Language Disorders in Children with Autism

JOANNE GERENSER

Autism spectrum disorders (ASD) are a group of severe developmental disorders that are characterized by deficits in social interaction and communication as well as restricted or repetitive patterns of behaviors or interests (American Psychiatric Association, 2000). There are five specific diagnoses within the autism spectrum disorders (see Table 3.1). Two of the disorders—Rett’s disorder and childhood disintegrative disorder—are defined by a regression in skills (Corsello, 2005). The remaining three autism spectrum disorders include autism, Asperger’s disorder (AD) and pervasive developmental disorder—not otherwise specified (PDD-NOS). PDD-NOS is sometimes referred to as “atypical autism” (Towbin, 1997). There is considerable overlap in the diagnostic criteria for the categories of autism, AD and PDD-NOS.

The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR: American Psychiatric Association, 2000), provides the criteria for the diagnosis of ASD (see Table 3.1). Until recently, a diagnosis of an ASD was generally not made until a child was 2½ to 3 years of age. Recent advances in early indicators of autism have, however, revealed behaviors that can distinguish infants with autism from typically developing infants as early as 1 year of age (Dawson, Osterling, Meltzoff, & Kuhl, 2000; Osterling & Dawson, 1994). The two behaviors most frequently noted in very young children that later received a diagnosis of autism were failure to participate in joint attention routines and failure to orient to name (Baranek, 1999; Werner, Dawson, Osterling, & Dinno, 2000).

Instruments used to diagnose autism have evolved and developed over the past 20 years, contributing to more effective differential diagnosis. The most used instruments today include the Autism Diagnostic Interview–Revised (ADI–R: Lord, Rutter, & Le Couteur, 1994), the Autism Diagnostic Observation Schedule–Generic (Lord et al., 2000), and the Diagnostic Interview for Social and Communication Disorders (Wing, Leekam, Libby, Gould, & Larcombe, 2002). In addition, there are several screening tools that are available for use. The Checklist for Autism in Toddlers (CHAT: Baron-Cohen, Allen, & Gillberg, 1992) has been the most rigorously researched and validated of the available screening instruments (Chakrabarti, Haubus, Dugmore, Orgill, & Devine, 2005).

Despite advances in early identifying behaviors and the development of sophisticated diagnostic and screening instruments, accurate differential diagnosis of ASD remains difficult and is often delayed. Many children continue to go undiagnosed or misdiagnosed until they are 3 or 4 years old (Brogan & Knussen, 2003). Some clinicians are hesitant to
<table>
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<th>Diagnosis</th>
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| Autistic Disorder | 1. *Qualitative impairment in social interaction*  
  A. Impairment in use of nonverbal behaviors to regulate behavior  
  B. Failure to develop age appropriate peer relationships  
  C. Lack of spontaneous seeking to share enjoyment  
  D. Lack of social or emotional reciprocity  
  2. *Qualitative impairment in communication*  
  A. Delay or total lack of the development of spoken language  
  B. Marked inability to initiate or sustain conversation, even with adequate speech  
  C. Stereotyped or repetitive use of language  
  D. Lack of spontaneous make-believe play  
  3. *Restrictive, repetitive, and stereotyped patterns of behaviors, interests, and activities*  
  A. Preoccupation with one or more patterns of interests  
  B. Inflexible adherence to nonfunctional routines  
  C. Stereotyped and repetitive motor mannerisms  
  D. Persistent preoccupation with parts of objects  
  4. *Onset of abnormal functioning prior to 3 years of age* |
| Rett's Disorder   | 1. *All of the following:*  
  A. Apparently normal prenatal and perinatal development  
  B. Apparently normal psychomotor development through the first 5 months after birth  
  C. Normal head circumference at birth  
  2. *Onset of all of the following after the period of normal development:*  
  A. Deceleration of head growth at 5–48 months of age  
  B. Loss of previously acquired purposeful hand skills between 5 and 30 months, with subsequent development of stereotyped hand movements  
  C. Early loss of social engagement  
  D. Appearance of poorly coordinated gait or trunk movements  
  E. Severely impaired expressive and receptive language development with severe psychomotor retardation |
| Childhood Disintegartive Disorder | 1. *Apparentely normal development for at least the first 2 years after birth, as manifested by age-appropriate verbal and nonverbal communication, social relationships, play, and adaptive behavior*  
  2. *Clinically significant loss of previously acquired skills before 10 years of age in at least two of the following areas:*  
  A. Expressive or receptive language  
  B. Social skills or adaptive behavior  
  C. Bowel or bladder control  
  D. Play  
  E. Motor skills  
  3. *Abnormal functioning in at least two of the following areas:*  
  A. Qualitative impairment in social interaction (see Autistic Disorder)  
  B. Qualitative impairment in communication (see Autistic Disorder)  
  C. Restricted, repetitive, and stereotyped patterns of behavior, interests, and activities  
| Asperger's disorder | 1. *Qualitative impairment in social interaction*  
  A. Impairment in use of nonverbal behaviors to regulate behavior  
  B. Failure to develop age-appropriate peer relationships  
  C. Lack of spontaneous seeking to share enjoyment  
  D. Lack of social or emotional reciprocity  
  2. *Restrictive, repetitive, and stereotyped patterns of behaviors, interests, and activities*  
  A. Preoccupation with one or more patterns of interests |
discuss the possibility of autism because they anticipate family distress and assume adverse side effects of labeling the child (Filipek et al., 1999). However, families universally prefer to be informed about a diagnosis of autism as early as possible (Marcus & Stone, 1993). Furthermore, it has been well established that early intervention yields the most successful outcomes (Dawson & Osterling, 1997; Filipek et al., 2000).

