CHAPTER 14

Imitation and Play in Autism

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Over the past 20 years, the developmental aspects of autism have been a central focus of research activities. This developmental lens for viewing autism focuses attention on the evolving symptoms of autism, influenced by the interplay of biology and experience. This interactive, developmental framework has several implications that strongly affect current research ideas: (1) There is some plasticity in the evolution of the symptoms, (2) individual differences in course and outcomes will be affected by an individual’s experiences as well as the individual biology of the disorder, and (3) early developmental course will have a substantially greater impact on outcomes than later events. In contrast to research in the period between 1960 and 1980 and in response to this developmental orientation, the past 20 years have seen much more emphasis on understanding autism as early in life as possible and searching for autism-specific deviations in the early developmental processes that lead to language, social, and cognitive development, both to understand the developmental processes involved in the disorder and to conceptualize treatment strategies for maximizing outcomes.

Strongly influenced by Piaget’s model of cognitive development, the developmental studies of autism of the past 20 years have carefully dissected early development. In the first major papers reflecting this approach, Marian Sigman and her colleagues (Sigman & Ungerer, 1984; Ungerer & Sigman, 1981) found that of the multiple areas of sensorimotor development that Piaget delineated, children with autism showed syndrome-specific impairments in only two: imitation and play. Furthermore, Piaget (1962) suggested that symbolic play developed from imitation, particularly deferred imitation, as children developed the ability to represent mentally events they had experienced and reproduce them at a later time. This theoretical linkage between imitation and pretend play gains support from the symptom pattern seen in early autism, and this chapter focuses on research findings in these two areas.

Thus, this chapter reviews what is currently known about imitative abilities and play characteristics that distinguish autism from other disorders. We also examine the nature of individual differences in play and imitation skills among children with autism. Finally, we consider the proposed mechanisms thought to underlie the autism impairments in imitation and play. For the purposes of this chapter, play is defined as play with objects, rather than social play with people.

IMITATION

Roles of Imitation in Development

In normal infant and early childhood development, imitative ability is considered to be a key mechanism for cultural transmission of skills and knowledge, serving an apprenticeship, or learning function, helping young children learn complex, goal-directed behavior patterns from others (Baldwin, 1906; Bruner, 1972; Piaget,
1962; Rogoff, Mistry, Goncu, & Mosier, 1993; Tomasello, Kruger, & Ratner, 1993; Uzgiris, 1999). A less emphasized function of imitation involves social interpersonal communication. Imitation of body movements and postures, facial expressions, and vocal behavior permeate social and emotional exchanges, providing a key mechanism for emotional synchrony and communication between social partners, from early infancy throughout the lifespan (Gopnik & Meltzoff, 1994; Hatfield, Cacioppo, & Rapson, 1994; Uzgiris, 1981).

How imitation is defined is crucial when reviewing imitative studies, since there are many nonimitative ways in which behavior acquisition can be socially influenced. The research on social behavior acquisition in animals has delineated these processes in the following way (see Byrne & Russon, 1998; Heyes & Galef, 1996; Tomasello et al., 1993; Want & Harris, 2002):

- **Stimulus enhancement** is the tendency to pay attention to or aim responses toward a particular object or place after observing a conspecific’s actions. In the case of stimulus enhancement, the observer’s actions on the object are generated through trial and error learning as opposed to reenacting the model’s behavior, but the chance that the trial and error learning will take place with the object is elevated as a result of the model’s behavior.

- **Emulation** is a process in which the goal of the other is made overt as a result of the other’s actions and that goal becomes a goal for the observer also. The observer then attempts to reproduce the completed goal by whatever means he or she comes up with from his or her own behavioral repertoire. While the preceding processes do not reflect direct acquisition of another’s behavior through observation and thus are not truly imitative, **response facilitation** is an increase in the frequency of a behavior already in an individual’s repertoire as a result of seeing it performed by another. This kind of performance is considered to reflect imitation by most infant researchers. **Action level imitation** occurs when the observer fully demonstrates the behavior of another, including novel acts, and acts that match the minor details and the style of the model’s action. There is disagreement in the field about whether this should involve a reproduction of the goals of the model, as well as the behavioral means, or whether “mimicry” of body movements by themselves should be considered imitation (see Tomasello et al., 1993). Given the definition of imitation that pervades the autism studies, we define imitation as the purposeful reproduction of another’s body movements, whether novel or familiar.

While the view of imitation as a powerful tool for learning instrumental actions from others has been present in developmental psychology for many years, Meltzoff and Moore’s (1977) discovery of oral imitation in infants in the first days and weeks of life required considerable revision of the view of the role of imitation in development. While the evolutionary utility of imitation in older infants and children as a powerful learning tool is clear (Rogoff et al., 1993), what might the evolutionary role of neonatal oral imitations serve? Uzgiris (1981) was the first to suggest that in early infancy, imitation may primarily serve social communication and interpersonal development. Trevarthen, Kokkinaki, and Fiamenghi (1999) have extended this view, suggesting that the core function of human imitation is the sharing of motives or intentions, which is at the heart of its other functions, including but not limited to sharing emotional states, instrumental learning, and continuing interactions.

Rogers and Pennington (1991), following Stern’s (1985) model of interpersonal development, suggested that early deficits in imitation could lead to impaired metarepresentation abilities characteristic of children with autism. Meltzoff and Gopnik (1993) took this idea further, suggesting that imitation serves social development by providing a mechanism for acquiring mental state understanding. Gopnik and Meltzoff (1994) proposed that early imitation initially provides the infant with shared experiences of interpersonal connectedness via bodies and movements. In the next few months of life, imitation of facial expressions leads to a shared experience of emotional expressions and inner sensations, and then to a shared sense of motives and intentions underlying communication in the 9- to 12-month period, thus laying the groundwork for intersubjectivity and developing theory of mind.

Is there supportive evidence for the role of early imitation in social relations? In line with Gopnik and Meltzoff (1994), Kugiumutzakis
suggested that the crucial social element in early imitation is sharing affect via facial, vocal, and physical matchings. Heimann and colleagues have provided the only longitudinal data that address this hypothesis. Their findings demonstrate: (1) relationships between neonatal imitative ability and social responses to the mother in 3-month-olds and (2) positive relationships between 3-month-old imitation and 12-month-old imitation (Heimann, 1998; Heimann & Ullstadius, 1999). Nor is this limited to infancy. The research on emotional contagion has provided a body of evidence on the role of facial and postural imitation in rapid sharing of emotional states between people across the lifespan (as reviewed in Hatfield et al., 1994).

**Imitation Performance in Autism**

Difficulty imitating other people’s movements has been reported in autism in a variety of studies across the past 30 years. The studies reviewed all involve autism versus matched clinical comparison groups in order to examine the question of specificity of the imitation problem in autism. These studies used a variety of imitative tasks: actions on objects, imitation of body movements, and imitation of facial movements.

**Actions on Objects**

Studies in this area provide the most mixed findings and the strongest developmental relations of the three areas. An investigation of the youngest sample of children with autism documented an autism-specific deficit in imitation of simple actions on objects (Charman et al., 1997). The 20-month-old subjects with autism performed significantly worse than a matched clinical comparison group on tasks involving imitation of simple actions on familiar objects. Several other comparative studies of preschoolers with autism have demonstrated object imitation deficits, using both conventional and nonconventional acts (Dawson, Meltzoff, Osterling, & Rinaldi, 1998; DeMyer et al., 1972; Rogers, Stackhouse, Hepburn, & Wehner, 2003; Stone, Ousley, & Littleford, 1997). In contrast, several other groups have not identified such difficulties. McDonough, Stahmer, Schreibman, and Thompson (1997) failed to find significant group differences in performance on tasks of both immediate and deferred imitation of familiar actions with realistic objects in a sample with a mean age just under 5 years old. In a sample of older children (mean age 8.1 years), Hammes and Langdell (1981) found that although imitation of actions with imaginary objects (pantomime) and imitation of actions with a counterconventional object (e.g., using a cup as a hat) distinguished the children with autism from children with mental retardation matched on language abilities, performance on the imitation of actions with real objects did not differentiate the two groups. In a sample of adolescents, Hobson and Lee (1999) did not find an autism-specific deficit in imitation when movements were analyzed in terms of functional actions on objects. This difference in the performance of older and younger age groups may be due to maturing imitative abilities in autism or to methodological issues involving coding systems or choices of tasks that are too simple, resulting in ceiling effects (as seen in a study by Charman and Baron-Cohen in 1994, which used a task designed for 7-month-old infants with subjects with a mean chronological age [CA] close to 12 years).

