

Effects of Autism on Social Learning and Social Attention

chapter
ONE

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Most often autism is regarded as an early-onset disorder that affects the development of social interaction and communication abilities and that has a significant negative impact on the quality of life and outcomes of individuals affected by autism and their families.¹ Although valid, the standard “social impairment” perspective on autism may not readily speak to the needs of educators who are charged with promoting academic achievement in reading or math for students with autism. Consequently there is the perception of a gap between clinical research and educational practices for school-age children with autism.²

This chapter addresses the gap by describing how the social impairments of autism affect learning in children. Indeed, we will argue that in regard to education for children with autism, this syndrome may be accurately and usefully conceptualized as a form of social learning disability. First, to understand fully what we

	1—Very rarely 4—Somewhat often	2—Rarely 5—Often	3—Occasionally 6—Very often
Questions:			
1.	I like being around other people.		1 2 3 4 5 6
2.	I find it hard to get my words out smoothly.		1 2 3 4 5 6
3.	I am comfortable with unexpected changes in my plans.		1 2 3 4 5 6
4.	It's hard for me to avoid getting sidetracked in conversation.		1 2 3 4 5 6
5.	I would rather talk to people to get information than to socialize.		1 2 3 4 5 6
6.	People have to talk me into trying something new.		1 2 3 4 5 6
7.	I am "in-tune" with the other person during conversation.		1 2 3 4 5 6
8.	I have to warm myself up to the idea of visiting an unfamiliar place.		1 2 3 4 5 6
9.	I enjoy being in social situations.		1 2 3 4 5 6
10.	My voice has a flat or monotone sound to it.		1 2 3 4 5 6
11.	I feel disconnected or "out of sync" in conversations with others.		1 2 3 4 5 6
12.	People find it easy to approach me.		1 2 3 4 5 6
13.	I feel a strong need for sameness from day to day.		1 2 3 4 5 6
14.	People ask me to repeat things I've said because they don't understand.		1 2 3 4 5 6
15.	I am flexible about how things should be done.		1 2 3 4 5 6
16.	I look forward to situations where I can meet new people.		1 2 3 4 5 6

FIGURE 1.1 Examples of Items from the Broad Autism Phenotype Questionnaire³
 These items represent *some of the behaviors and dispositions* that may be observed in many people at moderate levels of expression. However, autism is characterized by more extreme levels of expression of these otherwise typical behaviors. People affected by autism exhibit different subsets and levels of these behaviors, hence autism's characterization as a range or spectrum of presentations (also known as autism spectrum disorders).

mean when we use such terms as *disability*, *impairment*, and *disorder*, we must recognize that autism is a part of human nature.

The characteristics associated with autism can be observed in many people in the general population. This is called the *broad autism phenotype* (see Figure 1.1).⁴ For example, the social interactions and social learning of people with autism may be diminished by a tendency to focus on or even obsess about a restricted range of interests. However, this type of behavior is not limited to people with autism. For example, artists, scientists, or businesspeople can obsessively, but productively, focus on a narrow range of interests that have limited appeal for many other people. Because the broad autism phenotype is part of human nature, some argue that “autism” is not a disease or a disorder, but rather one of the many expressions of human diversity.⁵

THEY ARE CHILDREN FIRST: UNDERSTANDING THE AUTISM SPECTRUM OF DISORDERS

This human diversity perspective reminds us that children affected by autism are more similar to than different from their peers. They are children first, not a category unto themselves. Like all children they display a wide range of abilities and personalities. Taking pleasure in getting to know and engage each child and his or her idiosyncrasies can be immensely rewarding for teachers. Moreover, this approach provides the fundamental and necessary building blocks for optimizing education for children with autism in classrooms and schools.

Getting to know, engage, and prize the differences that make each child a unique student is as essential to the effective education of a child affected by autism as it is for any other child in a classroom.

It stands to reason then that the better that teachers and school administrators can understand the development and idiosyncrasies of children with autism, the better they can engage these students, interpret their behaviors, and instruct or guide them in the classroom. Of course this may be challenging. Autism weakens students’ ability to engage interpersonally with teachers and peers in

expected ways. For example, some children and adults may be so extremely fixated on their own interests that it is hard for them to pay attention to the immediate interests of another person, such as a task assignment described by their teacher. This can lead to the perception that the child or adult is aloof, oppositional, or even unreachable.

When problems of this magnitude occur—and they chronically disrupt learning and the quality of life for children and parents—we refer to autism using the terms *disorder, impairment, and disability*. Of course autism is no different from other “disorders” of human nature in this respect. Many people may often mispronounce words, talk to themselves, or feel sad. However, if those behaviors become sufficiently extreme as to hinder one’s ability to learn to read, to engage in social interactions, or to work, we may infer that an individual is affected by a *reading disability, a psychotic disorder, or a mood disorder*, respectively.

Diversity Within the Spectrum

The term *autism spectrum disorders* (ASD) is now used to acknowledge that children can present with many different patterns or combinations of symptoms within the broad autism phenotype. To illustrate this point, note that at various times research has emphasized that autism is characterized by the following:

- A specific inability to think about the mental states (thoughts) of other people (also known as the “Theory of Mind” hypothesis)⁶
- A deficit in the planning and execution of complex actions and thinking (also known as the “Executive Function” hypothesis)⁷
- An inability to focus on broad, comprehensive sets of information as opposed to a limited set of details (also known as the “Weak Central Coherence” hypothesis)⁸

Each hypothesis holds more than a grain of truth about autism. However, when Pelicano⁹ examined the degree to which these “core” deficits characterized six- and nine-year-olds, she observed that only twenty-two of thirty-seven six-year-olds with autism (60 percent) displayed evidence of deficits in all three cognitive domains (Theory of Mind, Executive Function, and Weak Central Coherence). Moreover, by nine years of age only seven of thirty-seven children

(19 percent) displayed deficits in all three domains. At no point in this age range did all children with autism display the same pattern of “core” cognitive difficulties, but all children displayed impairment in at least one domain.

Related to this point, Lorna Wing long ago observed that there are at least three behavioral subgroups of children with autism:¹⁰

- Some children display an aloof behavior pattern.
- Some display a passive but responsive behavior pattern.
- Some are characteristically active but odd in their frequent social interactions.

This diversity of expression can make autism difficult to recognize, especially among higher-functioning children with active but odd behavior patterns. It probably reflects biological differences that occur across all people in the relative tendency toward very active patterns of behavior or more inhibited patterns of behavior.¹¹

This type of temperament-related variability in autism is of more than passing interest, though, because active children may present greater behavior challenges but also a greater responsiveness to interventions. For example, recent reports have suggested that three- to six-year-olds affected by ASD who are more active in toy play and in approaching other people are more likely to be responsive to early, intensive, discrete trial behavioral intervention¹² as well as pivotal response treatment.¹³

Accommodating ASD Diversity in Education

The wide range of characteristics of children with autism makes it necessary to provide a wide range of services in schools. The Institute of Education Sciences (IES)¹⁴ estimated that 296,000 children with autism were served by public schools across the United States in 2007–2008. That figure represents about 4.5 percent of all children served under the Individuals with Disabilities Education Act (IDEA). However, this was only about 0.6 percent of the population of school-age children. We say “only” because that is significantly less than the current Centers for Disease Control and Prevention¹⁵ estimates of prevalence obtained from a large sample of elementary school students with autism, which is about 1 in 110, or 0.9 percent of the population. It is likely that the increased

identification of children with autism had not had its full impact on the K–12 student population at the time of the IES estimate. Nevertheless, the IES¹⁶ data also indicated the following:

- 35 percent of identified children spent 80 percent or more of their time in regular classrooms.
- 18 percent spent 40 to 79 percent of their time in regular classrooms.
- 37 percent spent less than 40 percent of their time in regular classrooms.
- The remaining 10 percent were in separate public, private, or home-based education settings.