Currently, the best estimate of the prevalence of ASD in children under the age of 8 years is approximately 60 in 10,000, or 1 in every 166 children (Fombonne, 2005). It is clear that the prevalence of ASD has increased in the past 15 years. What is not clear is the reason for this increase. Expanded diagnostic criteria, improved diagnostic tools and instruments, better awareness, and possible environmental and genetic factors have all been discussed as possible contributing factors (Rutter, 2005; Blaxill, 2004).

ASD can occur at all levels of intelligence, although 40% of people with ASD function in the range of mental retardation (Fombonne, 2005). It is four times more common in boys than in girls (Fombonne, 2005). There is a higher incidence of autism in siblings and family members, suggesting a strong genetic component (Bailey et al., 1995; Rutter, 2005). ASD is commonly associated with other developmental disabilities such as fragile X syndrome and tuberous sclerosis (Rutter, Silberg, O’Connor, & Simonoff, 1999; Wiznitzer, 2004). Almost one third of people with autism will develop epilepsy by adolescence (McDermott et al., 2005).

### EARLY DEVELOPMENT

#### Joint Attention

Joint attention is the ability to use eye contact and pointing for the social purpose of sharing experiences with others. Typical infants demonstrate, from very early in life, a predisposition for focusing on eye gaze, facial expression, gestures, and caregivers’ voice (Bushnell, Sai, & Mullin, 1989; Hains & Muir, 1996; Mundy & Neal, 2001).

Joint attention begins with face-to-face affective exchanges between the infant and caregiver. By 6 months of age, the infant becomes interested in objects in the environment. This is followed shortly by the coordination of the child’s and caregiver’s attention to a third object or event. These early triadic exchanges characterize communication between 6 and 18 months of age (Bakeman & Adamson, 1986).

A typical infant is able to follow a caregiver’s point or eye gaze by 9 months of age. By
1 year, a child will begin to demonstrate protoimperative pointing (pointing to get an object). Protodeclarative pointing follows a few months later. The goal of protodeclarative pointing is to direct an adult’s attention to an object or event of interest simply for the purpose of sharing this interest (Corkum & Moore, 1998).

Joint attention plays a critical role in the development of language, communication, and social interaction (Baldwin, 1991). Reading facial expressions and intonation in others helps the young child perceive emotional states, which, in turn, allows the child to perceive new events with fear or happiness. More importantly, it contributes to the development of social communication such as sharing experiences and expressing empathy (Vander Zanden, 1993).

Joint attention is important for appreciating a speaker’s intention and perspective. By 16–19 months of age, a typical child is sensitive to a caregiver’s nonverbal cues such as eye gaze or gestures as a source of information about the reference of novel objects (Baldwin, 1991). This is critical to allow the young language learner to accurately map words on to novel objects, given the infinite possibilities in the environment.

There is an abundance of research demonstrating a breakdown or failure to develop joint attention skills in children with ASD (Mundy et al., 1994; Osterling & Dawson, 1994; Werner, Dawson, Osterling, & Dinno, 2000). Differences in early joint attention behaviors become apparent in young children with ASD by approximately 1 year of age. Children with ASD fail to attend to attentional cues such as eye gaze, pointing, and gestures (Klin, Chawarska, Ruben, & Volkmar, 2004). They do not respond preferentially to a caregiver’s voice (Lord, 1995; Dawson, Meltzoff, Osterling, & Rinaldi, 1998). Children with ASD have difficulty shifting gaze between people and objects and demonstrate little or no protodeclarative pointing (Werner et al., 2000). In a study examining word learning, Baron-Cohen, Baldwin, and Crowson (1997) found that children with autism made frequent mapping errors because of their inability to follow the eye gaze or pointing of others.

Research suggests that joint attention skills can serve as predictors of later language abilities (Baldwin, 1991; Mundy & Crowson, 1997). Measures of joint attention behaviors now serve as powerful prognostic indicators, allowing for earlier identification of children with ASD (Baron-Cohen, Cox, Baird, Swettenham, & Nightingale, 1996).

**Early Regression vs. Nonregression**

When Leo Kanner first described autism, he suggested that it was a disorder present from birth (Kanner, 1943). Until recently, however, little was actually known about the early development, as diagnosis was usually not made until the 3rd or 4th year of life. Clinicians and researchers were forced to rely upon parent recall of the course of development during the first two years of life. Many parents reported being aware of differences from the beginning and noted that these problems gradually became more severe (Hoshino et al., 1987). Others, however, described onset as occurring almost overnight; there was normal or even precocious development, followed by a sudden and dramatic loss of skills (Hoshino et al., 1987; Rogers & DiLalla, 1990).

These two distinct patterns of development have been validated using detailed parent interview protocols and tools, review of early home videos, as well as tracking from birth infants who were at risk of autism based on to familial history (Osterling & Dawson, 1994; Werner, Dawson, Munson, & Osterling, 2005). It has been estimated that anywhere between 20% and 47% of individuals with autism exhibit late-onset patterns (Davidovitch, Glick, Holtzman, Tirosh, & Safir, 2000; Lord, 1995). Furthermore, following regression, these children rarely regain skills immediately, and few, if any, demonstrate full recovery (Rapin & Katzman, 1998).
These two groups of children may represent distinct subgroups of autism with potentially very different underlying etiologies. Of significant interest to parents and clinicians is the question of whether these two subgroups of children experience different outcomes (Werner et al., 2005). To date, studies have resulted in inconsistent findings with respect to outcomes in relation to early versus late onset. Some studies found that the late-onset or regression group was more severely impaired in speech and language as well as in social skills compared to the early-onset or nonregression group (Brown & Prelock, 1995; Rogers & DiLalla, 1990). Davidovitch et al. (2000) found that more of the children in the regression group developed verbal communication skills when compared to the nonregression group. Still others found no differences between the groups (Werner et al., 2005).