**Imitation of Body Movements**

*Intransitive Acts*

An autism-specific deficit in imitating body movements has been consistently, but not universally supported. Of all the tasks analyzed in the first study of imitation in autism (DeMyer et al., 1972), imitation of body movements generated the most robust effects of all the imitation tasks. Ohta (1987) found significant differences between high functioning children with autism and nonverbal IQ-matched typical preschoolers on imitation of simple hand movements. Rogers, Bennetto, McEvoy, and Pennington (1996) found an autism-specific deficit on single and sequential non-meaningful hand movements in high-functioning adolescents. Dawson et al. (1998) found an autism deficit relative to developmentally delayed and typical control children on familiar and novel hand movements. Aldridge, Stone, Sweeney, and Bower (2000) found an autism deficit in gestural imitation in a sample of 2- to 4-year-olds relative to cognitively matched normally developing infants. Smith and Bryson
(1998) found an autism deficit on single hand postures for high-functioning children with autism. Bennetto (1999) also found body imitation deficits among a group of high-functioning older children compared to clinical controls and isolated the difficulty to the kinesthetic reproductions of limb postures. Two comparative studies that did not find any autism-specific deficits used very infantile tasks and had ceiling effects that may have accounted for their null results (see Charman & Baron-Cohen, 1994; Morgan, Cutrer, Coplin, & Rodrigue, 1989). In summary, in contrast to the findings on imitation of actions on objects, studies of imitation of body movements have repeatedly yielded autism-specific deficits across a wide range of IQ and language levels and across all ages studied. While it may seem counterintuitive, the presence of echolalia does not indicate preserved imitative abilities. Curcio [1978] found that children with echolalia could produce almost no abstract forms of pantomime. Rogers and Pennington [1991] suggested that echolalia was part of the auditory rehearsal loop, a distinct system from the motor processes involved in action imitations. Thus, echolalia should not be considered an example of motor imitation.

**Oral-Facial Imitations**

Like body movements, oral-motor movements are consistently reported to be severely affected in autism, though this area has been much less well studied. Rogers et al. (2003) found that oral-motor imitation was more impaired than imitation of body movements in toddlers with autism compared to clinical and typical controls. Rapin (1996) reported greater oral-motor impairment in both high- and lower functioning children with autism than with clinical comparison groups. In a small comparative study, Adams (1998) reported a greater level of oral-motor difficulty in children with autism than in the CA-matched typical comparison group. Rogers et al. (1996) found an overall deficit in facial imitation for their high-functioning adolescent subjects with autism relative to a CA- and verbal IQ VIQ-matched clinical control group, as did Dawson et al. (1998) with a much younger sample. Loveland, Tunali-Kotoski, Pearson, and Brelsford (1994) found that although their subjects with autism did not differ significantly in the number of identifiable imitations of emotional facial expressions, the autism group made significantly more unusual and mechanical expressions than the control group. Given the consistency of the findings in the literature, oral-facial imitation appears to be specifically impaired in autism.

While it is well established that a significant percentage of people with autism do not acquire speech, we have few explanations for this phenomenon (see Rodier, 2000, for a model based on brain differences affecting cranial nerve function). Lord and colleagues have demonstrated that level of retardation does not fully explain the lack of speech in autism (Lord & Pickles, 1996). The consistently replicated finding of autism-specific difficulties with oral-facial imitation (see also Rogers et al., 2003; Sigman & Ungerer, 1984) and the strong relationship of oral-facial imitation to speech (both in autism and in typical development) have led to the suggestion that a specific oral-motor or speech dyspraxia might underlie lack of speech development for a subgroup of children with autism (DeMyer, Hingtgen, & Jackson, 1981; Page & Boucher, 1998; Rogers, 1999; Rogers et al., 1996).

**Relations among the Three Kinds of Tasks**

Is imitation across the three kinds of tasks a unitary phenomenon? So far the evidence is contradictory. While Stone and colleagues (1997) reported a dissociation between imitation of actions on objects and imitation of body/facial actions in young children with autism, Rogers et al. (1996, 2003) found all three different types of imitations to be significantly related in toddlers with autism, and they found hand and face imitations to be significantly related in adults (no object imitations were tested in that study). However, the correlations are in the .40 to .70 range, demonstrating that these are not totally overlapping phenomena.

**Developmental Correlates of Imitation**

Several studies of normal development in infancy have specifically linked early infant motor imitation skills to later social responsibility to a parent. As reported earlier, Heimann
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and Ullstadius (1999) reported relationships between frequency of imitation in newborns and frequency of gaze aversion to the other three months later. Furthermore, the same authors reported consistencies between facial imitation in 3-month-olds and both manual and vocal imitation at 12 months. Finally, Forman and Kochanska (2001) reported a longitudinal study of toddlers seen at 14 and 22 months that demonstrated stability between imitation of the mother and cooperation with her requests both concurrently and predictively. There is also evidence of concurrent relationships between imitation skills and social responsivity. Uzgiris (1999) reported a study demonstrating relationships between 12-month-olds’ amount of affective imitation with their mothers and the emotionally congruent expressions shared with other people. The research of Asendorpf and Baudonniere (1993) and Nadel and Peze (1993) have demonstrated toddlers’ use of synchronous imitations as a main vehicle for reciprocal peer interactions, demonstrated in complex rounds of nonverbal imitations. Thus, several different findings attest to the social impact of infant imitation.

In Autism

While the directionality of the effects from imitation to social engagement are clearly laid out in theories of typical development, it is less clear in developmental theories of autism. Rogers (1999) has hypothesized the same directionality in autism: That early imitation problems contribute to impaired social development in autism. However, Hobson (1989), among others, has suggested that a more general early social impairment leads to lessened imitation of other people.

While directionality is not yet established, relationships between imitation and delayed or disordered development of several social and communicative abilities have been described. In one of the earliest studies of imitation, Curcio (1978) reported concurrent relationships between imitation and social communication in a group of nonverbal children with autism. This relationship has been reported by others as well (Dawson & Galpert, 1990; Rogers et al., 2003; Sigman & Ungerer, 1984; Stone et al., 1997). Stone and Yoder (2001) found that, after controlling for language skills, at age 2, only motor imitation and speech therapy hours predicted language ability at age 4 whereas SES, age 2 play skills, and joint attention did not.

Only one study has directly tested the effects of imitation on social responsivity in autism. Dawson and Adams (1984) demonstrated that imitation differentially facilitated other kinds of social engagement for more severely impaired young children with autism, but this did not hold true for young, higher functioning children. Two longitudinal studies also support the hypothesis that imitation affects social functioning in autism. Stone et al. (1997) reported that early imitation predicted later language development and play abilities. Rogers and colleagues (2003) found that early imitation was a better predictor of outcomes in language, IQ, and social skills than dyadic social behavior.