How Autism Affects Learning

So if autism is diverse in its presentation, how can teachers and professionals understand the syndrome in a way that facilitates their ability to engage and instruct these students? One way is to consider the effects of autism on learning.

From its earliest presentation in preschool children, autism exhibits the characteristics of a social learning disability. To illustrate the utility of this social learning disability perspective, we will do the following in this chapter:

- Describe how autism affects learning in the first thirty-six months of life
- Discuss the history of autism research and describe how research on the early development of children with autism in the first thirty-six to sixty months of life has advanced diagnostic methods
- Describe how research on the early development of these children has led to the social attention and social learning disability perspective on autism
- Discuss the similarities and differences of the learning difficulties of school-age children with autism compared to those of other children who receive services under the auspices of IDEA, such as children affected by attention deficit hyperactivity disorder (ADHD)
- Consider how the social learning disability perspective on autism can inform and improve educational interventions

BRIEF HISTORY OF RESEARCH ON AUTISM

Unlike specific learning disabilities or ADHD, autism is apparent in many children well before they enter school or even preschool. The very early onset of

autism is similar to that of intellectual and developmental disabilities (IDD, formally known as “mental retardation”). However, *autism is not a form of intellectual disability*. For people with IDD, most (or all) domains of cognitive development (for example, language, visual-spatial skills, and reasoning) are equally delayed or disturbed from early in life. By definition they display uniformly lower performance than peers on measures of vocabulary, verbal and nonverbal analogies, language comprehension, memory, and mental rotation of abstract figures that are common to intelligence tests. As a consequence, their test scores or intelligence quotients (IQs) are lower than 70 to 75. Based on the scores of thousands of children in a normative sample, an average score on an IQ test is about 100, and 98 percent of all children receive a score above 70.

Many, if not most, school-age children currently identified as affected by autism have an IQ estimate greater than 75. The most recent data on this come from the new Centers for Disease Control and Prevention (CDC) national surveillance network on autism, called the Autism and Developmental Disabilities Monitoring (ADDM) Network. In 2006 the ADDM Network gathered data on 307,790 eight-year-olds in public schools across eleven states and identified 2,757 children, or 1 in 110, affected by autism.¹⁷ Equally important, albeit less well recognized, the CDC also reported that 59 percent of the identified children with ASD had average to above-average intelligence quotients.¹⁸

By comparison, in the 1980s we believed that about 1 in 2,500 children were affected by autism, and only about 25 percent to 30 percent of these children had IQs higher than 75. So both the total number of children identified as having autism *and the proportion of children with ASD without intellectual disabilities* have gone up noticeably in the last thirty years.

These findings have important implications for advancing education for children with autism. For example, much of the available research on adapting instruction for school-age children with autism involves children who are also affected by intellectual disabilities.¹⁹ Yet the CDC data suggest that we must develop effective evidence-based interventions for children with autism with average or above-average, as well as below-average, intellectual competencies. That, obviously, is no small task.

The notion that autism displays a pattern of cognitive development that is different from those of IDD began to emerge in the 1980s. Surprisingly, little was known about the development of autism at that time, even though it had been forty years since the syndrome was initially described.²⁰ In the 1980s, however, people like Geraldine Dawson, Marian Sigman, and Sally Rogers, among many others, began to recognize the value of applying new insights from infant developmental science to the study of autism. As this began to occur, the conceptualization of ASD, the diagnostic instruments used to identify ASD, and intervention methods used with children affected by ASD gradually began to improve.

One thing that immediately became apparent was that young children with autism displayed a distinctive pattern of strengths and weaknesses in cognitive development when compared to children with IDD, such as those affected by Down syndrome. Preschoolers with autism seemed to learn about solving problems that involved object manipulation, such as puzzles, relatively quickly, but their ability to attend to and engage with people developed relatively slowly. For example,

- They readily learned *object permanence*, or that objects do not cease to exist when they are moved out of view and can often be recovered by searching.²¹
- They could even find objects in difficult tasks that required searching in multiple locations.²²
- They came to understand that an intermediary object (such as a stick) could be used as a means to obtain a goal, such as an out-of-reach toy.²³
- They didn't display specific problems with using gestures and eye contact to request assistance from adults.²⁴
- They could recognize themselves in a mirror.²⁵
- They displayed clear evidence of attachment to a specific caregiver.²⁶

However, preschool children with autism displayed significant delays or impairments in paying attention to people compared to children with IDD or typical development. For example, although young children with autism would make eye contact with an adult to nonverbally request a toy, they did not readily use spontaneous eye contact with an adult to socially share their enjoyment while playing with the toy (see Figure 1.2 for an illustration of this type of behavior).²⁷ They also did not automatically follow the gaze direction when an

