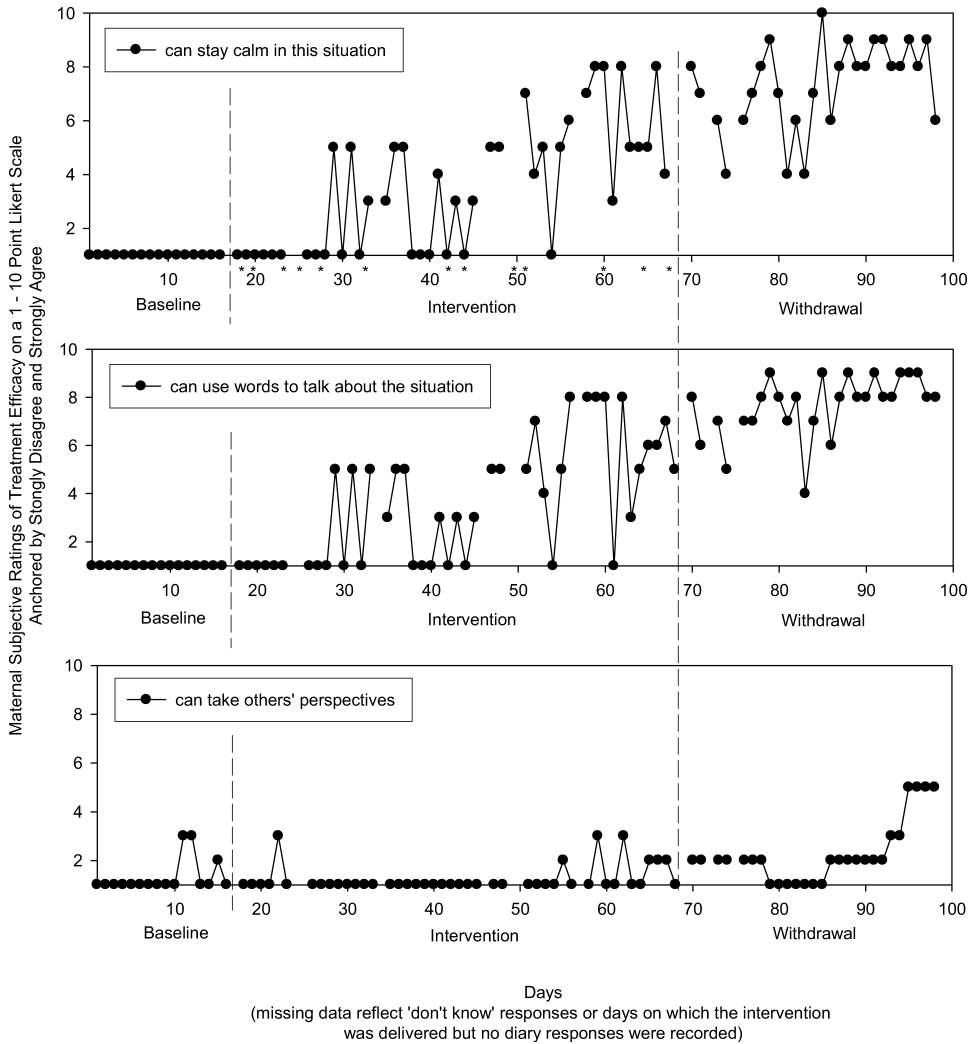


Figure 2. Maternal subjective ratings across A (baseline), B (intervention), and A (withdrawal) phases of study for three outcomes (i.e., being able to stay calm in this situation, being able to use words to talk about the situation, and being able to take others' perspectives). *Days on which the intervention was delivered are noted on the top figure only.

Brown, & Beardsall, 1991; Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996) that the ability to engage in discussions about the causes of mental states across diverse physical, social, and situational contexts may be of special importance in the development of ToM. This discussion works to focus attention on mental processes and thus foster a greater sensitivity to the existence and nature of mental states. On the other hand, the content of the social story and CSCs may have

led to shifts in ToM understanding, which, in turn, facilitated communicative changes. In this case, the lag in perspective-taking ratings might simply reflect the fact that it is through these kinds of communicative exchanges (and over time) that a parent informant becomes aware of the mentalizing ability of the child. As noted in this article's introduction, it may be most appropriate to conclude that these relationships are not strictly unidirectional but rather are dynamic and transactional,