Delay versus Deviance

Though some have proposed that the imitation deficit in autism marks a delayed as opposed to deviant course of development (Stone et al., 1997), Carpenter, Pennington, and Rogers (2002) found that children with autism differ from typically developing children in terms of the sequence in which imitation and other social-cognitive skills develop across the infancy period. Whereas joint engagement and attention following skills emerged prior to imitative learning in the developmentally delayed group (a pattern also seen in normal development), imitative learning preceded the development of the other social-cognitive skills for the subjects with autism. Their results suggest that the role of imitation in the development of social-communicative abilities differs in autism and that the course of development diverges from the normal path around the interaction of joint attention and imitation. Carpenter et al. suggested that the use of imitation without joint attention (or with diminished joint attention skills) may explain the atypical linguistic features observed in autism such as echolalia, “metaphorical speech,” pronoun reversal, and the abnormal use of questioning intonation for statements. In addition to these findings, the previously reviewed reports of continuing imitation impairments in high-functioning adolescents and adults with
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autism support deviance, rather than delay, in imitative development in autism.

Possible Mechanisms Underlying the Imitation Problem

Praxis and Body Mapping

The idea that the imitation problem in autism might be due to dyspraxia was first suggested by DeMyer et al. (1981). They suggested that dyspraxia in autism was of sufficient severity to prevent the child with autism from participating in everyday nonverbal communication, contributing to the inability to learn the meaning and use of nonverbal communicative acts. Dyspraxia and its adult counterpart, apraxia, refer to impairments in the ability to plan and execute movements in the absence of other motor symptoms (Ayres, 2000). The dyspraxia hypothesis in autism has been suggested by others as well, both to explain autism-specific difficulties with imitation and pantomime tasks (Bennetto, 1999; Jones & Prior, 1985; Rogers et al., 1996) and to explain nonimitative problems with motor planning and sequencing (Hill & Leary, 1993; Hughes, 1996; Minshew, Goldstein, & Siegel, 1997). Clinicians have long suggested that children with autism have poor body awareness, which might contribute to their difficulties with praxis in terms of planning and executing an imitative movement (Hill & Leary, 1993). The findings of the Rogers et al. (1996) study involved widespread deficits in imitation and pantomime, classic tests of praxis.

Bennetto (1999) examined several aspects of praxis in autism, including body mapping, visual representation of the movement, and motor execution. Examining high-functioning older children with autism and well-matched clinical controls, she found no group differences in the ability to map locations onto the body and no differences in visual recognition memory for the movements, even after delay. The group differences in this study involved one specific aspect of motor execution: limb postures. She also demonstrated that performance on a standard motor test revealed significant group differences and accounted for much, but not all, of the variability in imitation performance in the subjects with autism, findings also reported by Smith and Bryson (1998). Thus, while problems in praxis have been supported in autism studies, they appear confounded with general motor problems.

Motor Problems in Autism

Motor problems have frequently been reported in autism. Damasio and Maurer (1978) carefully described the many motor symptoms seen in autism in an early report. Kohen-Raz, Volkmar, and Cohen (1992) reported striking differences in children with autism on tasks involving standing balance on unstable surfaces. Lack of typical hand dominance has been demonstrated (Hauck & Dewey, 2001). Manjiviona and Prior (1995) reported clinically significant levels of general motor impairments in a majority of children with diagnoses of autism or Asperger syndrome compared to test norms. Rapin (1996) reported that hypotonia, limb dyspraxia, and stereotypes were all more frequent in a group of children with autism than those with other communication problems. In some of the most intriguing reports, home video studies of infants later diagnosed with autism suggest that some motor differences may be present in autism before the first birthday (Baranek, 1999; Osterling, Dawson, & Munson, 2002; Teitelbaum, Teitelbaum, Ney, Fryman, & Maurer, 1998).

However, in a direct test of the dyspraxia hypothesis, no autism-specific motor difficulties were found by Rogers et al. (2003) on fine motor, gross motor, and nonimitative praxis performance in a comparative study of a group of toddlers with autism compared to both developmentally matched clinical controls and typically developing children. Yet, the children with autism demonstrated an imitation deficit. Thus, even though motor functioning accounted for a significant amount of the variance in imitation scores in this study (a finding also reported by Bennetto, 1999, and Smith & Bryson, 1998), the evidence did not support a generalized dyspraxia as the main mechanism underlying overall imitation deficits in autism.

The age and functioning level of the subjects appear to influence findings of motor deficits in groups with autism. Comparative studies that report autism-specific motor differences have involved high-functioning children with autism compared to clinical controls (Bennetto, 1999; Smith & Bryson, 1998). However, when
younger or lower functioning subjects are examined, different findings emerge. Several studies have compared children with autism to a group with mental retardation matched on CA and mental age (MA) (Hauck & Dewey, 2001; Kohen-Raz et al., 1992; Rapin, 1996; Rogers et al., 2003), and all have reported essentially equivalent levels of motor performance (though in Hauck & Dewey, 2001, the groups differed on established handedness preference). Thus, the general motor problem in autism may not differ in kind or severity from that seen in other groups with motor difficulties, such as children with retardation. If a nonspecific praxis deficit reflects a generalized central nervous system impairment rather than an autism-specific motor problem, then it cannot explain the imitation impairment in autism.

Executive Functions: Sequencing and Working Memory

Rogers and Pennington (1991) proposed that an executive function deficit might lead to problems with imitation, given that imitation may have a working memory component. The neurological literature has demonstrated that patients with frontal lesions have motor sequencing deficits (Kimberg & Farah, 1993). An executive function deficit has been consistently reported in studies of older children and adults with autism (Bennetto, Pennington, & Rogers, 1996; Ozonoff & McEvoy, 1994; Ozonoff, Pennington, & Rogers, 1991; Prior & Hoffman, 1990; Rumsey & Hamburger, 1988; Russell, 1997). However, the evidence for an executive function component in imitation problems is mixed. Rogers et al. (1996) demonstrated that imitating manual sequences was more impaired for the group with autism than a clinical comparison group. However, autism-specific deficits in single movements appear to be as marked as deficits in sequential movements. Smith and Bryson (1998) and Bennetto (1999) also reported that adding the sequencing element to the nonmeaningful hand imitation task did not lead to a decline in the autism group’s performance. Finally, several studies have explicitly examined working memory for the stimuli (Bennetto, 1999; Rogers et al., 1996; Smith & Bryson, 1998). No study has reported any group difference involving the ability of subjects with autism to remember the tasks correctly over time.

Dawson et al. (1998) demonstrated significant correlations between executive function tasks and infant imitation tasks in preschoolers with autism. However, the size of the correlations revealed that much of the variability in imitation scores was not accounted for by executive function performance. The executive function hypothesis lacks some face validity in explaining difficulty with imitation in young children with autism as several recent published studies have demonstrated unimpaired executive function performance in young children with autism compared to controls (Dawson et al., 2002; Griffith, Pennington, Wehner, & Rogers, 1999). Thus, while executive functions may play some role in imitative skill, the evidence does not support this as a primary mechanism for explaining the imitation difficulties in autism.

Symbolic Content

In a study by Rogers and colleagues (1996) in which actions with symbolic content were compared with nonmeaningful actions, subjects with autism never performed differentially worse on the meaningful conditions. Of four significant group differences found on the hand and face tasks, only one was on a meaningful task whereas three were found on nonmeaningful tasks. Furthermore, autism-specific differences on nonsymbolic tasks have been reported from several studies (Bennetto, 1999; Smith & Bryson, 1998). Thus, difficulties with symbolic content do not appear to explain the imitation deficit in autism.

Kinesthesia

Perceptual-motor studies by Hermelin and O’Connor (1970) led to the suggestion that children with autism may express abnormalities in the integration of visual and kinesthetic input, which could certainly impair imitation of body movements. One method for highlighting the role of kinesthesia in imitation is to prevent the subject from viewing his or her movements. Studies that have manipulated the imitator’s view of his or her movement copying attempts have found that the nonvisible gesture imitation items tend to differentiate autism and control groups more than any other kind of task.
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(Roeyers, Van Oost, & Bothuyne, 1998). However, nonvisible presentations increase the error rate in typical and developmentally delayed participants as well as individuals with autism (Smith & Bryson, 1998). Bennetto (1999) identified reproduction of limb postures—kinesthesia—as the most affected component of imitation in her subjects with autism. Convergence of these findings makes kinesthesia an area that should be investigated further.