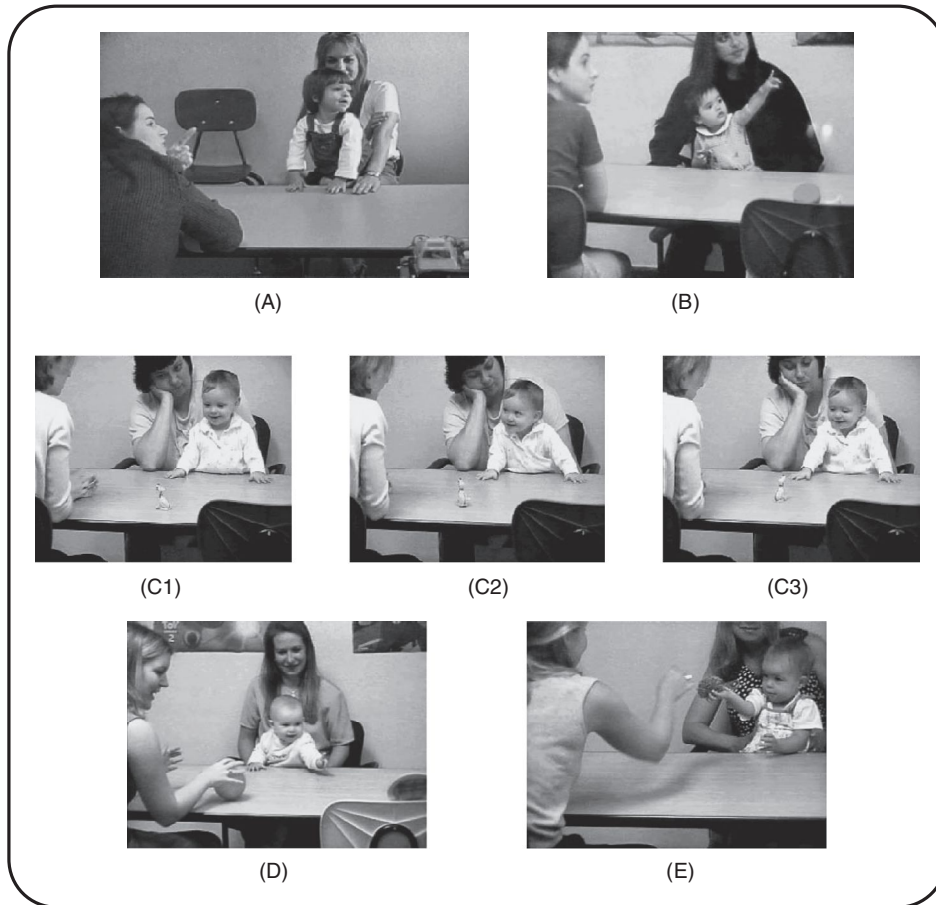


FIGURE 1.2 Examples of Social Attention Coordination or Joint Attention Preverbal Behaviors That Develop in the First Nine to Twelve Months of Life²⁸

These examples include the following: (A) responding to joint attention or following another person's line of regard to share the experience of an object or event; (B) initiating joint attention or initiating attention coordination with pointing or showing, with the goal of sharing an experience with others; (C1, C2, C3) initiating joint attention by alternating the gaze between an object or event of interest and another person; (D) initiating a request for a behavior, and coordinating attention, with the goal of eliciting aid in obtaining an object or event from others; and (E) responding to a behavior request and coordinating attention with that of another person in order to correctly respond to the request, such as with an open-palm, "give it to me" gesture. Children with autism develop D and E relatively well. They develop A, B, and C more slowly. Often before preschool they become relatively proficient at A. However, B and C can remain problematic through the school-age years. In preschool assessment little alternating eye contact to share pleasure in an event is a red flag for autism. Improving this type of behavior can lead to improved learning in children with autism.

adult looked away from them and pointed to direct their attention to an object or picture in the room. Children with IDD, including children with Down syndrome, shared interests and followed gaze much more readily.

Together these observations indicated that children with autism displayed the following behaviors and patterns:

- A specific developmental impairment in the tendency to coordinate their attention spontaneously with that of other people, or to use *joint attention* to share experiences and information with others
- Reticence to share experiences with other people by imitating their actions²⁹
- A tendency not to respond to their parent's voice or their name being called,³⁰ or to process information from people's faces³¹

The pattern of evidence was very consistent with what Kanner³² had described in 1943 as the essential quantitative and qualitative impairment of social-emotional contact with other people in children affected by autism. In addition, for the first time the research of the 1980s indicated that this type of impairment could be precisely measured in young children, such that children with autism could be discriminated from children with other developmental disorders. Finally, the results of research in the 1980s also indicated that compared to children with IDD, young children with autism were characterized by a pattern of relative strengths and in social as well as cognitive development.

Prior to the 1980s, the lack of evidence-based descriptions of the behavioral characteristics of autism had a profound and negative effect on diagnosis and identification. It was not until 1980 that a description of autism appeared in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III) of the American Psychiatric Association.³³ This very positive step forward, however, was also problematic: the highly influential DSM-III was released just as developmental science began to advance our understanding of autism, but before the benefits of that science could be realized. DSM-III suggested that the behavior of children with autism could be characterized as consistent with a pervasive lack of responsiveness to others, even though nascent research suggested that autism was characterized by individual differences in social behavior³⁴ and a pattern of relative strengths and weaknesses in cognitive development. The DSM-III description was at best imprecise and at worst misleading.³⁵

Such a broad description could not accurately describe children across age groups, because the social behaviors associated with autism were shown to frequently change and improve over time.³⁶ Studies also indicated the following:³⁷

- Many children with autism responded when adults imitated their behavior.
- They displayed greater attention to others in structured rather than unstructured situations.
- They enjoyed physical play with caregivers.
- They systematically expressed some types of nonverbal communication with eye contact.
- They displayed clear evidence of caregiver attachment.

The perception that children with autism displayed a *pervasive lack of responsiveness to others* was simultaneously too broad to apply to different age groups of children and too narrow and imprecise to identify accurately many children who had profound impairments in social development but yet were still responsive to other people. These limits contributed to conceptual confusion about the nature of autism and to the tendency to identify relatively few children with this disability through the end of the twentieth century.

It wasn't until the publication of the fourth edition of the DSM in 1994 and its "technical revision" in 2000 that more precise, evidence-based behavioral descriptors of autism were provided.³⁸ One advance was the explicit recognition that the course and characteristics of autism could present quite differently across children. For example, individuals with "Asperger's Disorder" were described as having a "higher-functioning" variant of autism. These individuals did not display intellectual disabilities or problems with some aspects of language and communication development. Problems in the conceptual validity and diagnostic reliability of the distinction between "Autism Spectrum Disorder" and "Asperger's Disorder" have been such that it is unlikely that the latter term will be retained in the fifth version of the DSM.³⁹

Nevertheless, the explicit recognition that children with autism differ in terms of social and cognitive course, and that many children achieve higher-functioning (average and above-average IQ) outcomes, will remain in DSM-5. These differences will be described in DSM-5 in terms of three severity ratings based on children's manifest need for support.

With the improved evidence-based behavioral descriptions of autism, powerful new "gold standard" standardized diagnostic instruments were developed in the latter part of the 1990s, such as the Autism Diagnostic Inventory⁴⁰ and the Autism Diagnostic Observation Schedule.⁴¹ These advanced methods allow true cases of autism to be recognized by more people within a wider range of children. Its increased recognition led autism to be added as a category that qualifies for special education services in 1990, when the Individuals with Disabilities Education Act was authorized. Equally important, the increased precision of the diagnostic description reflected a subtle but telling shift in our conceptualization of autism: the description of the social impairments of autism now emphasized problems in the spontaneous initiation of behaviors to share information with other people, rather than emphasizing a pervasive lack of responsiveness to other people.

EARLY DEVELOPMENT, SOCIAL ATTENTION, AND LEARNING

Exemplifying the shift to an emphasis on impairments in the tendency to initiate adaptive social behaviors in ASD, DSM-IV describes a fundamental social symptom of autism as "a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest)."⁴² The critical role of impaired initiations in the developmental course of autism has become clear as we have begun to adopt a developmental social learning perspective on the symptoms of autism. This perspective is perhaps best represented in what has become known as the social attention model of autism (see Figure 1.3).⁴³ A basic premise of this model is that the early and robust disturbance of the typical development of social attention significantly disrupts the normal process of social learning in preschool-age children with autism, and this impairment is likely to also be expressed in school-age children and adults as well. This model is well illustrated by details from research on the role of joint attention in typical development and in cases of autism.