Table 1. Examples of maternal comments regarding child's behaviors by day (see Figure 2)

Day	Comments
29	Usually Zach has a major fit (screams, bangs on the PC with hands) when playing games on the PC. Today Zach came to me and told me he was upset and "angry." He did this three times! Yeah!
31	Played "chutes and ladders" and "Candy Land" with Zach. He was very excited about playing. He said that he was going to "follow the rules" and "not have a fit." I actually had a nice time playing a game with him. We had no problems.
35	After a bad morning, we went out for a hike. We were not able to get our usual spot on the trail. We had to drive to a new trail. Zach was very cooperative and flexible, more so than usual in a situation where the routine changes.
37	Zach asked for help again with his computer instead of having a tantrum. He was having trouble with his train program and came and got me for help.
43	Played games with mom and dad today. A little different with the three of us. Zach lost one game and cried. He asked to play again. I was surprised he cried but very proud of him for not lashing out at me or dad and not throwing a fit.
50	Asked for help to fix a train track set up that wasn't coming together for him easily. He didn't get upset about the pieces not fitting together. He helped me change it so that it would work.
52	Played outside. Zach usually plays in the backyard and deck. Unable to do that today (beehive). He followed directions and stayed in the front. No problems. I notice over the last few days that Zach still gets upset in situations; however, he seems to cry more instead of lashing out and trying to hit or break things.
54	Zach got a haircut today. It is usually a very upsetting experience for him; however, he didn't lash out or hurt anyone or anything. He cried and was upset, but his behavior was much more manageable.
55	Played with classmate today. Followed her lead with play choices. Did have a tantrum over his schedule at school, but was able to talk about it and move on.
58	Zach walked on the nature trail with class. He was promised he would cross two bridges, but they were flooded. He wasn't able to cross them. He screamed but then talked about why he was upset and talked about ways to fix the bridges.
63	Half day at school. Even though Zach knew what was going to happen, he still became very emotional and upset. He was <i>not</i> aggressive but very upset.
66	Able to calm down at school with help. Spilt milk on himself and calmed down and listened to his friends who said it was OK.
71	Altercation at school with two other kids. They weren't doing what Zach wanted to do. Zach imposed a self time-out, calmed down on his own, and returned to play with the same kids.
73	Tough day with Zach. Easily upset with everything today (games, toys, even meals). <i>Not</i> physically aggressive though.
77	Was tested at school today (had to demonstrate some fine motor skills). Had some frustrations. Talked about it. Finished the test.
78	Played outside with classmates. Followed their lead. Played chase. Did what they wanted to do. Didn't control play or get upset. He comes to me when he is upset with games/play saying "I'm angry" and asks for help.
81	Very upset about a situation where we were not able to follow Zach's plan. He was very willing to talk about it afterwards and make a new plan.

(continues)

Table 1. Examples of maternal comments regarding child's behaviors by day (see Figure 2) (*Continued*)

Day	Comments
85	Better at remaining calm in most situations in general. Dropped lunch tray at school—food everywhere—remained calm. Helped pick up food and asked for another tray. No problems.
89	Surprise visit from a friend today. Zach did great. Some problems with toys, but he came and asked for help.
93	Zach was upset with some kids in class choosing sand table to play instead of doing what Zach wanted. Zach talked about it with aid in hall and calmed down and rejoined the class for the rest of the afternoon. Also played musical chairs with class when the game got too much for him, he asked to leave and remained calm.

underscoring the importance that “the two not be treated as competing hypotheses but rather complementary accounts” (Astington, 2001, p. 686)

Our intervention with Zach produced preliminary evidence that intervention using social stories and comic book conversations can achieve clinically meaningful changes across a range of real-life contexts with a child with ASD. Although the observation of a single case and our use of ratings from an informant who was not blind to her child's treatment status (including the time at which the intervention phase of study began) limited our ability to rule out threats to validity (e.g., maturation, history, response demands, observer bias, placebo effects), the results are consistent with the notion that social stories and CSCs may have potential for advancing behavioral and cognitive development. The fact that the mother's ratings in the daily diaries were supported by her anecdotal elaborations and justifications of these ratings (see Table 1) lends further confidence to the interpretation that observable changes in Zach's behaviors were associated with the intervention. Although research is needed to clarify whether the intervention was responsible for these changes, we suspect that social stories and CSCs may be particularly effective because they are specifically designed to give individuals with ASD explicit social information (Gray, 1994b).