Cross-Modal Matching and Body Mapping

Difficulties with cross-modal matching and body mapping might impair imitative ability but have been examined in only one imitation study. Bennetto (1999) tested this explicitly using a task that examined body awareness. The group with autism showed no differences from comparison subjects in accurately identifying specific locations on their own bodies in response to a line drawing of a body profile with certain locations highlighted (also see Hobson, Ouston, & Lee, 1989). This is an understudied area that should be investigated further, but thus far, we have no evidence that cross-modal transfer is the impaired function responsible for imitation impairments in autism.

Neural Mechanisms

The information processing models of imitation underlying several of the preceding studies have been severely challenged by the discovery of specialized neurons in the superior temporal sulcus (STS) of monkeys that appear to be dedicated to the processing of visual information about the actions of others (Rizzolatti, Fadiga, Fogassi, & Gallese, 2003). Some of these neurons appear to code basic postures of the face, limbs, or whole body, whereas others appear to be involved in coding the movement of body parts in relation to objects or goals. A subset of these neurons, identified in the prefrontal cortex in monkeys, fires when a specific action (such as reach and grasp) has been performed by the monkey as well as when the monkey observes another monkey performing the same specific action. These neurons have been labeled “mirror neurons” and are located in Broca’s area in the human brain. This finding suggests potential connections among observations of another’s acts, imitation, and communication of meaning, with critical links to language (Rizzolatti & Arbib, 1998).

Recent functional imaging studies in humans have identified parallel networks of cells in frontal regions of humans that fire during observation of finger movements and fire more rapidly when the observation is accompanied by performance of the same action by the observer (Rizzolatti et al., 2003). Observation of hand actions has been shown to result in activity in the premotor cortex and Broca’s area in humans (Iacoboni et al., 1999). This area of premotor cortex has shown some evidence of mirror neuron activity and has been implicated in reading facial emotion in a normal population (Nakamura et al., 1999). J. H. Williams, Whiten, Suddendorf, and Perrett (2001) propose that mirror neurons may facilitate understanding of others’ actions and intentions and that they may be involved in the development of language, executive function, and theory of mind abilities. Failure to develop an intact mirror neuron system (or alternatively, failure to develop the mechanisms necessary for proper regulation of such a system) could impair the development of these capabilities in humans. Williams and colleagues suggest this as a model for autism.

Two studies have examined mirror neuron functioning in autism. Individuals with autism showed less involvement in this mirror neuron region during emotional interpretation (Nakamura et al., 1999). A very small study of imitation in Asperger syndrome did not reveal group differences, but power problems may have been present (Avikainen, Kulomaki, & Hari, 1999). Mirror neurons have also been suggested as the neural mechanism by which we understand the intent of others’ actions. Several studies of intentionality in autism have demonstrated that children with autism do not show difficulties on a simple intentionality task (Aldridge et al., 2000; Carpenter, Pennington, & Rogers, 2001) although mechanisms other than reading intentionality may underlie this task (see Huang, Heyes, & Charman, 2002). Thus, the existence of this mirror neuron system and its role in facilitating imitation (and other synchronous behaviors between people) may provide us with new understanding of brain-behavior relations involved in imitation, but this line of research...
is in its infancy and needs to be fully explored in both typical and atypical groups.

**Methodological Issues**

Methodological issues may underlie the discrepancies in findings across imitation studies, which have occurred most often on tasks involving actions on objects and in studies assessing older and higher functioning subjects. Task characteristics that appear to influence results include the novelty, difficulty level, and conventionality of the movement. One difficulty in many of the methods used in these studies has to do with task affordances and conventional actions. When people are asked to imitate conventional actions on common objects that tap specific affordances of the object (rolling a car, marking with a pen, hitting a drum with a stick, etc.), you must question to what extent imitation of the precise movements of the model is required. A simpler and nonimitative process, such as stimulus enhancement or repetition of previously learned and automatic actions, could suffice. To control for other interpretations, it is important that object imitation tasks involve novel acts that are not directly elicited by the object’s unique features.

The effect of the type of task chosen for imitation of actions on objects was illustrated by Roeyers et al. (1998). The group of 18 young children with autism in their study performed significantly worse than a well-matched group of children with retardation on imitation of gestures and on imitation of actions on objects, with the imitation of gestures more impaired than imitation of actions on objects. However, the causal effect of the action on the object seemed to have an impact on the magnitude of the difference in group performance. The action task that best served to discriminate the two groups involved an object that did not produce a sensorimotor effect. This brings up a related methodological issue: How do we begin to examine the different functions of imitation? While on the surface, all imitation tasks seem inherently social, Tomasello (1998) has argued that, in an instrumental, goal-directed, and object-oriented act, the focus of the imitative behavior may be on the means-ends relations inherent in the act, rather than on imitating the other person as a person. The observer may reproduce the model’s actions because the actions invoke a representation of an outcome in the environment, creating an intention in the imitator to carry out the intended act, rather than to imitate the model’s motor movements. Tomasello’s distinction between *emulation learning* and *cultural learning* may be relevant here. In emulation learning, the individual’s goal is to create a specific result in the environment. In cultural learning, the observer not only directs attention to the other’s activity and to the objects involved but also attempts to be like the other person, to perceive the situation the way the other sees it.

How can these be teased apart? Hobson, Lee, and Brown (1999) provide a helpful example. The tasks given to the subjects had both an instrumental function and an affective quality to them, and the accuracy of the instrumental function and the stylistic quality were rated separately. Both the participants with autism and those with other developmental disorders could perform the instrumental aspects of the tasks accurately. However, those with autism were much poorer than the controls at imitating the affective quality of the movement. The authors proposed that what distinguished their subjects with autism from the clinical comparison group was not so much their inability to imitate the actions modeled but rather their deficiency in their attempts to imitate the person who modeled them. They suggested further that in typically developing infants, it may be these goal-irrelevant aspects of imitation such as the imitation of affective tone and body language that contribute to establishing the intersubjective contact, or the “like me” experience with others (Meltzoff & Gopnik, 1993). To understand the imitation problems in autism, we must tend to these distinctions.

A final methodological issue concerns scoring practices. Those studies that have reported differences on body imitations in older and higher functioning persons have tended to use more detailed scoring systems that involve analysis of the movements on videotape. However, the typical scoring system used in many studies involves live ratings of “correct, partial, or fail.” While the differences among younger
subjects may be extensive enough to be captured in live ratings, such scoring systems may not be sensitive to imitation differences in older and higher functioning persons, which may be more subtle and require a more fine-grained analysis.

Summary of Imitation

The imitation studies in autism appear to have established that imitation is specifically impaired in autism, from the earliest time at which autism can be diagnosed, persisting into adulthood, in both higher functioning and lower functioning groups. More than most other neuropsychological areas of impairment in autism, imitation thus appears to meet the four criteria for a primary psychological deficit in autism: universality, specificity, precedence, and persistence (Pennington & Ozonoff, 1991). Several mechanisms hypothesized to account for the imitation deficit in autism, such as symbolic content, visual representation, cross-modal transfer, and working memory, have been examined and rejected. The mechanism with the greatest support is motor planning/execution, which accounts for some, but not all, of the variance in imitation performance in autism. However, general motor problems do not appear to be specific to autism, as similar levels of motor impairment are also found in children with mental retardation who do not have autism. Thus, motor difficulties (or dyspraxia) certainly contribute to the imitation problems in autism, but are not necessarily a primary mechanism underlying imitation problems in autism. An exception to this may involve oral imitation. For the few studies that have specifically examined oral-facial movements, there is consistent evidence of dysfunction and deviation from typical patterns. Furthermore, the relationships between oral-facial imitations and speech development have been repeatedly found to be large and significant. Thus, a specific oral-motor dysfunction may be involved in autism, leading directly in its severe form to impairments in speech development specific to autism and perhaps to imitation of facial expressions as well.