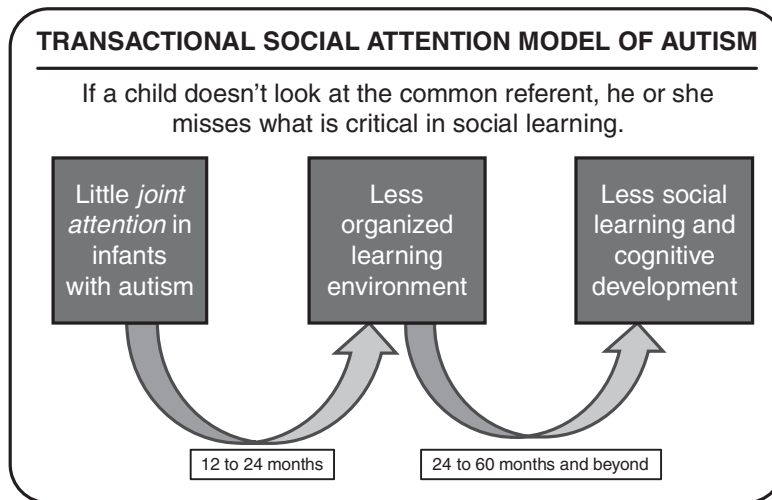


FIGURE 1.3 An Illustration of the Social Attention Model of Autism

Prioritizing attention to people—and learning to coordinate attention with that of other people in particular—is a major milestone of early development. This type of joint attention skill development helps young children adopt a common frame of visual reference with others that facilitates social engagement, symbolic and language development, and social cognition (learning about people). Children with autism have a syndrome-specific deficit in joint attention development. This deficit not only is a symptom of autism but also is part of the disorder of autism, hindering children's ability to readily share information with other people and easily benefit from social learning opportunities. Left untreated, this deficit can lead to significant delays in cognitive development and perhaps even have an impact on early neurocognitive development. Even when treated, many children with autism continue to struggle with joint attention and with adopting a common frame of reference with others. This can impede their capacity for learning in the classroom.

Joint Attention's Role in Typical Development and in Cases of Autism

One of the primary reasons why human learning is unique and expansive is that we are highly capable and highly motivated when it comes to sharing information with each other. But how do we learn to share information? Certainly, speech and language development, as well as our capacity for mental and symbolic representation, are central to our ability to share information. We use language and symbols (such as the written word) to establish a common point of external physical reference (for example, "Today we are going to count all the different types of

leaves we can collect outside”) or internal mental reference (“Who can describe a beautiful leaf they found yesterday?”). Establishing a common frame of reference is essential to the meaningful and useful exchange of information.

So, how do we learn to establish a common frame of reference with other people? Does language or symbolic development enable this, or do we learn to establish a common frame of reference before we learn to process language and symbols? The latter increasingly appears to be the case. Indeed, the preverbal ability to establish a common frame of reference with others is likely to provide critical aspects of the cognitive scaffolding needed to build language and symbolic skills.⁴⁴

Infants are not born with this ability, but rather gradually develop it in their practice of joint attention. Two types of joint attention behaviors develop in the first year of life:

- Responding to joint attention
- Initiating joint attention

Responding to joint attention (RJA) refers to infants’ ability to follow the direction of the gaze and gestures of others to share a common point of reference (see Figure 1.2). RJA development begins between two and four months of age, is associated with activity in the frontal as well as posterior (parietal and temporal) brain areas by five months, and exhibits stable individual differences across children by nine months.⁴⁵ At first joint attention is effortful for infants. At nine months it takes the typical infant about 2 seconds to process the shift of attention of an adult and then successfully follow that adult’s direction of gaze. By eighteen months of age this type of social information processing on average requires about 0.8 seconds.⁴⁶

Initiating joint attention (IJA) reflects infants’ spontaneous sharing of experience by directing the attention of adults to their experience of objects or events through the use of gestures (for example, showing) and eye contact (see Figure 1.2). Stable individual differences in joint attention development also emerge by nine months of age, and there is evidence that both the frontal and posterior brain areas begin to work together to advance the development of this type of skill in the second year of life.⁴⁷ Ultimately, by adulthood IJA and RJA are associated with activity in common brain systems as well as in systems that distinguish IJA from RJA.⁴⁸

The development of joint attention abilities is vital to advances in the rate and quality of social learning most infants begin to experience with respect to language and social cognitive development beginning at six months of age.⁴⁹ Parents do not intentionally teach infants and toddlers all the words they need to learn through daily, structured language instruction. Indeed, it is the rare parent who sets aside a day to systematically instruct his or her twelve-month-old on all the names for different types of cutlery in the kitchen (“This is a fork,” “This is a knife,” and so on). Instead, during the course of daily interactions parents spontaneously refer to novel objects or events by name, and in this way they provide innumerable, unstructured, incidental word learning opportunities for their infant (see Figure 1.4).

Infants have an advantage regarding these incidental opportunities if they are active partners in establishing a common frame of reference with caregivers. Baldwin⁵⁰ suggests that they do this by actively and spontaneously coordinating their visual attention with that of their parent or caregiver. That is, they follow the direction of their parent’s gaze to understand the most likely place to look, thereby increasing the chances that they will identify the correct target in novel word learning situations. In other words, infants actively use responding to joint attention (see Figure 1.2) to self-organize the flow of information in incidental word learning opportunities to reduce referential mapping errors.⁵¹ This is not to belie the observation that parents (or teachers) actively scaffold the learning of their young children. Nevertheless, the benefits that infants receive from scaffolding are amplified as they begin to develop the facility of mind (joint attention ability) that increases their likelihood of establishing a common frame of reference with parents.⁵²

Initiating joint attention also has positive effects on infants’ social learning. The associated behaviors, such as showing an object, spontaneously and clearly express a child’s attempt to share his or her immediate interest with a parent or other potential teacher. When parents respond to such behaviors by providing object labels or other information, they do so at a time when their child’s interest and attention are optimal for learning.⁵³ So both types of joint attention serve a self-organizing role in infant learning.

This learning function of joint attention develops slowly in infancy but *continues to operate throughout our lives*.⁵⁴ Indeed, without the well-honed capacity for joint attention, success in many pedagogical contexts would be difficult.



FIGURE 1.4 Illustration of the Role of Joint Attention in Social Learning⁵⁵

In this image an eighteen-month-old has the opportunity to learn a new word, *Rooster*. However, the possibility of a referential mapping error exists (that is, incorrectly associating the new word, *rooster*, with the wrong entity, the lizard). To decrease the likelihood of this error and increase correct word learning, the infant may be an active partner in the social learning process. She may look in the direction of her parent's gaze and turn in the correct direction toward the rooster. This is a simple illustration of a larger and vital element of social learning: children must actively coordinate their attention with that of others to adopt a common frame of reference in order to avoid referential mapping errors in most direct instruction situations. If children, such as those affected by autism, struggle with adopting a common frame of reference with others, their learning can suffer. Recognizing this issue goes more than halfway to providing improved educational opportunities for children with autism.