Unlike previous attempts to teach ToM that describe alternative, artificial, or compensatory pathways to ToM that serve as “prosthetic devices” (Wellman et al., 2003), social stories and CSCs arguably facilitate access to the processes believed to operate in the typical development of social understanding. The primary difference may involve the fact that whereas typically developing children identify and understand the relevant metacognitive aspects of a social situation easily and implicitly (Peskin & Astington, 2004), children with ASD do not. From a social-constructivist perspective, social stories and CSCs may help children with ASD engage in shared meaning making and enable them to reason through social phenomena during episodes of language-mediated joint attention. In the context of guided participation with a mentor, the use of repetition, visual stimuli, structured activities, and topics that are applicable, pertinent, and motivating may clarify the relevant aspects of the social situation.

IMPLICATIONS AND FUTURE DIRECTIONS

Research on the effectiveness of using social stories and CSCs to support development of ToM and more appropriate social and behavioral routines is in its infancy. The limitations posed by an uncontrolled single-subject ABA design does not allow for inferences of

causality. Therefore, our interpretations are speculative. A full-scale, controlled, longitudinal study is needed to meet standards of internal validity and more fully examine causal linkages. It should be noted, however, that although Zach's mother was aware of when the intervention was initiated, change in maternal ratings was evident only after several intervention sessions and that incremental improvement in ratings persisted into the withdrawal phase of study. This suggests that repeated exposure and experience with this kind of intervention is needed to establish more appropriate and enduring social interactions, and this is in line with previous literature in this area (Hutchins & Prelock, 2006; Norris & Dattilo, 1999). Furthermore, the timing in the pattern observed is inconsistent with the interpretation that changes were due to placebo effects and would be highly coincidental (although not impossible) if due to maturation or other co-occurring treatments. No other support services or educational programming were implemented during the course of this intervention because it was administered over the summer months when the school was out of session.

Further work in this area is also needed to identify factors that are related to efficacy. We do not wish to give the false impression that this kind of intervention will be uniformly successful or easy to implement. To the contrary, some of the children that we worked with in the larger study demonstrated very few changes (Hutchins & Prelock, 2006, 2008). This is to be expected considering that no one intervention has been found to be effective for every individual with ASD (Diehl, 2003). To some degree, the lack of therapeutic change in the larger study was probably due to the use of our fixed experimental procedures. One advantage of working in a clinical setting is the freedom to modify assessment or intervention procedures to support movement toward behavioral or performance goals.

To illustrate how the intervention might be modified in a clinical setting, we offer the case of another boy who participated in our research. Brady (pseudonym), a 4-year-old di-

agnosed with ASD, was nonverbal and exhibited a seizure disorder and visual impairment in one eye secondary to complications as a premature infant. He experienced considerable difficulty establishing and responding to bids for joint attention. Brady's social stories and CSCs emphasized only the earliest and most basic ToM skills related to emotion recognition (i.e., being able to identify happy, sad, and mad faces). Although social stories and CSCs were reasonably effective in helping Brady recognize emotions, other strategies that were not a part of our experimental protocol represent appropriate choices to further enhance ToM and communicative functioning. More specifically, a focus on reinforcing joint attention would be desirable for a child who lacks this basic skill. Recall that joint attention is an important mechanism underlying ToM and language development. Strategies to facilitate joint attention might make use of relationship-based interventions (Greenspan & Wieder, 1998; Gutstein & Sheely, 2002a, 2002b; Ingersoll, Dvortcsak, Whalen, & Sikora, 2005; Prizant et al., 2004) facilitating the child's ability to establish two-way communication, share enjoyment, and engage in symbol use through motivating activities and frameworks for play.

Through experiences with children in our study who represented a range of functioning across the autism spectrum, we learned that progress often required creative tailoring to the child's skills and, in particular, the child's ability and willingness to engage socially with a clinician. Zach's intervention was particularly challenging given his explosive and avoidant behaviors, which continued in the context of treatment until the final week of the intervention. Thus, a combination of visual schedules, frequent breaks, token rewards, the use of timers, and gentle physical control were incorporated during intervention. We imagine that professionals who experience similar challenges may benefit from employing a variety of strategies to ensure child engagement. Although Zach strongly objected to the intervention and confided in his mother that the stories were "bad" and "scary,"

his discomfort might have revealed insights into his own inability to express emotions and understand situations that he knew were difficult for him. This is consistent with previous observations (Hutchins & Prelock, 2006) and provides a rationale for persevering with a difficult intervention but in a way that continually attempts to understand the child's perspectives and experiences that may not be fully understood by parents or professionals who work with the child.