**SPEECH, LANGUAGE, AND COMMUNICATION SKILLS**

Although the behavioral characteristics of autism and related disorders vary considerably, one consistent problem area is in the acquisition and use of language (Lord & Paul, 1997; Rutter & Schopler, 1987). Many individuals with autism perform within normal limits on nonverbal intelligence tests yet demonstrate severely impaired or restricted use of language (Gluer & Pagin, 2003; Wetherby, Prizant, & Schuler, 2000). The unique speech and language problems present in children with autism have attracted significant attention developmental psycholinguists. However, the precise nature of these deficits has not yet been delineated.

There is great heterogeneity across cognitive, linguistic, and behavioral functioning within and across individuals with autism. Estimates indicate that approximately 35% of children with autism may not develop functional speech (Mesibov, Adams, & Klinger, 1997). Anywhere from 40% to 75% of individuals diagnosed with autism have IQ scores consistent with a diagnosis of mental retardation (Frith, 1989; Zelazo, 2001). The variability and nature of the language deficits remain present, however, even in children with an IQ that is within normal limits. Therefore, the language deficits cannot be simply accounted for by deficits in general intelligence (Chan, Cheung, Leung, Cheung, & Cheung, 2005). The best approach for determining cognitive and linguistic deficits specific to autism is to focus on the higher functioning subgroup of individuals with autism spectrum disorders (Lord & Paul, 1997; Rutter, 1983; Tager-Flusberg, 1985a, 1985b). This subgroup of individuals provides researchers with an opportunity to identify those characteristic deficits that are unique to autism and are not the result of more general cognitive impairments. Although these findings may not be generalizable to the entire population of individuals diagnosed with autism and related disorders, this may be a starting point for research with the other more severely impaired subgroups.

**Articulation and Prosody**

Delayed onset of speech is typical in children with autism. Despite this delay, children with autism seem to demonstrate normal speech acquisition patterns and typical phonological errors (Bartak, Rutter, & Cox, 1975; Gluer & Pagin, 2003; Kjelgaard & Tager-Flusberg, 2001). Thus, the phonological development of children with autism is appropriate for their developmental levels. These findings, however, have been questioned with more recent research. Flipsen (1999) found that 33% of high-functioning adolescents and adults with autism and Asperger syndrome exhibited distortion errors. This is compared to estimates of 1–2% in the typical adult population. One of the problems with the earlier findings was that
researchers focused exclusively on children in preschool and elementary school (Flipsen, 1999; Shriberg et al., 2001).

Verbal individuals with autism demonstrate deficits in the comprehension and use of prosody (Shriberg et al., 2001). These deficits typically persist over time, despite improvements in other aspects of speech and language (Simmons & Baltaxe, 1975).

Abnormal prosody has been shown to negatively affect the perception of social and communicative competence of a speaker (Paul et al., 2004; Shriberg et al., 2001). Furthermore, it has been reported that the atypical prosody of individuals with autism is the factor that most immediately creates an impression of oddness (Mesibov, 1992).

Prosody can be examined in three general categories: grammatical prosody, marking syntactic information within a sentence; pragmatic prosody, used to carry social information beyond what is conveyed in the sentence; and affective prosody, the change in register conveying speaker’s general feelings. Paul, Augustyn, Klin, and Volkmar (2005) examined 30 individuals with autism who ranged in age from 10 to 49 years. They found that all of the speakers with ASD demonstrated significant problems with pragmatic and affective prosody. Problems with grammatical prosody were also noted.

**Semantics**

Semantic problems have been noted in children with autism at the earliest stages of language acquisition. The first words acquired by children with autism are generally names for concrete objects, such as “cookie” and “car.” Noticeably absent from early vocabularies of children with autism are words such as “up,” “more,” or “all gone” (Menyuk & Quill, 1985).

Although it is clear that children with autism demonstrate semantic deficits, there are conflicting views as to the nature of these deficits. In a series of experiments examining naming and categorization skills, children with autism performed similarly to mental-age-matched control groups (Tager-Flusberg, 1985a; Ungerer & Sigman, 1987). These results suggest that the semantic deficits present in children with autism are a result of cognitive deficits and are not unique to autism.

Other findings, however, indicate that children with autism demonstrate semantic deficits that cannot be accounted for by cognitive deficits. Children with autism fail to use semantic information to aid in encoding verbal information and to recall information (Bowler, Matthews, & Gardiner, 1997; Tager-Flusberg, 1991). They are not able to recall words from a list of related words any better than from a list of unrelated word in free recall tasks (Tager-Flusberg, 1991). In addition, they rely on syntactic word order as opposed to semantic comprehension strategies when interpreting sentences (Paul, Fischer, & Cohen, 1988).

Although many children with autism demonstrate age-appropriate vocabulary skills as measured by standardized tests, there is compelling evidence that the underlying organization of the lexicon may be atypical and impoverished (Dunn & Bates, 2005; Gerenser, 2004; Kjelgaard & Tager-Flusberg, 2001). Dunn, Gomes, and Sebastian (1996) found that children with autism provided significantly fewer prototypical exemplars of categories in a word-fluency task when compared with typical developing children and language-impaired children matched on mental age. This apparent lack of organization within lexical categories could inhibit access to more prototypical exemplars.