Neither the various types of imitation nor the various functions of imitation may be uniformly affected in autism. Functions involving instrumental learning of meaningful actions on objects may be less affected than the function of imitation in facilitating social interactions. Oral-facial and body imitation may particularly subserve the social aspect, while imitations of acts on objects may particularly serve the instrumental aspect. There has been little examination of relationships between imitative ability and social behavior in autism. In addition to continued investigation into possible mechanisms underlying the imitation deficit and brain-behavior relations related to imitative behavior, future research should consider the possibility that different functions of imitation may be differentially affected in autism.

PLAY IN AUTISM

For the purposes of this chapter, play is defined as the purposeful manipulation of objects in which exploration and practice of effects appear to be the child’s goals. Play is considered a powerful means by which the young of many species master skills that will eventually be important for their development and survival (Bruner, 1972). Piaget (1962) considered play to be an intrinsically motivated activity, in which carrying out the activity is pleasurable. He distinguished between sensorimotor play, involving object manipulation as a means for practice and mastery of action schemas, and symbolic, or pretend play, which grows out of the child’s developing ability for mental representation and provides a means of practicing and understanding the events of the social world.

Symbolic play is generally defined as play in which absent elements are represented through objects, gestures, and language in the play. This may take the form of animating the play characters or by representing absent objects through object substitution or pantomime (pantomime would seem to play a very important role in bridging between imitation and symbolic play, since pantomime fuses the concepts of deferred imitation and pretending). Pretend play generally appears in a toddler’s repertoire by 18 months and becomes increasingly elaborated over the preschool period (McCune-Nicholich, 1977).
Autism-Specific Findings in Pretend Play

In 1975, Ricks and Wing reviewed what was known about communication, conceptual development, and play in autism. “The central problem, present in even the most mildly handicapped autistic people, appears to be a specific difficulty in handling symbols, which affects language, nonverbal communication, and many other aspects of cognitive and social activity” (p. 214). Lack of symbolic play was considered to be one of the main symptoms of this inner lack of symbolic capacity. In 1977, Wing, Gould, Yeates, and Brierley published the first major research paper on symbolic play in autism. The group documented two original findings that would stand the test of time: (1) There is a paucity of spontaneous symbolic play in children with autism whose developmental functioning level appears mature enough to support symbolic play; and (2) for those who demonstrated symbolic play acts, their play appeared repetitive and stereotypic, lacking the typical variety of differing play acts seen in comparison groups of similar mental ages.

This paper was followed in 1981 by two important comparative papers that used adult scaffolded conditions to stimulate symbolic play. Hammes and Langdell (1981) compared pretend play acts using increasingly abstract props imitated from video models of eight children with autism who had little or no language and eight children with mental retardation, matched for mental and chronological age. They reported that children with autism imitated the play acts with real objects similarly to comparison children, but differed in their lack of use of pantomimed or symbolically transformed acts. In contrast to Wing et al.’s (1977) view, they suggested that the children’s difficulty was not due to a problem with symbol formation, but rather with flexible manipulation of symbols. Riguet, Taylor, Benaroya, and Klein (1981) compared three groups of children in free play and modeling conditions, with the findings of better performance of all children in scaffolded conditions and poorer imitation and lower levels of symbolic play in scaffolded conditions for children with autism than language-matched clinical or typical controls. In these early papers arises another theme that reoccurs throughout the symbolic play literature in autism—the improved ability of children with autism to carry out pretend play in scaffolded conditions. These two papers, examined together, highlight issues that are not yet resolved: (1) methodological issues concerning appropriate methods for eliciting symbolic play in children with autism and (2) conceptual concerns involving the cognitive processes involved in imitating and spontaneously producing symbolic play schemas.

A number of papers in the 1980s replicated findings from these two papers, with increasing attention to methodological issues involved in administration and rating of play schemas, as well as matching of clinical populations. Sigman and Ungerer (1984) and Mundy, Sigman, Ungerer, and Sherman (1986) replicated Wing’s earlier findings of autism-specific deficits in three related areas: frequency of spontaneous pretend play acts, frequency and complexity of symbolic sequences, and frequency of different symbolic acts. These findings were obtained for both spontaneous play acts and for play that occurred in response to an adult model. However, in a finding that has come to have large repercussions, these authors also reported that the children’s nonsymbolic play was similarly affected. Under spontaneous play conditions, children with autism demonstrated fewer functional and sensorimotor play acts and fewer different play acts. However, unlike their symbolic play, adult modeling and prompting resulted in normalizing the frequency of functional play. These studies continued to emphasize symbolic deficits as a core part of the autism picture.

Symbolic Play as Metarepresentation

There were conceptual problems with this early view of autism as a problem of symbolic abilities. From the Piagetian standpoint, while symbolic play and symbolic language involve mental representation, so do stage 6 object permanence, means end relations, and spatial relations, which also require the child to operate from internalized, mental models of the world (Piaget, 1962), and which do not present special problems for children with autism (Morgan et al., 1989; Sigman & Ungerer, 1984).
Alan Leslie’s (1987) landmark paper provided a new interpretation of pretend play. He suggested that, unlike other acts that require representational thought, pretend play involves a more complex representational stance. The child needs to simultaneously hold two representations in mind: the primary, or veridical representation, and the newly assigned pretend identity (a state of double knowledge; McCune-Nicholich, 1981), both during his or her own play and when faced with pretend play of others. The child decouples the representations from his or her real-world roles and assigns his or her new pretend identities, representing the pretend world alongside the real world. Leslie suggested that aspects of pretend representations were similar to those seen in mental state representations in that reference, truth, and existence relations among primary representations are suspended. Defining pretend play as a metarepresentational act drew parallels between the cognitive processes involved in theory of mind tasks and those involved in pretend play. Leslie suggested that the poor performance of children with autism on both tasks was due to a difficulty in cognitive decoupling necessary for metarepresentation.

Building on Leslie’s theory, Baron-Cohen (1987) reported a very carefully constructed study of spontaneous play, in which he set out to correct earlier methodological inconsistencies, laid out a clear rationale for matching groups, and suggested tight definitions of symbolic and functional play. He also pointed out the problems of using adult modeling and the resulting confusion between imitation and symbolic acts in previous studies. In a study of completely spontaneous play using junk props, miniatures, and dolls, he compared 10 verbal children with autism, 10 with mental retardation, and 10 typical children, all matched for verbal ability of 4 years. This study thus involved higher functioning children with autism than had been previously reported on. The children with autism produced much less symbolic play than had been previously reported on. The children with autism who produced much less symbolic play than comparison groups, but no differences in functional play. Supporting Leslie’s hypothesis, Baron-Cohen suggested the symbolic play deficit in autism reflected an impairment in metarepresentation, which he believed to be the primary psychological impairment in autism.

Challenges to the Metarepresentational Account

While the metarepresentational account of symbolic play problems in autism was theoretically satisfying, several challenges to this interpretation arose out of findings over the next decade, involving: (1) new evidence of symbolic play abilities in autism, (2) evidence of problems with nonsymbolic play in autism, and (3) symbolic immaturities in typical children.

Evidence of Intact Symbolic Abilities

The uniformity of findings in symbolic play deficits in autism was severely challenged when Lewis and Boucher (1988) published a paper demonstrating equivalent performance of children with autism and controls under conditions that involved no modeling. In an effort to isolate the cognitive deficit underlying children with autism’s performance problems in symbolic play, these authors developed a method for separating symbolic play competence from performance. The task involved dolls and cars, miniature objects, and junk objects in two conditions: spontaneous and elicited. Unlike other studies, in the elicited condition, the symbolic idea was verbally suggested, but not modeled, by the adult, who asked the children, “Show me how you would make a . . .”

Using the strict definitions of symbolic play suggested by Leslie and measures of quantity, quality, and duration, the authors demonstrated that there was the expected autism-specific problem in the spontaneous condition. However, there was no autism difference in the use of substitute or imaginary objects in the elicited condition, which the authors interpreted as suggesting that children with autism did not have a problem with the representational aspects of play, but rather with generation of play ideas—an executive problem involving generativity rather than a representational problem.