Our findings agree with others who have used subjective evaluation of informants close to the child to determine whether those who interact with the child regularly see changes that are perceived as important and meaningful (Kazdin, 1977). The use of such measures is also consistent with a family-centered approach (McCauley, 2001). Because the establishment of clinical significance requires a frame of reference or perspective (Kazdin, 1999), we recommend regular evaluations over baseline and intervention phases, using carefully designed rating scales that tap areas of functioning identified as priorities for remediation. We also recommend that parents be centrally involved in the identification of specific targets of intervention and the development of the intervention materials such as social stories (Prelock & Hutchins, 2008). This is particularly important to ensure that the content of the social stories (including the lexical items chosen, the level of grammatical complexity, and the objectivity and accuracy of the descriptions of social context) is appropriate to the child's language level. Whether interventions take place at the home, the school, or the clinic, parents should be given the opportunity to confirm more broadly that collaborators have understood and captured the context and nature of the targets of intervention.

We chose to involve parents as informants to gauge the outcome of the intervention. The informant described in this article was not blind to the treatment status of her child, which introduced the threat of biased responding. The limitations posed by our data collection procedures could be instructive to

professionals who seek to conduct interventions to promote ToM in a way that can meet standards for a higher level of evidence. Our data collection procedures would have benefited from triangulation through the use of multiple raters, some of whom could be kept blind to the point in the intervention process. Convergent findings across raters would offer more convincing evidence for an intervention's efficacy than could be provided using the current methods and would argue against the interpretation that responses were the result of altered response demands or interactant bias (Prelock & Hutchins, 2008). Unfortunately, other usual daily observers could not be engaged in this research because Zach's intervention took place over the summer months when he did not have regular contact with educators or other professionals involved in his education planning and health care. Of course, another alternative for professionals would involve the reliable coding of observations in relevant contexts in which target behaviors are expected to occur.

Subjective ratings also benefit from triangulation through the use of multiple measures. We encouraged informal diary descriptions to add qualitative data regarding the nature of change being reported to the quantitative ratings. Postintervention administration of the ToM informant measure (Hutchins et al., 2008) might also be appropriate to examine whether intervention was associated with a change in score. Standard ToM task batteries or individual ToM task probes represent another possibility for measuring change, although improvement over time may be difficult to interpret given the repeated presentation of tasks and the potential for test practice effects (Hutchins et al.). Formal tests may be used most appropriately either in the context of assessment or in controlled experiments. In any case, performance on formal tasks to indicate change (or lack of change) must be interpreted with caution.

We encourage professionals who provide services to individuals with ASD to consider incorporating assessment and intervention

procedures that acknowledge the importance of ToM, as well as the connections between ToM and communicative and behavioral functioning. This is meant as a call for the matching of intervention to the family's vision and the situational contexts important to the family and the professionals who work with children. Such matching can be achieved through a combination of thoughtful interviews, progress monitoring, and standard assessments. Evidence-based practice could also

benefit from further controlled evaluations of the intervention described here, with involvement of other professionals working with children with ASD who can be valuable partners in this endeavor. Furthermore, the use of social stories and CSCs should not be utilized in lieu of other interventions but rather incorporated into a comprehensive program that addresses the core deficits of communication, social interaction, behavior, and ToM for children with ASD.