Findings from more controlled online tasks also provide evidence of atypical lexical organization in children with autism. Gerenser (2004) used an online priming task to examine the lexical organization of children with autism. More specifically, naming reaction time was measured within a picture-naming task that included association primes (e.g., hat–head), category primes (e.g., nose–head) and identity primes (e.g., head–head). The results
revealed significant differences within the association prime condition between the children with autism and the typically developing control group. Children with autism did not demonstrate the robust priming effect that is found in the typical population within association tasks. Differences have also been noted in semantic priming tasks. Kamio, Robins, Kelley, Swainson, and Fein (2007) examined naming reaction times in teens with autism and typically developing age-matched peers. The typical control group demonstrated significant priming effects for semantically related words, whereas no effects were noted for the participants with autism.

Recent advances in electrophysiological research provide neurophysiologic support for these behavioral findings. Dunn and Bates (2005) found significant event-related potential (ERP) differences in responses by children with autism when compared to typically developing children. More specifically, the children with autism consistently failed to show a differentiation response to context-dependent words in a single-word semantic classification task.

Children with autism appear to rely on inflexible rule-based strategies to form novel categories (Klinger & Dawson, 1995, 2001). Children with autism and typically developing peers were given pictures of nonsense objects to sort into categories. In one condition, the children were given the rules for membership (e.g., big head; three eyes; yellow); in the other condition, they were not given any rules. When given the rules for category membership, both groups of children were able to categorize novel items. Typical children were also able to form novel categories using a prototype strategy in the “no rule” condition. The children with autism were unable to extract the common features of novel items to form prototypes.

Semantic development and processing is a complex and critical aspect of language (see chapter 16 by McGregor). Anecdotal information as well as recent research suggest that children with autism demonstrate unique deficits in semantic development and lexical processing. Further behavioral and electrophysiological research will be essential in the future in order to delineate the specific aspects of these deficits and guide future intervention.

Syntax

There are conflicting findings in the area of syntactic development. Some researchers have concluded that children with autism have no specific deficits in the comprehension and production of syntax (Gluer & Pagin, 2003; Tager-Flusberg, 1994; Waterhouse & Fein, 1982). The length and overall complexity of utterances seemed comparable to individuals with similar cognitive developmental levels.

A longitudinal study, spanning 2 years, compared six 3- to 6-year-old high-functioning children with autism with six mental-age-matched children with Down syndrome. The findings revealed similar syntactic development across the two groups (Tager-Flusberg et al., 1990). Furthermore, the development across the two groups did not differ from typical development.

Others, however, propose that there may be specific deficits in syntactic processing and development in children with autism (Boucher, 2003; Kjelgaard & Tager-Flusberg, 2001). For example, typically developing children are significantly better at recalling syntactically well-formed utterances, regardless of degree of semantic relatedness, than are children with autism (Ramando & Milech, 1984). In addition, children with autism use fewer grammatical morphemes than do typically developing children (Bartolucci, Pierce, & Streiner, 1980). Even when IQ scores and vocabulary scores are within normal limits, many children with autism demonstrate specific deficits in syntax on standardized language tests (Kjelgaard & Tager-Flusberg, 2001).
There remain many unresolved questions regarding the development and use of syntax in children with autism. In the past most of the research has examined only the most basic aspects of syntax, and findings have been mixed (see chapter 17 by Fletcher). The more recent findings demonstrating deficits in syntax and morphology that could not be accounted for by cognitive deficits have led to speculation about a possible link between specific language impairment (SLI) (see chapter 1 by Schwartz) and autism (Kjelgaard, & Tager-Flusberg, 2001). More research is necessary to determine whether similar linguistic profiles between some children with ASD and children with SLI demonstrate a superficial parallel or a specific subgroup of autism. It may be that the gene or genes involved in SLI are also involved in this subgroup of children with ASD (Kjelgaard & Tager-Flusberg, 2001).

Pragmatics

Deficits in social skills are one of the hallmark features defining autism. Thus, it is not surprising that individuals with ASD demonstrate significant problems in pragmatics. Pragmatics can be defined as the appropriate use of language in context (see chapter 18 by Fujiki & Brinton). More specifically, pragmatics refers to the conventions that govern language within social interactions (Prutting & Kirchner, 1987).

Deficits in pragmatics are seen across the entire autism spectrum. Even those individuals who develop advanced vocabulary skills and sophisticated grammar will have problems with the use of language in social situations (Klin & Volkmar, 1997). These social communication deficits often create a discrepancy between IQ and adaptive behavior (Volkmar, Klin, Schultz, Rubin, & Bronen, 2000). For example, an individual may have a score within normal limits on an IQ test but be unable to participate appropriately in a social conversation, or may get a college degree but not be able to keep a job due to the inability to respond to social cues.

Deficits in nonverbal communication skills are prominent in ASD. These deficits include problems with comprehension and use of gestures and intonation, an inability to read facial expressions, as well as qualitative issues with the use of eye contact (Lewy & Dawson, 1992; Mundy & Crowson, 1997). Eye contact issues typically involve a failure to make appropriate eye contact during conversations and in other social situations. In some cases, the individual overcompensates for a lack of eye contact by staring intently during a conversation. Much of what is communicated in social situations is done nonverbally. Thus, individuals on the autism spectrum often miss key information within social interactions.

Individuals with ASD have significant deficits in conversational skills (Loveland & Tunali, 1993). They demonstrate fewer initiations, frequent empty turns, as well as an inability to follow the topic or content of a conversation. This often leads to noncontextual or socially inappropriate comments (Klin & Volkmar, 1997). In addition, many individuals with ASD have problems with turntaking and perseveration of topics. They often have a difficult time recognizing and repairing breakdowns in communicative exchanges (Prizant & Rydell, 1993).