Imagine the school readiness problems of a five-year-old who enters kindergarten but is not adept at coordinating attention with that of teachers or peers. Similarly, children, adolescents, and adults who cannot follow, initiate, or join with the rapid-fire changes of shared attention in social interactions may be

impaired in any social learning context, as well as in their very capacity for relatedness and relationships.⁵⁶

In their cogent paper on bridging the gap between research and practice in intervention for autism, Dingfelder and Mandell⁵⁷ argue that one problem has been that although the mission of schools is to promote academic achievement in such content areas as reading and math, efficacy studies of intervention for autism tend to focus on “measures of the symptoms of autism (e.g., joint attention, imitation, challenging behaviors) or IQ, which may not directly relate to outcomes of interest” to teachers and schools.

Now imagine a child who has significant delays or impairments in the development of joint attention by early in the second year of life, when language development typically begins to accelerate. Such is the case for children with autism. Observations of parents’ interactions with children with autism indicate that they provide as many incidental learning opportunities to their children as do parents of other children.⁵⁸ However, young children with autism are much less likely than other children to play an active role in establishing a common frame of reference with parents using joint attention, and they are far less capable of doing so. In recent years we have begun to study the development of autism in infants before they receive a diagnosis. Infant siblings of children with autism are more likely to develop autism than are infants in the general population. Working with large numbers of infant siblings of children with autism, researchers are able to observe when and how some infants begin to display subtle problems early in life, before clearly developing autism between twenty-four to thirty-six months. New data from these *infant sibling studies* indicate that many siblings who go on to show symptoms of autism at age three first show developmental impairments in joint attention by twelve to fifteen months.⁵⁹ Interestingly, at least one study indicates that children with autism whose parents tend to follow their children’s line of regard and provide learning opportunities matched to their demonstrated interests develop language significantly better than do children with autism whose parents tend to present learning opportunities that require them to follow their parents’ frame of visual reference.⁶⁰

In addition, the degree to which young children with autism develop facility with RJA affects the degree to which an increase in the intensity of early intervention correlates with an increase in effectiveness in promoting their language development.⁶¹

Young children with autism are less likely to benefit from spontaneous social learning opportunities in parent-child interactions than are typically developing children, or even children with other developmental disorders. This is because symptoms of autism (that is, joint attention deficits) lead to impairments in children's capacity to establish a common frame of reference with other people, which hinders their ability to readily acquire information in social learning opportunities. This, in brief, is the idea behind the social attention and social learning model of autism (see Figure 1.3).

Why Does Autism Affect Social Attention?

We don't yet fully understand why autism affects the development of social attention and joint attention. However, research suggests there are two primary possibilities.

Neural Interconnectivity

One hypothesis is that children with autism fail to develop the ability to engage in joint attention. For example, research has suggested that children with autism are most vulnerable to difficulties in the development of complex mental processes that require several widely separated brain areas to work together. This is called the neural *interconnectivity hypothesis* of autism.⁶² Current research also suggests that joint attention places a high demand on connectivity between and within frontal and posterior brain networks for its development, even in young children.⁶³ So it is possible that problems in neural connectivity lead directly to the development of a *disability* of children with autism to engage in joint attention with other people. In this regard, the frontal networks are thought to play a primary role in the development of children's capacity to monitor and regulate their own attention, and the posterior system is involved in monitoring and

mentally representing other people's attention and behavior. Interconnectivity allows these two systems to work together so that children and adults can engage in the *triadic tasks* of monitoring, comparing, and aligning one's own attention in relation to that of another person or other people.

If a disability significantly decreases the tendency of a child to align his or her attention with that of other people, this can also significantly decrease his or her opportunities to learn from others, share information with others, or express and enjoy engagement with others at any age. Such is too often the case for children with autism.

One other point about the interconnectivity hypothesis is noteworthy. Current research suggests that several other problematic aspects of human nature, such as difficulties with self-regulation, attention deficit hyperactivity disorder, or obsessive-compulsive disorder, and even specific learning disabilities, involve connectivity problems in brain systems that overlap with those observed in autism. This may be one reason why behaviors associated with these aspects of human nature are also often part of the broad autism phenotype.

Motivation and Social Attention

An alternative to the idea that autism is associated with an *inability* to engage in joint attention is presented by the *social motivation hypothesis*.⁶⁴ According to this hypothesis, sharing attention and experiences with other people may be intrinsically rewarding. Consequently, internal motivation may play a major role in joint attention, such as the motivation that moves us to bring an interesting event or object (for example, a magazine photo) to the attention of a family member. If motivation affects the frequency with which we engage in joint attention, then low motivation may play a role in the reduction of joint attention in autism.

A motivation deficit associated with joint attention may occur if social attention is aversive for children with autism. This may be true for some children, some of the time. However, it does not generally appear to be the case. Many

children with autism enjoy physical play with adults, they display attachment behaviors, and they direct eye contact and gestures to people to make requests. Yet these same children display joint attention impairments. Such observations have long suggested that an aversion hypothesis does not readily explain joint attention disturbance in autism.⁶⁵

Alternatively, social stimuli may not necessarily be aversive, but they could be less interesting (*less positively rewarding*) than is typical, and nonsocial objects and events may be more interesting (*more positively rewarding*) than is typical. In the latter case, idiosyncratic preferences or interests may be expected to chronically divert children with autism from effectively sharing attention with people. If unusual motivation toward nonsocial objects or events is prominent in guiding attention in early development, this could contribute to joint attention deficits and impaired social learning in children with autism. By and large, this possibility currently has the best support in research with young children.

Evidence for the social motivation hypothesis has been provided by the comparative study of responding to joint attention versus initiating joint attention behaviors. Differences in internal motivation may more strongly influence the tendency to initiate behaviors than the tendency to respond to the behaviors of others. This is what we see in autism with respect to joint attention deficits: many children with autism attend to and respond to the joint attention bids of others, at least in the later preschool years. However, they continue to exhibit difficulty in initiating joint attention.⁶⁶ It also seems that, even when they do initiate joint attention, they smile and take pleasure from the experience of joint attention less frequently than do other groups of children.⁶⁷ The social motivation hypothesis of joint attention gained additional support in a recent brain imaging study, which indicated that the brain systems associated with IJA more clearly involve the activation of reward centers of the brain than do those associated with RJA.⁶⁸

Of course the social motivation hypothesis has implications for teachers. Imagine what this difference in basic social motivation could be like for the child with autism in the classroom. We all get frustrated when, from time to time, our schedules interrupt the pursuit of our own interests and goals. Fortunately, many of us often experience sufficiently clear rewards in shifting away from our own preference to collaborate with others, so we can relatively easily learn to regulate our frustration with being distracted. However, what if sharing attention and collaborating with others were not clearly rewarding, and our own

pattern of interests and attention priorities rarely matched the proclivities of those around us at home, school, or work? Multiple daily expressions of frustration in having our attention diverted to things of less intrinsic reward value and meaning might become routine. That pattern of behavior and emotional expression in the classroom and elsewhere can be common at any age for children with autism.