REFERENCES

- Appleton, M., & Reddy, V. (1996). Teaching three year-olds to pass false belief tests: A conversational approach. *Social Development, 56*, 275–291.
- Astington, J. W. (2001). The future of theory-of-mind research: Understanding motivational states, the role of language, and real-world consequences. *Child Development, 72*, 685–687.
- Astington, J. W. (2005). Introduction: Why language matters. In J. W. Astington & J. A. Baird (Eds.), *Why language matters for theory of mind* (pp. 3–25). New York: Oxford University Press.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.
- Baron-Cohen, S. (2000). Theory of mind in autism: A fifteen year review. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from developmental cognitive neuroscience* (pp. 3–20). New York: Oxford University Press.
- Baron-Cohen, S., Baldwin, D., & Crowson, M. (1997). Do children with autism use the speaker's direction of gaze strategy to crack the code of language? *Child Development, 68*, 48–57.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a theory of mind? *Cognition, 21*, 37–46.
- Baron-Cohen, S., Ring, H., Moriarty, J., Shmitz, P., Costa, D., & Ell, P. (1994). Recognition of mental state terms. *British Journal of Psychiatry, 195*, 640–649.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "reading of the mind in the eyes" test revised version: A study with normal adults and adults with Asperger's syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry, 42*(2), 241–251.
- Barr, R. (2006). Developing social understanding in a social context. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 188–207). Malden, MA: Blackwell.
- Bartsch, K., & Wellman, H. M. (1989). Young children's attribution of action to beliefs and desires. *Child Development, 60*, 946–964.
- Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York: Oxford University Press.
- Brinton, B., & Fujiki, M. (2003). Blending quantitative and qualitative methods in language research and intervention. *American Journal of Speech-Language Pathology, 12*, 165–171.
- Carpendale, J., & Chandler, M. J. (1996). On the distinction between false belief understand and subscribing to an interpretive theory of mind. *Child Development, 67*, 1686–1706.
- Carpendale, J., & Lewis, C. (2006). *How children develop social understanding*. Malden, MA: Blackwell.
- Carpenter, J., & Lewis, C. (2006). *How children develop social understanding*. Malden, MA: Blackwell.
- Chandler, M. J., & Hala, S. (1994). The role of personal involvement in the assessment of early false belief skills. In C. Lewis & P. Mitchell (Eds.), *Children's early understanding of mind: Origins and development* (pp. 403–425). Mahwah, NJ: Erlbaum.
- Clements, W. A., Rustin, C. L., & McCallum, S. (2000). Promoting the transition from implicit to explicit understanding: A training study of false belief. *Developmental Science, 3*(1), 81–92.
- Crais, E. R. (1993). Families and professionals as collaborators in assessment. *Topics in Language Disorders, 14*(1), 29–40.
- Diehl, S. (2003). The SLP's role in collaborative assessment and intervention for children with ASD. *Topics in Language Disorders, 23*(2), 95–115.
- Dunn, Bretherton, & Munn. (1987).
- Dunn, J., Brown, J., & Beardsall, L. (1991). Family talk about feeling states and children's later understanding of others' emotions. *Developmental Psychology, 27*, 448–455.
- Flavell, J. H., Green, F. L., & Flavell, E. R. (1986). Development of knowledge about the appearance-reality distinction. *Monographs of the Society for Research in Child Development, 51* (1, Serial No. 212).
- Frith, U., Happe, E., & Siddons, F. (1994). Autism and