There is little debate as to the presence of a significant pragmatic language disorder in autism. One area that is under debate is the idea that there is a specific subgroup of children with ASD referred to as pragmatic language-impaired (PLI). PLI, previously referred to as semantic-pragmatic disorder, refers to a subgroup of children who demonstrate fluent expressive language skills with clear articulation but fail to use their language appropriately (Bishop, 2000). The question today involves the relationship between ASD, PLI, and SLI (Bishop & Norbury, 2002). There may be a closer relationship between
PLI and autism than between PLI and SLI; PLI may be a subgroup of autism, typically described as high-functioning autism (Shields, Varley, Broks, & Simpson, 1996).

An alternative to this concept is that some children with PLI may actually fall between the classifications of SLI and ASD (Bishop, 1998, 2000)—that is, these children demonstrate some aspects of SLI and some symptoms of autism, but they fail to reach diagnostic criteria for an autism spectrum disorder. The actual research exploring the relationship between SLI, PLI, and ASD is quite limited. Bishop and Norbury (2002) conducted the most extensive study to date. They examined 12 language-impaired children (ages 8–9 years) and found that some children met the criteria for PLI but did not meet the criteria for autism. This therefore contradicts the assumption that PLI is a subgroup of autism. Rather, they suggest that SLI, PLI, and ASD are on a continuum with no clear boundaries. It is likely that future research will reveal pragmatic deficits in language-impaired children with very different underlying causes (Bishop & Norbury, 2002).

Regardless of the specific diagnosis, any comprehensive language intervention program for individuals with ASD must address the challenges of social communication. In addition, careful evaluation of the child must involve the whole clinical picture, not just the communication impairment alone (Bishop & Norbury, 2002).

RELATED ISSUES

Echolalia

It has been estimated that more than 75% of verbal children with autism demonstrate echolalia, the repetition of what has been said by someone else (Prizant, 1983). This is a significantly higher incidence than in any other population of people who also demonstrate echolalia (e.g., mental retardation, schizophrenia). Echolalia can be immediate, or it can be delayed by hours or even days. As the child with autism develops more language, there is typically a reduction in the use of echolalia (McEvoy, Loveland, & Landry, 1988). Echolalia was once seen as nonfunctional and problematic (Lovaas, 1977). More recently, however, some aspects of echolalia have been shown to be quite functional and can actually play an important role in language and communication development (Prizant & Duchan, 1981; Prizant & Rydell, 1984). Echolalic utterances may actually be used with communicative intent (e.g., to request) before the individual with autism has learned the more appropriate words to use.

Even if some of the child’s echolalic utterances may be functional and communicative, however, others may be nonfunctional and self-stimulatory in nature (Frith, 1998). It is essential, especially as the child grows older, to distinguish between echolalic utterances that are functional and communicative and those that are self-stimulatory and nonfunctional. There is an inverse relationship between the presence of high rates of self-stimulatory behavior and learning (Lovaas & Smith, 1989). Therefore, those behaviors determined to be self-stimulatory, including immediate and delayed echolalia, must be addressed programmatically to ensure the learning and development of more appropriate behaviors.

Deixis

Another unique aspect of the language of verbal individuals with autism is the difficulty with deictic terms. Deictic terms refer to places, times, or other participants in a conversation from the speaker’s point of view. Deixis is the aspect of language that codes shifting reference. Personal or demonstrative pronouns, such as “I” and “you” or “this” and “that,”
depend on whether a person is a speaker or a listener. Other examples of deictic terms include terms such as here/there as well as temporal terms such as now and then. Typically developing children as young as 2 and 3 years of age are sensitive to deixis (Wales, 1986). There is evidence that speakers with autism have a great deal of difficulty with deictic terms from very early in development on through adulthood (Le Couteur et al., 1989; Lee, Hobson, & Chiat, 1994). One of the most frequently noted problems with deixis in autism is pronoun reversal. In the 1960s and 1970s the erroneous use of “I” and “you” was viewed as a problem in the identification of self (Bettelheim, 1967; Mahler, 1968). More recently, however, deficits in joint attention and perspective taking have been identified as the major factors that contribute to the problems with deixis in autism (Hemphill, Picardi, & Tager-Flusberg, 1991).

**Play Skills**

Play can be defined as an activity that is pleasurable, intrinsically motivational, flexible, nonliteral, and voluntary, and that involves active engagement (Wolfberg, 1999). Play skills in children with autism vary widely and appear to be influenced by the severity of autism and the degree of cognitive deficits. For some children, even the most basic object manipulation is severely impaired. Toys often occasion repetitive, nonfunctional, and concrete behaviors involving little or no imagination (Thomas & Smith, 2004; Stone et al., 1990). Children with ASD also demonstrate reduced frequency and complexity of pretend play (Rogers, Cook, & Meryl, 2005). In addition, they are more frequently engaged in solitary play activities as opposed to social play activities (Pierce-Jordon & Lifter, 2005).

Although the majority of the evidence suggests a wide array of play deficits in ASD, there are some conflicting findings. Most notably, there is some disagreement as to the extent of the deficits in pretend play. Some researchers have found that when controlling for cognitive abilities, children with ASD engaged in the same amount of pretend play as do their peers (Morgan, Maybery, & Durkin, 2003). Other conflicting results can be accounted for by variations in the definition of pretend play.