This paper created great controversy, but the several replications that followed (Charman & Baron-Cohen, 1997; Jarrold, Boucher, & Smith, 1996; Lewis & Boucher, 1995; McDonough et al., 1997) all supported the initial findings. Additionally, Lewis and Boucher’s replication specifically put in a direct test of generativity: an executive problem involving generativity rather than a representational problem.

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time period. They found autism-specific differences in the generativity task, but not in the elicited play condition—findings they interpreted as supporting the idea that the symbolic play problem in autism is a production problem stemming from (1) a lack of generativity of ideas and (2) difficulty shifting attention from a current behavior to a new behavior.

Other papers published in the 1990s also demonstrated intact skills in children with autism in certain kinds of symbolic play tasks. Kavanaugh and Harris (1994) tested Leslie’s (1987) suggestion that understanding another’s pretend play required the same metarepresentational decoupling that production required another way of separating competence from performance. Children were shown pretend acts with six different small animals (e.g., the experimenter held a teapot over the animal and said he or she was pretending to pour tea on it). Children were then asked, “How does the . . . look now?” and were asked to select one of three pictures showing the animal in various physical states, including the real state, the pretend state, and another transformed state. The children with autism performed better than the comparison group on these tasks, which were also completed by typically developing children age 30 months. The authors interpreted the findings as supporting the idea that the symbolic play problem is one of production, not one of understanding, as supported also by treatment studies in autism that have demonstrated improved symbolic play after modeling (Goldstein, Wickstrom, Hoyson, Jamieson, & Odom, 1988; Rogers & Lewis, 1989; Thorp, Stahmer, & Schreibman, 1995). While a replication of this study also demonstrated no group differences (Jarrold, Smith, Boucher, & Harris, 1994), floor effects for both groups made further interpretation of results difficult. Finally, Jarrold et al. demonstrated that children with autism were as able to use ambiguous and counterconventional props to enact pretend sequences as well as comparison groups. Furthermore, the children with autism did not have trouble switching sets from the real to the pretend identity of these objects.

These various studies of symbolic play demonstrated that children with autism could form and manipulate symbols associated with play acts when the symbol was suggested by another. They could represent absent objects in play, assign new identities to existing objects, and ignore the salience of the object’s true identity while representing a different identity. These findings of preserved function and the competence/performance contrast thus challenged Leslie’s metarepresentational account of the symbolic play problem in autism.

**Evidence of Impaired Sensorimotor and Functional Play**

A second crucial challenge to the metarepresentational explanation of play deficits in autism concerns autism-specific differences in play that had no symbolic aspects to it. Non-symbolic play can be categorized as sensorimotor or functional. Sensorimotor play involves manipulation of the objects for their sensorimotor properties, and functional play involves combining objects and forming play acts in ways that reflect social conventions—using objects in the way they are typically used (eating and drinking from plates, cups, and utensils) or combining objects in socially conventional ways (placing cups on saucers).

The findings about nonsymbolic play differences in autism are somewhat mixed. Baron-Cohen (1987) reported that 8-year-old children with autism did not differ from carefully matched comparison groups in their functional play. Sigman and Ruskin (1999) similarly reported no autism-specific differences in functional play skills in their sample of 70 preschoolers with autism.

However, the majority of studies examining functional and sensorimotor play have reported group differences. Tilton and Ottinger (1964) found that children with autism differed from mentally retarded and normal children in their organization of play behaviors. Using very careful definitions of play, Sigman and Ungerer (1984) reported that in spontaneous play conditions, young children with autism with low verbal mental ages produced fewer functional play acts, especially with dolls, fewer different functional play acts, and fewer sequences than a comparison group of children with mental retardation. However, in an adult modeling and prompting condition, the group differences were no longer present. Similar findings have been reported by Mundy et al. (1986), Lewis and Boucher (1988), Blanc et al. (2000), and
McDonough et al. (1997). E. Williams, Reddy, and Costall (2001) found striking qualitative differences in both functional and sensorimotor play of children with autism. In addition to abnormalities in rates and levels of sensorimotor and functional play, the proportion of immature to more mature play appears affected in autism. Sigman and Ungerer and Libby et al. documented that children with autism spent equivalent amounts of time playing in immature types of play as well as more mature types of play, while comparison children spent the majority of their play time in more mature play.

Thus, there is considerable evidence that children with autism exhibit qualitative differences compared to typically developing, developmentally delayed, and other clinical populations in their nonsymbolic play skills and that the differences somewhat mirror the differences seen in their symbolic play: more repetition, less novelty, and less diversity of play schemas, with immature patterns predominating. These differences are not well accounted for by the metarepresentational model.

Symbolic Difficulties in Typical Children

The final challenge to the metarepresentational theory of pretend play covered here comes from other cognitive theorists. There is a basic developmental problem in the metarepresentational account. How can pretend play, which is developing in 18-month-olds, involve the same metarepresentational abilities as theory of mind, which in typical development, does not develop until age 4? Several theorists suggest that early pretend play can be accounted for by simpler processes than metarepresentation. Piaget (1962), distinguishing between mental representations and the mental manipulation of symbols, suggested that neither early words nor early pretend play was synonymous with symbol use. He believed that early words, early pretend play, and deferred imitation all demonstrated the formation and use of mental representations of previous experiences. He suggested that manipulation of symbols in thought was a later accomplishment of the 2- to 4-year-old preoperational period.

Other theorists share somewhat similar views. Perner (1991) suggests that the onset of pretend play, object permanence, language, and the other representational milestones in the toddler period demonstrates the infant’s new ability to generate multiple representations of reality. The infant can use multiple models to substitute for each other and, in doing so, represent past events, coming events, and as-if events. To Perner, acting as-if does not require metarepresentation. Substitution of representations does not require metarepresentation; it instead requires the use of multiple models, which young children mark in their play. The capacity for metarepresentation develops slowly across the preschool period and is later reflected by much more advanced pretend play, especially role play, with others.

Perner’s view is nicely supported by work of Tomasello, Striano, and Rochat (1999), who also question the symbolic interpretation of early pretend play, both from their own and DeLoache’s (1995) findings concerning young preschoolers’ difficulties in understanding what miniatures represent. In two studies of 18- to 35-month-old children’s understanding and production of symbols as representations of an absent object, Tomasello and his colleagues found that this ability gradually developed over this age period, virtually absent at 18 months, well developed and integrated at 35 months, and spotty in 26-month-olds. The authors suggest that early pretend play of the sort seen in 18- to 24-month-olds and older is heavily scaffolded by either adult language or through deferred imitation of previously seen events. Only gradually can children go on to use symbols that are socially acquired, as well as newly invented, in individually creative ways.

Development of the Generativity Hypothesis

The preceding findings represent powerful challenges to the metarepresentational hypothesis and led Christopher Jarrold and colleagues to focus on the competence/performance question. In a 1996 paper, they reported three experiments, each exploring one or more dimensions of symbolic understanding of children with autism. Two of these, replications of Kavanaugh and Harris (1994) and of Lewis and Boucher (1988), have already been described (Jarrold et al., 1996). The third experiment examined generativity. The children were first asked to generate as many pretend acts as they
could, first without props, then with props (a ruler, a scarf, candle, etc.). In both conditions, children with autism generated fewer pretend acts than controls in both conditions.

In an integration of the findings of competences and difficulties of children with autism in pretend play studies, Jarrold considered problems both with inhibition and with generativity as possible obstacles to pretend play for children with autism (Jarrold, 1997; Jarrold et al., 1996). A problem with inhibition could impair symbolic play by making it difficult to inhibit the true nature of an object and shift to a hypothetical identity (Harris, 1993). From the empirical evidence, Jarrold concluded that there was little support for the idea that children with autism had difficulty inhibiting the real use of a prop in order to assign a substitute use. In contrast, difficulties with generativity of play ideas had considerable support across studies. He suggested that this generativity deficit occurred in many areas of functioning, citing research by others in word fluency, free recall, and drawing studies that demonstrated parallel results. In a detailed analysis of the kinds of executive problems seen in autism, Jarrold suggests that difficulties generating new behavior and difficulties in maintaining goals in working memory could account for both the patterns of reduced generativity and impulsive behavior seen in children with autism in their play and in many other situations (Jarrold, 1997; see also Harris & Leevers, 2000).