- theory of mind in everyday life. *Social Development*, 3, 108-124.
- Gray, C. (1994a). *The new social storybook*. Arlington, VA: Future Horizons.
- Gray, C. (1994b). *Comic strip conversations*. Jenison, MI: The Morning News.
- Gray, C. (1995). Teaching children with autism to read social situations. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 219-242). New York: Delmar.
- Gray, C. (1998). Social stories and comic strip conversations with students with Asperger syndrome and high-functioning autism. In E. Schopler (Ed.), *Asperger syndrome or high-functioning autism?* (pp. 167-194). New York: Plenum Press.
- Gray, C., & Garand, J. D. (1993). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior*, 8, 1-10.
- Greenspan, S. I., & Wieder, S. (1998). *The child with special needs: Encouraging intellectual and emotional growth*. Reading, MA: Addison-Wesley.
- Guajardo, N. R., & Watson, A. C. (2002). Narrative discourse and theory of mind development. *The Journal of Genetic Psychology*, 163(3), 305-325.
- Gutstein, S. E., & Sheely, R. K. (2002a). *Relationship development intervention with children, adolescents & adults: Social and emotional development activities for Asperger syndrome, autism, PDD & NLD*. Philadelphia: Jessica Kingsley.
- Gutstein, S. E., & Sheely, R. K. (2002b). *Relationship development intervention with young children: Social and emotional development activities for Asperger syndrome, autism, PDD & NLD*. Philadelphia: Jessica Kingsley.
- Hadwin, J., Baron-Cohen, S., Howlin, P., & Hill, K. (1996). Can we teach children with autism to understand emotions, belief, or pretence? *Development & Psychopathology*, 8, 345-365.
- Happe, F. (1994). An advanced test of theory of mind: Understanding the story characters thoughts and feelings by able autistic mentally handicapped and normal children and adults. *Journal of Autism & Developmental Disorders*, 24, 129-154.
- Happe, F. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, 66, 843-855.
- Happe, F., & Winner, E. (1998). The getting of wisdom: Theory of mind in old age. *Developmental Psychology*, 43(2), 358-362.
- Harris, P., Johnson, C. N., Hutton, D., Andrews, G., & Cooke, T. (1989). Young children's theory of mind and emotion. *Cognition and Emotion*, 3, 370-400.
- Holroyd, S., & Baron-Cohen, S. (1993). How far can people with autism go in developing a theory of mind? *Journal of Autism and Developmental Disorders*, 23, 379-385.
- Hutchins, T. L., Bonazinga, L. A., Prelock, P. A., & Taylor, R. (2008). Beyond false beliefs: The development and psychometric evaluation of the Perceptions of Children's Theory of Mind Measure—Experimental Version (PCToMM-E). *Journal of Autism and Developmental Disabilities*, 38(1), 143-155.
- Hutchins, T. L., Bond, L. A., Silliman, E. R., & Bryant, J. (in press). Maternal epistemological perspectives and variation in mental state talk. *Journal of Speech, Language, and Hearing Research*.
- Hutchins, T. L., & Prelock, P. A. (2006). Using social stories and comic strip conversations to promote socially valid outcomes for children with ASD. *Seminars in Speech and Language*, 27(1), 47-59.
- Hutchins, T. L., & Prelock, P. A. (2008). *The effects of social stories for remediating the behavioral, communicative, and theory of mind deficits characteristic of autism spectrum disorder*. Manuscript in preparation.
- Hutchins, T. L., Prelock, P. A., & Chace, W. (in press). Test-retest reliability of theory of mind tasks representing a range of content and complexity and adapted to facilitate the performance of children with autism spectrum disorder. *Focus on Autism and other Developmental Disabilities*.
- Ingersoll, B., Dvortcsak, A., Whalen, C., & Sikora, D. (2005). The effects of a developmental, social-pragmatic language intervention on rate of expressive language production in young children with ASD. *Focus on Autism and Other Developmental Disabilities*, 20(4), 213-222.
- Kazdin, A. E. (1977). Assessing the clinical or applied significance of behavioral change through validation. *Behavior Modification*, 1, 427-452.
- Kazdin, A. E. (1999). The meanings and measurement of clinical significance. *Journal of Consulting and Clinical Psychology*, 67, 332-339.
- Klin, A. (2000). Attributing social meaning to ambiguous visual stimuli in higher-functioning autism and Asperger syndrome: The social attribution task. *Journal of Child Psychology and Psychiatry*, 7, 831-846.
- Koegel, L. K., & Koegel, R. L. (2006). *Pivotal response treatments: Communication, social and academic development*. Baltimore: Paul H. Brookes.
- Koegel, L. K., Koegel, R. L., & Carter, C. M. (1998). Pivotal responses and the natural language paradigm. *Seminars in Speech & Language*, 19, 355-372.
- Kuttler, S., Myles, B., & Carlson, J. K. (1998). The use of social stories to reduce precursors to tantrum behavior in a student with autism. *Focus on Autism and Other Developmental Disabilities*, 13, 176-182.
- Lalonde, C. E., & Chandler, M. J. (2002). Children's understanding of interpretation. *New Ideas in Psychology*, 20, 163-198.
- Lewis, C., Freeman, N. H., Kyriakidou, C., Maridakis, K., & Berridge, D. M. (1996). Social influences on false belief access: Specific sibling influences or general apprenticeship? *Child Development*, 67, 2930-2947.

- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55, 3–9.
- McCauley, R. (2001). *Assessment of language disorders in children*. Mahwah, NJ: Erlbaum.
- McGhee, P. E. (1979). *Humor: Its origin and development*. San Francisco: W. H. Freeman.
- McGregor, E., Whiten, A., & Blackburn, P. (1998). Teaching theory of mind by highlighting intention and illustrating thoughts: A comparison of their effectiveness with 3 year olds and autistic individuals. *British Journal of Developmental Psychology*, 16, 281–300.
- Miller, C. A. (2006). Developmental relationships between language and theory of mind. *American Journal of Speech-Language Pathology*, 15, 142–154.
- Muris, P., Steerneman, P., Meesters, C., Merckelbach, H., Horselenberg, R., van den Hogen, T., et al. (1999). The TOM test: A new instrument for assessing theory of mind in normal children and children with pervasive developmental disorders. *Journal of Autism and Developmental Disorders*, 29, 67–80.
- National Research Council. Committee on Educational Interventions for Children with Autism. Division of Behavioral and Social Sciences and Education. (2001). *Educating Children With Autism*. Washington, DC: National Academy Press.
- Norris, C., & Dattilo, J. (1999). Evaluating effects of a social story intervention on a young girl with autism. *Focus on Autism and Other Developmental Disabilities*, 14(3), 180–186.
- Ozonoff, S., & McEvoy, R. E. (1994). A longitudinal study of executive function and theory of mind development in autism. *Development and Psychopathology*, 6, 415–431.
- Ozonoff, S., & Miller, J. N. (1995). Teaching theory of mind: A new approach to social skills training for individuals with autism. *Journal of Autism and Developmental Disorders*, 25(4), 415–433.
- Perner, J., Frith, U., Leslie, A. M., & Leekam, S. R. (1989). Exploration of the autistic child's theory of mind: Knowledge, belief, and communication. *Child Development*, 60, 689–700.
- Perner, J., Leekham, S. R., & Wimmer, H. (1987). 3-year-old's difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology*, 5, 125–137.
- Perner, J., & Wimmer, H. (1985). "John thinks that Mary thinks that...": Attribution of second-order beliefs by 5- and 10-year-old children. *Journal of Experimental Child Psychology*, 39, 427–471.
- Peskin, J., & Astington, J. W. (2004). The effects of adding metacognitive language to story contexts. *Cognitive Development*, 19, 253–273.
- Phillips, W., Baron-Cohen, S., & Rutter, M. (1998). Understanding intention in normal development and in autism. *British Journal of Developmental Psychology*, 16, 337–348.
- Pillow, B. H. (1991). Children's understanding of biased social cognition. *Developmental Psychology*, 17, 263–276.
- Pratt, C., & Bryant, P. (1990). Young children understand that looking leads to knowing (so long as they are looking into a single barrel). *Child Development*, 61(4), 973–982.
- Prelock, P. A. (2006). *Autism spectrum disorders: Issues in assessment & intervention*. Austin, TX: Pro-Ed.
- Prelock, P. A., & Hutchins, T. L. (2008). The role of family-centered care in research: Supporting the social communication of children with autism spectrum disorder. *Topics in Language Disorders*, 28(4), 323–339.
- Prior, M., Dahlstrom, B., & Squires, T. L. (1990). Autistic children's knowledge of thinking and feeling in other people. *Journal of Child Psychology & Psychiatry*, 31, 587–601.
- Prizant, B. M., Wetherby, A. M., Rubin, E., Laurent, A. C., & Rydell, P. (2004). *The SCERTS model: Enhancing communication and socioemotional abilities of children with autism spectrum disorders*. Port Chester, NY: National Professional Resources Inc.
- Repacholi, B. M., & Gopnik, A. (1997). Early reasoning about desires: Evidence from 14- and 18-month-olds. *Developmental Psychology*, 33, 12–21.
- Sodian, B., Taylor, C., Harris, P., & Perner, J. (1992). Early deception and the child's theory of mind: False trails and genuine markers. *Child Development*, 62, 468–483.
- Steele, S., Joseph, R. M., & Tager-Flusberg, H. (2003). Brief report: Developmental change in theory of mind abilities in children with autism. *Journal of Autism and Developmental Disorders*, 33(4), 461–467.
- Sullivan, K., Zaitchik, D., & Tager-Flusberg, H. (1994). Preschoolers can attribute second-order beliefs. *Developmental Psychology*, 30, 395–402.
- Swaggart, B., Gagnon, E., Bock, S., & Earles, T. (1995). Using social stories to teach social and behavioral skills to children with autism. *Focus on Autistic Behavior*, 10, 1–16.
- Swettenham, J. G., Baron-Cohen, S., Gomez, J. C., & Walsh, S. (1996). What's inside someone's head? Conceiving of the mind as a camera helps children with autism acquire an alternative to a theory of mind. *Cognitive Neuropsychiatry*, 1 (1), 73–88.
- Tager-Flusberg, H. (1999). The challenge of studying language development in children with autism. In L. Menn, & N. Bernstein Ratner (Eds.), *Methods for studying language production* (pp. 313–331). Mahwah, NJ: Erlbaum.
- Tager-Flusberg, H. (2000). Language and understanding: Connections in autism. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from developmental cognitive neuroscience* (pp. 124–149). New York: Oxford University Press.
- Tager-Flusberg, H. (2001). A reexamination of the