What sounds singularly like a problem, though, can also be viewed as an opportunity for educators. Recall that children who initiate more may be more responsive to interventions.⁶⁹ Teachers may effectively guide that motivation to initiate toward improved learning. Indeed, that has become a basic principle that is central to both effective preschool intervention and pivotal response treatment. In both cases educators first react to or create instructional opportunities that recognize the interests of the child, and then use the child's interests as a fulcrum to increase his or her tendency to engage in social learning.⁷⁰ Although it may not be possible to engage in such child-directed episodes of instruction all the time in a classroom, education for children with autism is enhanced by recognizing and using their different motivations and interests.

We will return to this important perspective on social motivation in joint attention and autism when we discuss interventions later in the chapter. For the moment, though, let us consider in more detail how joint attention disturbance or difficulty with adopting a shared frame of reference with other people—and other problems—may affect elementary- and secondary-age students with autism.

EFFECTS OF AUTISM ON ATTENTION IN SCHOOL-AGE CHILDREN

In 2007 a story was published in the *New Yorker* called “Parallel Play: A Lifetime of Restless Isolation Explained.”⁷¹ In this story Tim Page provided the following recollection of the life of a very bright second-grade student in the 1960s who was affected by ASD:

My second-grade teacher never liked me much, and one assignment I turned in annoyed her so extravagantly that the red pencil with which she scrawled “See me!” broke through the lined paper. Our class had been asked to write about a recent field trip, and, as was so often the case in those days, I had noticed the wrong things.

“Well, we went to Boston, Massachusetts through the town of Warrenville, Connecticut on Route 44A. It was very pretty and there was a church that reminded me of pictures of Russia from our book that is published by Time-Life. We arrived in Boston at 9:17. At 11 we went on a big tour of Boston on Gray Line 43, made by the Superior Bus Company like School Bus Six, which goes down Hunting Lodge Road where Maria lives and then on to Separatist Road and then to South Eagleville before it comes to our school. We saw lots of good things like the Boston Massacre site. The tour ended at 1:05. Before I knew it we were going home. We went through Warrenville again but it was too dark to see much. A few days later it was Easter. We got a cuckoo clock.”

It is an unconventional but hardly unobservant report. In truth, I didn't care one bit about Boston on that spring day in 1963. Instead, I wanted to learn about Warrenville, a village a few miles northeast of the town of Mansfield, Connecticut, where we were then living. I had memorized the map of Mansfield, and knew all the school-bus routes by heart—a litany I would sing out to anybody I could corner. But Warrenville was in the town of Ashford, for which I had no guide, and I remember the blissful sense of resolution I felt when I certified that Route 44A crossed Route 89 in the town center, for I had long hypothesized that they might meet there. Of such joys and pains was my childhood composed.

I received a grade of “Unsatisfactory” in Social Development from the Mansfield Public Schools that year. I did not work to the best of my ability, did not show neatness and care in assignments, did not cooperate with the group, and did not exercise self-control. About the only positive assessment was that I worked well independently. Of course: then as now, it was all that I could do.

This recollection poignantly illustrates one fundamental problem for many children with autism and their teachers in elementary and secondary classrooms. The information of interest, or the objects and events that “grab” their attention, are often very different for students affected by autism than for most other students in any given classroom. Of course, all students have idiosyncratic momentary interests or pursuits that divert them from task engagement in the classroom every day, but they are also possessed of the motivation and ability to

recognize the consensual focus of attention with teachers and peers, and to become sufficiently interested in the common topic or achievement goals to return to the collaborative learning process. However, a biologically based difficulty with the motivation and ability to adopt a common frame of reference and topic of interest with others may chronically impede classroom learning and be regarded as a defining feature of the social learning disability of autism.

In a student with an average or above-average IQ the behavior associated with autism may lead teachers to perceive the student as oppositional and may mystify if not alienate peers. This chronic negative impact the child's social learning disability may have on his or her interactions with peers and teachers can contribute to an overlay of frustration and emotional and self-regulation difficulties that make matters worse for the student.

Because this pattern of behavior is often perceived as a failure in a child's ability to pay attention to class tasks and assignments (and as a sign of oppositionality), autism in higher-functioning students is often mistaken for ADHD. In fact, some symptoms of ADHD are often evident in children with autism.⁷² It is important to identify these children because the presence of higher levels of ADHD symptoms can negatively affect social attention, cognition, and academic achievement in children with autism.⁷³ By and large, though, children with ADHD and higher-functioning autism can be distinguished by using both a measure of ADHD symptoms, such as the Conners 3 parent and teacher report scales,⁷⁴ and the Autism Spectrum Screening Questionnaire.⁷⁵

Oddly enough, research has yet to provide a clear and evidence-based conceptual definition of the differences in the attention problems of school-age students with autism and school-age students with ADHD. Nevertheless, the following provisional distinctions can serve as a guide. The attention problems of children with ADHD may be characterized by difficulty inhibiting off-task sensory and mental distractions. If their attention is diverted from a task by distractions, children with ADHD may also have problems in remembering what the task is (working memory weakness) when attempting to return to the task after their attention to distracters has diminished or has been actively inhibited. Attention regulation problems in many children with ADHD may also occur with a tendency for high levels of activity (hyperactivity), which increases the likelihood of distraction and further decreases the likelihood of returning to tasks with the cessation of distraction.

Alternatively, although they are not immune to distraction, a more fundamental issue for children with autism is a tendency to (over)focus on their own interests or visual and auditory stimulus preferences. This and the reduced motivation or ability to routinely become engaged and interested in a common topic or frame of reference with others combine to lead to a high frequency of off-task behaviors. Their off-task behaviors may be complicated by hyperactivity less often than in ADHD, although hyperactivity can be an issue for some children with autism. So in some sense ADHD may be characterized as a tendency to adopt but then lose track of the common topic or social-cognitive frame of reference during classroom tasks and assignments, whereas autism may be characterized as a tendency to have difficulty initially adopting, recognizing, or finding interest in a topic or common social-cognitive frame of reference (coordinated focus of social attention) required by tasks or assignments in the classroom.

INTERVENTIONS AND CHILDREN WITH AUTISM

When evidence-based interventions for autism first began to be developed, researchers did not explicitly recognize problems in initiating versus responding behaviors, or problems with adopting a common frame of reference. Early interventions for autism were primarily based on operant models for learning verbal behaviors that were prominently available in the 1960s and 1970s.⁷⁶ Experimental group studies have provided compelling evidence supporting these applied behavior analysis (ABA) approaches. At minimum, they can be very effective in reducing the risk for intellectual disabilities in preschool children with autism (for example, see Figure 1.5). ABA approaches primarily rely on reinforcing and shaping children's responses to task demands using adult-directed instruction trials. The systematic use of discrete adult-directed instruction trials gradually increases desired behavior targets while reducing problematic behaviors in many children.