Despite some conflicting findings, play skills in most children with autism are qualitatively different from their age-matched and IQ-matched peers. These differences cannot be solely attributed to developmental delays (Rogers, Cook, & Meryl, 2005), and thus the underlying etiology of these deficits remains unclear. Deficits in joint attention, executive functioning, and theory of mind have all been proposed to underlie the play deficits in autism (Tager-Flusberg, 1999). However, there is no direct evidence for the relation of play deficits and each of these factors.

Jarrold, Boucher, and Smith (1993) suggested that executive functioning deficits were insufficient to account for play deficits in ASD. They argued that deficits in executive functioning would mean that the child would be less likely to rely on internal plans and to be more dependent on the investigation of external objects. Therefore, the children should be less likely to use objects in imaginative ways (e.g., using a banana as a telephone). Their results, however, indicated that children with autism were as skilled in using objects in imaginative ways as cognitively controlled peer groups. Furthermore, play skills in the children with ASD did not correlate with measures of theory of mind or of joint attention (Morgan et al., 2003). Specifically, many of the children (3 to 6 years of age) were able to demonstrate pretend play but unable to demonstrate theory of mind, as opposed to the age-matched control group, who were able to do both.

Deficits in play are frequently presented as a core diagnostic feature in autism. However, we still know relatively little about the nature of play in ASD, the severity and range of deficits across the spectrum, and the possible factors contributing to these deficits.
Hyperlexia

Hyperlexia has been defined as having word-recognition skills that are far above reading comprehension skills (Nation, 1999; Silberberg & Silberberg, 1967). The observation of exceptional reading skills in autism was first made by Kanner (1943). Even after 60 years, however, there remain more questions than answers about hyperlexia (for an excellent review, refer to Grigorenko, Klin, & Volkmar, 2003). Some investigators have proposed that hyperlexia is a subtype of dyslexia (Benton, 1978; Cohen, Campbell, & Gelardo, 1987). Others, however, believe it to be a subtype of a language impairment, not specific to ASD (Healy, Aram, Horowitz, & Kessler, 1982; Seymor & Evans, 1992).

Although hyperlexia is not exclusive to autism, it does occur at a higher frequency than in other groups (Grigorenko et al., 2003). The prevalence of hyperlexia in ASD is estimated to be between 5% and 10% (Burd & Kerkeshian, 1985). Children with ASD who have hyperlexia demonstrate an early and often obsessive interest in letters and in printed material in general (Nation, 1999). There is, however, a significant gap between the decoding abilities and comprehension.

One hypothesis concerning hyperlexia is that it is just one of many obsessive interests and is not tied directly to cognitive or linguistic factors (Klin et al., 2004). Instead, its maintenance reflects a reduced ability to make sense of social stimuli and a preference for unchanging, constantly interpretable stimuli, such as print. As the child develops better social skills and a capacity for social stimuli, the obsessive interest in letters and print diminishes.

THEORIES UNDERLYING CORE DEFICITS IN AUTISM

Extensive research has been conducted over the past three decades examining the genetic, neurological, behavioral, and cognitive foundations of autism. Genetic research to date suggests a polygenetic mode of inheritance with as many as 10–20 autism susceptibility genes involved (Minshew, Sweeney, Bauman, & Webb, 2005; Rutter, 2005; see also chapter 10 by Tomblin). Neurological research in autism has been greatly advanced in the past decade through the use of structural imaging, FMRI, and autopsy studies. Some of the most significant findings include evidence of early abnormalities in brain growth, which coincide with the onset of many clinical symptoms as well as evidence of underconnectivity of neocortical neural systems involved in social, communication, and reasoning abilities (Minshew et al., 2005).

There are four important cognitive theories that are prominent in the autism literature and attempt to explain the speech, language, and communication deficits in individuals with ASD.

One of the best-known perspectives, referred to as the mindblindness theory or theory of mind model (TOM model) was first described by Baron-Cohen and colleagues (Baron-Cohen, Leslie, & Frith, 1985). (For a comprehensive overview of this model, refer to Baron-Cohen et al., 2005.) This model suggests that the social communication deficits in autism reflect a fundamental impairment in the ability to understand the thoughts or intentions of others (Tager-Flusberg, 1999). By 4–5 years of age, typically developing children demonstrate theory of mind or the ability to understand the complex mental states of others (Leslie, 1987). There is considerable experimental evidence that children with autism fail to develop theory of mind, even at the most basic level (Baron-Cohen et al., 1985; Holroyd & Baron-Cohen, 1993). This failure to develop theory of mind is, in turn, thought to lead to the social and language impairments present in autism (Tager-Flusberg, 1999).
Although the model is compelling, there are some problems that must be considered. Some children with autism demonstrate language deficits that go beyond the inability to use language in social contexts. The theory of mind hypothesis fails to account for the grammatical, phonological, and semantic problems found in many individuals with autism (Tager-Flusberg, 1999). Furthermore, the theory of mind model does not provide an adequate explanation for some of the other deficits present in children with autism, such as executive function or perceptual processing difficulties (Burnette et al., 2005; Frith, 1989; Pennington & Ozonoff, 1991). Despite the limitations, the TOM account has provided both theoretical as well as practical benefits in understanding and treating the social and communication deficits in people with ASD (Happe, 2005).