- theory of mind hypothesis of Autism. In J. Burack, T. Charman, N. Yirmiya, & P. R. Zelazo (Eds.), *The development of autism: Perspectives from theory and research* (pp. 173–193). Mahwah, NJ: Erlbaum.
- Tomasello, M. (1995). Joint attention as social cognition. In C. Moore & P. J. Dunham (Eds.), *Joint attention: It's origins and role in development* (pp. 103–130). Hillsdale, NJ: Erlbaum.
- Tomasello, M. (2003). *Constructing a language*. Cambridge, MA: Harvard University Press.
- Watson, L. R., Lord, C., Schaffer, B., & Schopler, E. (1989). *Teaching Spontaneous Communication to Autistic and Developmentally Handicapped Children* (TEACCH). NY: Irvington.
- Wellman, H. M., Baron-Cohen, S., Caswell, R., Gomez, J. C., Swettenham, J., Toye, E., et al. (2003). Thought-bubbles help children with autism acquire an alternative to a theory of mind. *Autism, 6*(4), 343–363.
- Wellman, H. M., Baron-Cohen, S., Caswell, R., Gomez, J. C., Swettenham, J., Toye, E., et al. (2002). Thought-bubbles help children with autism acquire an alternative to theory of mind. *Autism, 6*(4), 343–363.
- Wellman, H. M., & Bartsch, K. (1988). Young children's reasoning about beliefs. *Cognition, 30*, 239–277.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false beliefs. *Child Development, 72*, 655–684.
- Wellman, H. M., & Estes, D. (1986). Early understanding of mental entities: A reexamination of childhood realism. *Child Development, 57*, 910–923.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and the constraining function of wrong beliefs in young children's understanding of deception. *Cognition, 13*, 103–128.
- Yirmiya, N., Solmonica-Levi, D., Shulman, C., & Pilowsky, T. (1996). Theory of mind abilities in individuals with autism, down syndrome, and mental retardation of unknown etiology: The role of age and intelligence. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 37*(8), 1003–1014.

Appendix

Zach's social story "When things don't go how I think they will"

It makes me feel good when I know what is going to happen. [perspective]

But things don't always go the way I think they will. [perspective]

Sometimes things surprise me like when the fire alarm at school goes off. [perspective]

Sometimes I get disappointed because someone told me one thing, and we do something else.
[perspective]

I can get upset when there is a change of plans and my routine gets all messed up. [perspective]

This can make me scared because I don't know what is going to happen. [perspective]

It can also make me upset. [perspective]

I might throw a fit and hit, kick, bite, scream, or break things. [descriptive]

It makes my mom and dad sad when I throw a fit. [perspective]

They might think "I wish we could make Zach happy" or "I wish he would talk to us about what he was thinking and feeling." [thinking]

They might also think "Zach is not acting very nice right now" or "I wish he wouldn't throw a fit." [thinking]

When things don't go the way I think they will—that's okay and I'm okay. [perspective]

If I get scared or mad or disappointed, I can use my words to talk to my mom and dad. [directive]

I can calmly say "I'm not happy" "I don't like this" or "I need a break." [directive]

This makes my mom and dad happy. [perspective]

They will think "I'm so proud of Zach" and "I'm so happy that he is talking to us about how he thinks and feels." [thinking]

They might even give me a "high five." [descriptive]

It's good to talk to my mom and dad about the things that make me sad, mad, or scared. [perspective]

When I talk to them, they can help me think about things. [descriptive]

It's okay when things don't go exactly how I think they will. [perspective]

And when they don't, I will try to remember to talk calmly about how I feel. [directive]