The ABA approach provides a very important and effective foundation for interventions for children with autism. But because it seeks to rehabilitate the impairments of children one behavior at a time, it is labor intensive (requiring thirty to fifty hours per week for one or more years) and costly. Moreover, it is primarily designed to improve the ability of children with autism to respond to

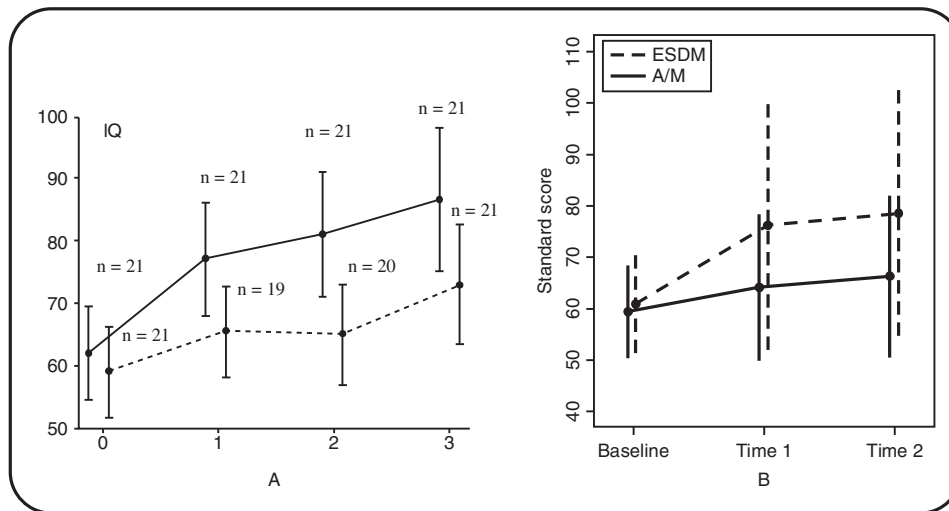


FIGURE 1.5 Comparison of Intervention Outcomes for Intense Preschool Applied Behavior Analysis Intervention (Panel A) and Intense Preschool Developmental Intervention (Panel B)⁷⁷

Panel A depicts the change on a preschool IQ assessment for children receiving ABA intervention (solid line) and those receiving community standard preschool interventions (dotted line). The graph shows development over years of intervention (1, 2) and a one-year follow-up (3). At the one-year follow-up, most of the children who had received ABA intervention had IQ estimates above the average for the range of intellectual disabilities (greater than 70), but few children in the sample who only received standard preschool interventions had comparable cognitive outcomes. Panel B depicts a group of children who received the Early Start Denver Model (ESDM) preschool intervention versus a community standard control. The control group was referred to as the Assess and Monitor (A/M) group. ESDM uses discrete adult-directed instruction trials, as does ABA intervention, but it adds incidental trials that are based on following the attention and behavior of the child to identify a momentary interest and then presenting learning opportunities vis-à-vis the child's expressed interest. This type of hybrid intervention has an impact on cognitive outcomes that is comparable to that of ABA, but it requires fewer hours of intervention. In both studies preschool IQ was measured with the Mullen Scales of Early Learning.

adult directives in instructional settings. Autism is, however, characterized as much by impairments in the ability to spontaneously adopt a common frame of reference and actively initiate and engage in learning with other people as by deficits in children's tendency to respond to directives. Therefore, even the best practitioners recognize that ABA approaches may need to be augmented by

other methods to target social attention and the initiation of self-organizing behaviors in learning situations among children with autism.⁷⁸

In response to this perceived need, intensive “developmental interventions” have been fashioned that attempt to balance the adult-directed, child-responsive format of ABA methods with increased use of child-directed incidental learning trials. In the second approach, interventionists and parents are trained to spontaneously modify instruction by following the child’s direction of gaze or activity and presenting learning opportunities related to the object or event of a child’s immediate, manifest interest. The incidental learning trials are included to promote greater child engagement and self-initiated, active learning. An outstanding example here is a report of a recent randomized controlled study of preschool intervention using the Early Start Denver Model (Figure 1.5, Panel B).⁷⁹ The results of this study indicated that this hybrid combination of discrete and incidental learning trials in early intervention may be just as effective as the pure ABA approach to reducing risk for intellectual disabilities in preschool children with autism but require less time in intervention.

Another approach to preschool intervention has explicitly tested the hypothesis that targeting social attention may promote a type of self-initiation that is pivotal for learning.⁸⁰ At UCLA, Kasari et al. first developed effective intervention methods for increasing IJA in young children with autism. These methods largely involve determining the interests of a child by following the direction of his or her gaze, and then entering into joint activity with the child around that interest. One method here is to imitate the child’s actions with an object of interest. Interestingly, although preschool children with autism are sometimes reticent to imitate others, they respond with increased social attention when other people imitate their actions. This increased social attention, or the spontaneous sharing of attention while the child and interventionist are engaged with the same toy, is a primary goal of the intervention. The interventionist takes pains to socially reward each episode of initiated social attention with especially clear, accentuated, and positive facial, vocal, and gestural affect. When they have been guided toward sharing attention and clearly rewarded in this way, many young children begin to engage in shared attention more frequently and elaborately with adults.⁸¹

After developing this intervention for IJA, the UCLA group then implemented a randomized controlled study that compared groups of preschool

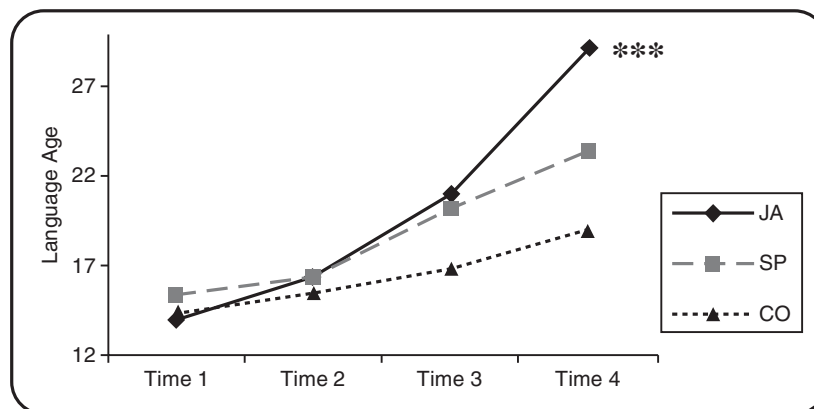


FIGURE 1.6 Impact of Targeting Joint Attention Skills in Preschool Interventions for Children with Autism⁸²

Equal numbers of children were randomly assigned to one of three intervention groups. One group received one year of intense ABA intervention (group CO, 1,400 hours per year). A second group received 1,400 hours of ABA plus 30 hours of targeted intervention designed to increase children’s spontaneous play behaviors (group SP). The third group received 1,400 hours of ABA intervention plus 30 hours of targeted intervention designed to increase initiation of the types of joint attention behaviors illustrated in Figure 1.2 (group JA). The results indicated that two years after the end of the intervention (Time 4), the group that received the targeted joint attention intervention had continued to learn language at a significantly more rapid rate than children who received either of the two comparison interventions.

children who received thirty hours per week of ABA intervention for one year (1,400 hours per year) with children who received ABA treatment augmented by one hour of IJA treatment, five times per week, for five to six weeks (25 to 30 hours per year). The results indicated that both groups of children displayed significant advances in language development (see Figure 1.6). However, the group that also received targeted IJA treatment displayed greater improvement in expressive language development six and twelve months after all treatment than did the ABA-only group. Moreover, children who showed better development of IJA also had better four-year outcomes in regard to both cognitive advances and symptom reduction. Thus, through a deeper appreciation of the contribution of joint attention disturbance to the learning disability of autism in the preschool period, researchers are beginning to move forward on the identification of targeted treatments that hold the promise of increasing the efficiency and cost-effectiveness of early intervention methods.