**Tests of the Executive Function/Generativity Hypothesis**

Very few studies have examined relations between any executive function measures and symbolic play abilities. Rutherford and Rogers (in press) examined the relationship among play maturity, joint attention, and executive function in a study of 28 very young children with autism and both delayed and typical comparison groups. Two executive function tasks were used: spatial reversal, which tests set shifting, and a generativity task, which examined number of different play acts generated to single toys without any particular function. Children with autism were equivalent to both comparison groups on both executive function tasks. However, for the entire group of children, both executive function tasks were strongly associated with pretend play but not with sensorimotor play. Generativity accounted for 27% of the variance in pretend play scores in the total group and correlated significantly with sensorimotor play scores, even when verbal ability was partialled out. (See Blanc et al., 2000 for a similar report on a small n study.)

However, in a somewhat contradictory finding, Dawson and colleagues (Dawson et al., 1998) used both a spontaneous and an elicited paradigm to stimulate pretend play in a group of 20 preschoolers with autism and with clinical and typical comparisons. While the expected symbolic play deficit was present in the children with autism, symbolic play scores did not correlate with performance on an executive function measure tapping working memory and inhibition—the delayed response task. Instead, it correlated at .72 with scores from a measure of orbital prefrontal cortex—the delayed nonmatch to sample (DNMS) task, which taps primary medial temporal lobe functions.

While the arguments supporting the executive function/generativity hypothesis are well reasoned and databased, the field has just begun to examine relationships between generativity (or, more broadly, executive functions) and performance on symbolic play tasks. The usefulness of this theory will be determined by the findings of additional studies that directly explore these relationships.

**Specificity of Symbolic Play Deficits to Autism**

Wing et al.’s (1977) study suggested that symbolic play problems were unique to autism. As seen from the review thus far, this finding has been universally supported among studies of spontaneous symbolic play. While it has been suggested that blind children have similar kinds of difficulties developing symbolic play (Fraiberg, 1977), there is evidence that symbolic play may develop better than was initially expected in blind children. Rogers and Puchalski (1984) documented the presence of pretend play acts in a group of blind children at age 25 months and found expected associations with language development and sensorimotor abilities. Hobson et al. (1999) compared the symbolic play of a group of blind children and a group of children with autism, matched on age.
and language level. The blind children demonstrated many more symbolic play acts than the children with autism, though the play was not complex. Thus, the current data suggest that the degree of difficulty that children with autism have producing symbolic play is unique.

**Brain Behavior Correlates**

We have no neuroimaging studies of pretend play, or even pantomime, at this time and very few neuropsychological models of pretend play. While the preceding generativity theory would emphasize frontal lobe contributions, Dawson et al. (1998) demonstrated a correlation between symbolic play and medial temporal lobe tasks rather than executive function tasks. This area is in great need of attention.

**Individual Differences and Developmental Correlates of Symbolic Play in Autism**

There are clearly large differences in performances of individual children with autism on both functional and pretend play tasks. IQ and language level (which are themselves closely related in autism) demonstrate associations with symbolic play skills. Baron-Cohen (1987) reported that children with autism who could demonstrate pretend play acts had significantly higher verbal and nonverbal IQs than non-pretenders. Sigman and Ungerer (1984) also reported correlations between language development and pretend play in autism, though not with sensorimotor play. However, Sigman and Ruskin (1999) reported that both functional play and symbolic play were related to concurrent language abilities. They also reported significant correlations between play and joint attention behavior in preschoolers with autism, but these were mediated by general developmental age, a precursor of language development, or with attention switching, which has implications for executive function.

However, two groups studying very young children with autism report an absence of correlations between pretend play and verbal language. Charman (2003) reported no relationship between play and language either concurrently or predictively from age 20 to age 42 months. Similarly, Rutherford and Rogers (2003) reported no relationship between either verbal or nonverbal mental ages and elicited pretend play skills in a sample of 2-year-olds with autism, 90% of which had not yet developed speech. The absence of relationships between language and play in these two studies may be due to the very young ages and essentially nonverbal status of these toddlers with autism (the children with other diagnoses the same age and language level shared the expected relations).

The relationship of pretend play to language development is interesting in light of the varying theories concerning the nature of the pretend play problem. It was the presence of both play and language problems in autism that led to the early symbolic deficit hypothesis. Mind theory would also expect language and play to be related, given that a main purpose of language is sharing of mental states and learning language requires awareness of the contents of the speaker’s mind. However, the generativity hypothesis would not necessarily predict that language and symbolic play should be related. This is further complicated by the studies that raise questions about how “symbolic” early pretend play really is (or, for that matter, how symbolic early language is). It is important to remember the modeling or imitation procedure used in most of the symbolic play procedures. Imitation is correlated with various developmental skills, including language development in autism and in normal development. Thus, it is possible that the relationships between symbolic play and language may be mediated by the imitation skills in play studies that provide play models for the children to imitate. The nature of the relationship between pretend play and language development in autism needs further study.

**Delay versus Deficit**

As Libby and colleagues pointed out (1998), the relationships between symbolic play development and language development in autism would suggest that symbolic play is delayed but eventually develops in those children with the cognitive abilities to acquire it. However, the unusual pattern of differences in symbolic and functional play—the lack of fluency, the repetitiveness of the play, the continuing use of very immature sensorimotor patterns as well as higher level patterns, and other aberrations in
the expression of play—indicates that play is qualitatively different in autism, a deficit as well as a delay.

Experiential Effects on Pretend Play and the Ecological Model of Autism

In addition to developmental maturity, childhood experiences affect symbolic play development in typically developing children. While the tendency of developmentalists is to view symbolic play as a universal developmental accomplishment, cross-cultural studies do not support this view. Symbolic play as defined here seems to be to some extent a phenomenon of middle-class Western cultures. In other cultures, there may be much rough and tumble play or practice play, and there may be role play in which the children act out adult roles but without symbolic transformation (Feitelson, 1977; Feitelson & Ross, 1973). In addition, the play of Western children who are severely socioeconomically deprived is marked by continued sensorimotor practice play qualities (Murphy, 1972). Western preschoolers from rural settings also demonstrate a paucity of symbolic play transformations compared to their middle-class suburban peers (Feitelson & Ross, 1973). Thus, symbolic play is to some extent a cultural phenomenon, supported by adult provision of play materials and play space, as well as by adult psychological support through active participation and modeling of pretend play and encouragement and respect for children’s pretend play activities.

While adults often think of children’s pretend play as involving fantastic images and deeply imaginative and creative activities, the reality of early pretend play is that it involves a replaying of daily life events (and again reflects the fuzzy boundaries between deferred imitation and early pretend play). Young children play out their lives: bedtime routines; mealtime routines; family dramas; and trips to the doctor, zoo, vet, and MacDonald’s; using real objects, miniatures, and neutral objects, as well as verbal scripts associated with these activities. The learning mechanism appears to involve deferred imitation or social learning. And this leads to the final hypothesis concerning the nature of pretend play deficits in autism—the impairment of social learning mechanisms in autism.

Earlier, this chapter reviewed what is currently known about problems of imitation in autism. Given the early reliance of pretend play on deferred imitation, you would expect that these two skills are related, both in typical development and in autism. To our knowledge, there are currently no published data on the relationships between deferred imitation and symbolic play.