The executive functions theory (EF) (Ozonoff, South, & Provenca, 2005) proposes that a general cognitive disturbance in executive function is central to autism (Pennington & Ozonoff, 1996). Specific executive functions include the ability to initiate behaviors while inhibiting competing responses that may interfere, the ability to regulate attention and filter distraction, and the ability to shift attention across relevant stimuli (Ozonoff, 1995). The primary EF deficit hypothesis argues that the symptoms observed in autism are consistent with breakdowns in EF related to frontal lobe damage (Hill, 2004; Pennington & Ozonoff, 1996). The research supporting the primary EF deficit hypothesis was, however, conducted primarily with school-aged children and adults. More recent research with young preschool children with autism failed to support the presence of specific EF deficits when compared with both chronological-age-matched and mental-age-matched peers (Dawson et al., 2002; Yerys, Hepburn, Pennington, & Rogers, 2007). These findings suggest that the EF deficits found in older children and adults may be secondary to the autism. It has been proposed that the delay in EF deficits may be the result of limitations of the social experiences needed to develop and refine EF skills (Dawson et al., 2002). Another perspective suggested that the deficits present in older individuals are primarily due to challenges in processing complex information, which would not be observable in young children due to the types of tasks employed with this population (Minshew & Goldstein, 2001; Williams, Goldstein, & Minshew, 2005).

Researchers propose that children fail theory of mind tasks because of a more general executive function deficit as opposed to a disturbance in theory of mind (Frye, Zelazo, & Palfai, 1995; Pennington & Ozonoff, 1996). There are a few problems with this conclusion. The first is that it fails to explain the individual with autism’s ability to understand false photographs and maps while being unable to perform similar false belief tasks (Leslie & Thaiss, 1992). Deficits in executive functions should result in similar performance across both tasks. Second, it fails to offer an account for why some children with ASD demonstrate significant executive function deficits yet perform well on TOM tasks (Ozonoff, 1995).

Although the EF theory does not appear to be sufficient to account for all of the core deficits in autism, it is an important area of research that does effectively address some of the complex behaviors in autism. Future research in areas such as cognitive flexibility, working memory, and inhibition, as well as strategies for addressing these areas clinically, is already underway (Ozonoff et al., 2005).

The central coherence theory (Happe, 2005) is a third model that attempts to account for the core deficits present in autism (Frith, 1989; Frith & Happe, 1994). Typically developing children are able to interpret information rapidly because of automatic and implicit coherent processing (Frith, 1989). This model proposes that children with autism demonstrate weak central coherence. Thus, these children tend to focus on individual pieces of information as opposed to more holistic processing. There is considerable evidence for piecemeal processing in this population (Plaisted, Swettenham, & Rees, 1999; Jolliffe & Baron-Cohen, 2001). For example, children with autism demonstrate superior performance
on block design or embedded figure tasks—two tasks that favor piecemeal processing—when compared to mental-age-matched peers (Morgan, Maybery, & Durkin, 2003). In addition, children with autism do poorly on tasks that require more holistic processing, such as disambiguation tasks or drawing inferences (Happe, 1997; Jolliffe & Baron-Cohen, 1999).

The central coherence theory provides insight into the learning styles of individuals with autism and could, in turn, help to inform teachers and clinicians working with this population. As with each of the theories presented, the central coherence theory is insufficient to account of all of the core deficits present in ASD. For example, there are some individuals with autism who appear to have theory of mind, pretend play skills, and joint attention skills, yet demonstrate the inability to process information holistically (Happe, 2005). It is very likely that the central coherence theory explains one component of a complex set of cognitive neural mechanisms or systems working together.

The social orienting model (Mundy & Burnette, 2005), is based on two key assumptions regarding early development. The first primary assumption is that typically developing children are predisposed to attend preferentially to social stimuli over nonsocial stimuli (Blass, 1999). The second assumption is that the early and pervasive deficits in joint attention in children with autism reflect a basic disturbance in this preference for social information (Mundy & Burnette, 2005; Mundy & Neal, 2001). There is considerable evidence of joint attention deficits in young children with autism (Baron-Cohen et al., 1996; Mundy, 1995; Osterling & Dawson, 1994).

In addition to the deficits in joint attention, there is evidence that children with autism do not attend preferentially to social information. For example, children with autism do not show a preference for speech over nonspeech (Klin, 1991). Dawson, Meltzoff, Osterling, Rinaldi, and Brown (1998) found that children with autism failed to orient preferentially to social stimuli such as clapping versus nonsocial stimuli such as shaking a rattle.

The social orienting and joint attention deficits in young children with autism deprive them of the social information necessary for typical neurodevelopment (Mundy & Burnette, 2005; Mundy & Neal, 2001). The loss of critical social input distorts or disrupts typical symbolic and social cognitive development (Mundy, 1995). The social orienting and joint attention deficits lead to secondary neurological disturbances. Over time, the child moves further and further off the path of normal development.

As with the first three theories, this proposal provides a compelling explanation for the language and social deficits in autism. However, it fails to account for some of the more unique learning characteristics described within the central coherence model. It seems clear from this review that the answers we are looking for to explain the complex and multifaceted disorder of autism will not fall within one single cognitive theory. Several independent cognitive deficits may collectively account for the core deficits present in individuals with autism, and the answer probably lies somewhere in all of these models. Future research should continue to examine these different models as well as the relationships among them to derive a more comprehensive picture of the autism spectrum disorders.

**INTERVENTION**

There has been a great deal written over the past decade regarding the treatment of speech and language skills of individuals with autism (for an in-depth review of communication intervention, see Corsello, 2005; Goldstein, 2002). Interventions range from behavioral approaches to developmental and social pragmatic models. A thorough review of the underlying theoretical foundations, as well as in-depth overview of the actual approaches, is beyond the scope of this chapter. The reader is referred to the following sources for
reviews: for the traditional behavior approach (Lovaas, 2002); natural behavior approach (Koegel, 1995); developmental approach (Gerber, 2003), and social-pragmatic approach (Prizant, Wetherby, & Rydell, 2000).