Other studies have also shown that improving joint attention in preschool children leads to a cascade of improved learning across other domains.⁸³ Moreover, the capacity to respond to and initiate social attention bids has been observed to affect the responsiveness of young children with autism to early language intervention.⁸⁴ Therefore, impairments in social attention are now widely regarded as pivotal targets for intervention among children with autism.⁸⁵ More recently, the National Standards Project of the National Autism Center⁸⁶ has listed joint attention intervention as one of eleven evidence-based approaches to treatment for children with autism (see Chapter Eight for the complete list of approaches). Joint attention has even begun to be recommended as a target for teaching and individualized education program development with school-age children.⁸⁷

The increasing recognition of the pivotal role that social, joint attention impairment plays in the learning problems of school-age children with autism is encouraging. At the very least this may help reduce some of the misinterpretations of behaviors that can disrupt teachers' engagement with often challenging students. However, much like in 1997 when we were just beginning to realize the applications of research on social attention to preschool interventions,⁸⁸ in 2011 we are only on the verge of developing applications designed to advance education for these children.

One question that comes to mind as we consider education for school-age children with autism is, "Can we expect education and intervention to be very effective throughout the lives of children affected by ASD?" The answer to this question is an unequivocal yes, even though it may appear from the reports of the media and researchers that the preschool period is the main time for effective intervention. The perception of its singular importance comes from the evidence of the success of early intervention and the possible association of that success with brain plasticity. Brain plasticity refers to a period of rapid brain growth and organization of neural functions and connections. Children may be most affected by interventions received during such periods of plasticity, and a major period of brain plasticity occurs in the preschool years. It is not, however, the only significant period of brain plasticity.

Another major period of neural plasticity occurs between eight and eighteen years of age and is associated with significant changes in the cognitive, executive, and social competencies of children.⁸⁹ However, the changes in neural plasticity

and aspects of cognitive development that are typical in the development of many children between elementary and secondary school are not as clearly evident in the development of children with ASD.⁹⁰ These observations are beginning to lead to the recognition of a later elementary to secondary school phase of delay in the development of children with ASD. This reminds us that autism is a *developmental* disorder that continues throughout child development, even after preschool treatment. Fortunately, the recognition of neural plasticity between eight and eighteen emphasizes that the late elementary and early secondary school years probably constitute another sensitive period for effective intervention for many.⁹¹ In this regard, school-age intervention may be as important as preschool intervention for children with ASD. We will probably only see optimal outcomes for children affected by ASD if we can improve the continuity of school-age education programs, making them a form of follow-through for advances begun with preschool efforts.

In this regard, important new approaches to and targets of intervention are beginning to follow from a deeper understanding of the social learning disability of autism. For example, one intervention involves teachers' explicit consideration of the interests of individuals with autism when adapting their curriculum and assignments. Very instructive examples of this pivotal response approach are available from the work of Lynn and Bob Koegel at UC Santa Barbara.⁹² Their research group has shown that encouraging children to express their interests by making choices within the confines of academics can lead to improved engagement and writing and better performance of arithmetic tasks.

It is also useful for teachers and school personnel to understand that children with autism may have specific difficulties with reading for meaning. These children can display relatively well-developed word decoding skills, but they often have trouble developing the types of reading comprehension skills that enable them to "read to learn" in later elementary and secondary school grades.⁹³ This is opposite to the pattern of poor decoding but less impaired comprehension observed in children with specific reading disability.⁹⁴ Indeed, 50 to 70 percent of school-age children with higher-functioning forms of autism ultimately display large enough IQ and achievement disparities to qualify for specific learning disability designations,⁹⁵ and reading (comprehension) disability is common among these children.⁹⁶

Deficits in social attention may be especially problematic for learning that requires the student to make social inferences or consistently keep track of social

referents, as is the case in the development of reading comprehension or written expression skills. For example, practice in reading comprehension requires the student to maintain a clear sense of reference (who said or did what) and to make inferences from information about the behavior of the characters. These types of referential and inferential skills in reading enable most children and adults to adopt and maintain similar background details to establish a frame of reference and meaning that is common to all readers of the same passage of text.⁹⁷ However, as we hope is clear at this point, adopting and maintaining a common frame of reference is difficult for children with autism, as is using accrued contextual and background information in problem solving.⁹⁸ Other observations also suggest that reading comprehension deficits may be central to the nature and course of autism in many school-age children. Two recent studies have reported that differences in the intensity of the social impairments of autism are either concurrently correlated with reading comprehension difficulties⁹⁹ or predictive of the development of reading comprehension difficulties in school-age children with autism.¹⁰⁰

Fortunately, a sufficiently detailed literature is emerging to guide teachers and schools in their attempts to improve reading comprehension instruction for students with autism. These students' reading difficulties may involve problems with identifying relationships between causal antecedents and consequences, generating and answering questions while reading (self-monitoring), and locating referents and rereading to repair understanding.¹⁰¹ Adapted instructional methods may help teachers systematically address each of these problem areas. Three informative reviews of research on and methods for delivering reading comprehension instruction for children with autism are now available.¹⁰² Interestingly, one observation in this literature is that cueing students to pay attention to and remember the best referent word of a given pronoun was one of the most effective strategies for improving reading comprehension.¹⁰³ In addition, Flores and Ganz¹⁰⁴ provided a small sample of children with concentrated instruction (twenty minutes per day) to increase their ability to interpret analogies, attend to and recall facts from a passage they read, and practice explaining the details of events they read about in short passages. These authors found that instruction in these three mental processes significantly improved reading comprehension in elementary school children with autism.

TO SUM UP

Studies of intervention for autism tend to focus on “measures of the symptoms of autism (e.g., joint attention, imitation, challenging behaviors) or IQ, which may not directly relate to outcomes of interest” to teachers and schools.¹⁰⁵

There is therefore a gap between the concepts that receive the most attention in research on autism and the needs of schools. We believe we are on the verge of closing that gap, however, and have tried to illustrate that belief with a discussion of the relevance of joint attention to the education of children with autism.

We hope that several main points are clear from this discussion:

- Children with autism are more similar to than different from their peers.
- What distinguishes them in large part is a reduced tendency to readily adopt a shared frame of reference with other people in the classroom. This begins with joint attention differences in preschool and continues to be expressed in different patterns of interests that guide their attention in elementary and secondary classrooms.
- We must recognize the biological basis of the different patterns of interests and social attention that are characteristic of children with autism.
- We must attempt to join with their patterns of interests to cultivate reciprocal engagement with others; this may be one component that is common to all effective methods for advancing education for children with autism.

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