Second, reenacting life events requires that children attend to social events and be oriented to others, their actions on objects, and their interactions. As Sigman and Ungerer suggested in 1984, lack of typical pretend play early in life in autism may reflect the lack of social learning on the part of the young child with autism or lack of pleasure in the social routines of life. Note that lack of social learning would affect functional play, which also involves the expression of socially conventional ways of acting on objects, as well as symbolic play. Relationships between play skills and social engagement have been described by Sigman and Ruskin (1999) in a large longitudinal study in which preschool functional and symbolic play skills predicted adolescent peer engagement, but not language development, in a large group of children with autism. The sociocultural aspects of pretend play have been eloquently summarized by Tomasello et al. (1999): “...the process of symbolic play development, as other cultural skills such as language development, may be seen as a delicate interplay between children’s emerging skills to interact with the world in culturally conventional ways, and their emerging skills to use these cultural conventions in individually creative ways” (p. 583).

Finally, this kind of “acculturation” theory is congruent with the already described relationships between language and symbolic play, since both rely heavily on acculturation, or social learning and imitation, in the toddler period. Given the autism-specific effects on early social orienting documented by Osterling and Dawson (1994); Baranek (1999); Werner, Dawson, Osterling, and Dinno (2000); and others in infant video studies, there is every reason to believe that this would result in a diminished be-
havioral repertoire early enough to affect both functional and symbolic play (see Loveland, 2001, for a compelling description of this ecological model of autism). Whether the lack of social modeling, social learning, and experiential differences can fully account for the difficulties in spontaneous production of functional and symbolic play is unclear (Harris, 2000).

While we currently have no studies that describe relationships among symbolic play and social interest, social orientation, and imitation in early autism, the intervention evidence is useful here. A number of studies have documented improvements in children with autism’s pretend play through a variety of focused treatment interventions, both behavioral and relational. These studies have demonstrated increases in frequency and complexity of symbolic play after treatment and corollary increases in social and communicative interactions with others. This treatment literature provides some indirect support for the hypothesis that there is an experiential aspect to the symbolic play difficulties seen in autism and that interventions focused on increasing children’s experience and motivation for such play has effects on play complexity, play frequency, and increased social engagement.

The social hypothesis may present us with an independent explanation for the symbolic play difficulties in autism, or it may be intertwined with the generativity hypothesis, in that when social engagement and social learning are not providing new play content and ideas, children are left to the mercy of their own immature and meager repertoire of sensory motor acts to create play schemas.

**Methodological Issues**

A variety of methodological problems pervade the studies of pretend play in autism and have been well discussed by Baron-Cohen (1987) and Jarrold et al. (1993). While the more recent studies demonstrate improved methods, both researchers and readers of research must be sensitive to the design challenges involved. Selection of comparison groups is an ongoing challenge in autism studies. The question of autism-specific differences requires an age-matched clinical comparison group, rather than a typical group matched for developmental level (although the typical group is a very useful third group in these studies, since it provides a point of comparison for the data from the clinical comparison group). Because symbolic play has been found to have relationships with language abilities in some studies, it is crucial that groups are matched for expressive language skill rather than nonverbal or overall IQ or MA. Some researchers have argued that this needs to include a measure of expressive language complexity, rather than a measure of picture naming vocabulary only, since picture naming may overestimate the language skills of children with autism.

In terms of tasks, a pervasive problem has been in the inconsistent definition of pretend play. Acts to self, acts to dolls, and use of miniatures have been classified as symbolic acts in some studies and as functional play acts in others. Baron-Cohen (1987) has suggested a clear definition of symbolic play, and Libby et al. (1998) have provided an excellent classification system for discriminating sensorimotor play from functional play, as well as clear definitions of symbolic play in line with Baron-Cohen’s. While both of these systems classify doll play as functional (even when the doll is exhibiting agency), the unique and specific problems that children with autism have with doll play may illustrate that doll play involves symbolic rather than functional play and should be empirically examined.

Moving to the issue of task administration, the state of the science in this area requires that experimenters examine children’s competence separate from their performance of pretend play. Having adults model pretend play acts and then scoring the child’s productions as symbolic acts confounds imitation with symbolic production and impedes interpretation of findings, as nicely discussed by Libby, Powell, Messer, and Jordan (1997). Data have been most typically coded as frequency counts from videotape. There are some tools in the literature that provide developmental play age equivalents (e.g., Fewell, 1992), which can be useful in examining developmental correlates. However, if such tools are used, it is critical that the definitions of pretend play in those tests be examined to make sure that symbolic play is being classified
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according to the principles described earlier. Finally, what frequency variables are gathered and analyzed has significant effect on the interpretation of group differences. As the studies from Sigman’s lab have illustrated, examining total number of play acts in a category can give quite a different picture than examining number of novel play acts or maturity of play acts. Qualitative differences may be missed when more fine-grained aspects of the play are not considered. Finally, both ceiling and floor effects have arisen in some of the symbolic play studies. Making sure that all the groups in a study are appropriately challenged by the task is crucial for identifying autism-specific differences or lack of differences.

Summary of Play

The work in symbolic play in autism seems poised at the edge of new developments. The increasing evidence that typically developing children are not actually using symbols as such until ages 3 to 4 requires us to view these early pretend play schemas as something other than symbolism per se. Metarepresentational theory is not a persuasive explanation for these deficits due to the timing of the deficits, the lack of symbolic ability of typically developing children in the early stages of pretend play, and the parallel impairments between pretend play and simpler types of play. Executive dysfunction theories capture several aspects of the play problems in autism: the predominance of repetitive, simple play behavior, both in sensorimotor schemes and in symbolic schemes; the ability to demonstrate understanding and production of symbolic transformations under various conditions; and the lack of fluency in spontaneously generating schemas. Yet, we do not currently have convincing data of early executive function differences in autism, nor do we have data that clearly links play difficulties with other executive function variables. The ecological, or social learning theory, is attractive, but it needs to be developed and tested.

Symbolic play research would benefit from refinement of our methods. We need straightforward procedures that are consistently used across studies so that data can be compared more easily. In each new study, we need to examine relations with other developmental skills, with neuropsychological correlates, and with social and environmental variables. The question of brain-behavior relations has only begun to be mentioned. Finally, we need to explore the theorized relations among immediate imitation, deferred imitation, pantomime, and symbolic play. Such efforts will most likely have a great payoff, for studying the primary symptoms of autism comparatively and at multiple levels of analysis have taken us far in understanding autism and have broadened considerably our understanding of normal development.

CONCLUSION

The research literature in imitation and symbolic play clearly demonstrates the severity with which autism affects these skills. The early appearance of these two skills in normal development and their seeming importance in human social, communicative, and cognitive development indicate that their impairment in autism may have powerful roles in determining outcomes in autism. From the work that has been done in imitation, it appears that there is a fundamental difficulty with imitation of other people’s actions in autism that permeates many different kinds of tasks and performance across both highly scaffolded and natural settings. In contrast, performance of functional and symbolic play varies according to setting, with normalized levels of play demonstrated in certain types of scaffolded situations and the most impaired performance demonstrated in spontaneous or free play situations. This competence-performance distinction in symbolic play appears to indicate that mediating variables are at work, and the area of executive dysfunctions, particularly generativity deficits, is a prime candidate. Thus, the current literature leads us to consider that imitation may be the more primary of the autism deficits, with play abnormalities reflecting effects of intellectual impairment, executive dysfunction, possible experiential deficits, and imitation decrements. Developmental theory links imitation and symbolic play, a hypothesis that has not yet been tested. If this is indeed the case, these two areas of difficulty may in fact represent one core impairment in autism. We await studies that examine performance in these two skill areas to other levels of analysis, in autism
and in other developmental groups, while at the same time examining the role of experience and environment, to understand the meaning of these skill deficits in the development of the behavioral phenotype in autism.

Cross-References

Developmental aspects of autism are addressed in Chapters 8 to 10, social development in autism is reviewed in Chapter 11 and communicative development in Chapter 12, affective aspects of autism are reviewed in Chapter 15, and theoretical perspectives are reviewed in Chapters 21 through 26.

REFERENCES


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