There is evidence that supports the use of more traditional behavioral approaches, such as discrete trial instruction, and the more naturalistic behavioral interventions, such as natural learning paradigm, to successfully address the speech language deficits in individuals with autism (Buffington, Krantz, McClannahan, & Poulsdon, 1998; Koegel, O’Dell, & Dunlap, 1988; Lasky, Charlop, & Schreibman, 1988; Lovaas, 1987). The developmental model, known as DIR (developmental, individual difference, relationship-based) or “floor-time” (Greenspan, 1997; Greenspan & Wieder, 1998), and the SCERTS (social communication, emotional regulation, and transactional support) model (Prizant, Wetherby, & Rydell, 2000) are frequently discussed in the literature as interventions for the communication deficits in individuals with autism. Both intervention models are comprehensive and focus on the range of challenges present in learners on the autism spectrum. Although there is little scientific evidence available for either model, both have anecdotal support. Greenspan and Wieder (1997) reviewed charts of a large number of children who had received DIR and found progress across the majority of participants. The SCERTS model has evolved over the years in response to ongoing research focusing on the learning characteristics children with autism. However, as with the DIR approach, support for this SCERTS remains anecdotal in nature.

The use of augmentative/alternative communication (AAC) to support speech–language development in autism has also been found effective. There is evidence that the use of the Picture Exchange Communication System (PECS; Bondy & Frost, 1994), sign language, and other visual systems can enhance the speech, language, and communication of individuals with autism (Charlop-Christy, Carpenter, Le, LeBanc, & Keller, 2003; Konstantantareas, 1984; Layton & Baker, 1981).

Facilitated communication (FC) is not a form of AAC that has any empirical support. FC, first identified in Australia and later popularized in the United States (Biklen, 1990; Crossley, 1992), involves a facilitator providing physical support on the hand, arm, or shoulder of a person with autism as he types on a keyboard. Proponents of FC have made remarkable claims of extraordinary literacy and cognitive abilities in people with ASD and that their failure to express themselves was due largely to motor limitations (Biklen, Morton, & Gold, 1992; Biklen & Schubert, 1991). Due to the widespread and controversial claims made by the FC community, as well as the weak theoretical underpinnings (Hudson, 1995), there has been considerable experimental evaluation. More than 15 well-controlled evaluations conducted over the past decade have failed to find any support for the efficacy of FC (Mostert, 2001). Nevertheless, despite the lack of any credible evidence, FC continues to find support in the autism community.

Due to the great variability in the language profiles within ASD, careful evaluation of each individual is essential. In addition, understanding the variables that may underlie some of the unique deficits is critical. For example, many individuals with ASD have difficulty processing transient input such as speech (Frith, 1989, Quill, 1997). This can play a significant role in the development of both receptive and expressive language. Problems with the development of joint attention adversely affect language development (Baron-Cohen et al., 1997; Mundy & Crowson, 1997). Other learning characteristics that must be considered include issues of stimulus overselectivity (Lovaas, Koegel, & Schreibman, 1979), problems with motivational variables and social contingencies (Lovaas & Smith, 1989), as well as reduced observation learning and imitation skills (Rogers & Pennington, 1991).

There remains considerable debate and controversy over which interventions should be used for individuals with autism. Although some models of intervention have more
empirical evidence supporting their efficacy, to date there is no evidence that indicates one approach is superior (Corsello, 2005). No one treatment is appropriate for all individuals. The individual’s strengths, deficits, and unique learning profile should guide the practitioner to select the intervention strategies. The only two consistent findings regarding intervention and the attainment of the best outcomes are that the intervention must begin early and it must be intensive (Dawson & Osterling, 1997).

CONCLUSION

Speech and language, communication, and social deficits are the defining characteristics of individuals with ASD. As we make progress in understanding these deficits, we will also make progress in treatment and intervention. Many questions remain about the relative effectiveness of the current intervention models. As we enter the era of evidence-based practice, it will be critical that interventions with little formal empirical support be critically evaluated. It is very probable that specific interventions will work better with specific types of children with autism. It will be important that applied research in treatment efficacy delineate or identify the specific types of children and their cognitive and behavioral profiles that benefit from the intervention. The one aspect of intervention that we do know with certainty is that it must begin as early as possible and must be delivered with a high level of intensity.

Another important area for future research will be to better understand the exact nature of the core deficits in autism. Although there are at least four compelling cognitive theories that attempt to account for the core deficits, none is yet sufficient to account for the complex behaviors in autism. In fact, it is much more likely these theories are interrelated, and all contribute in some way to the multifaceted disorder of autism.

Understanding early-appearing markers of autism, especially in the area of joint attention, will be critical to early identification and intervention. Since we know that early intervention is essential to achieving the best outcomes for this population, any research that would allow earlier identification would be important. To date, most children are not identified until at least 18–24 months of age, allowing valuable time to pass before intervention can be initiated.

Individuals with autism spectrum disorders represent a diverse and heterogeneous group. It is quite likely that there are distinct subgroups with different etiologies and behavioral characteristics (Kjelgaard & Tager-Flusberg, 2001), and research into identifying the possible subgroups of ASD will be very important. In addition to helping delineate possible genetic and neurological influences, defining clear subgroups would contribute to subject definition within research and possibly provide insights into intervention strategies.

Individuals with ASD will continue to challenge researchers and clinicians with their complex profiles and diverse characteristics. It will only be through continued investigation of this population that we will gain the knowledge needed to provide optimal and effective interventions for all individuals on the autism spectrum.

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