SYMBOLIC PLAY IN AUTISTIC, DOWN'S, AND NORMAL CHILDREN OF EQUIVALENT MENTAL AGE

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ABSTRACT

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The purpose of the study was to assess autistic children's play behavior and response to modelled symbolic play in a paradigm which controlled for the effects of verbal mental age as well as mental retardation. Subjects were 3 groups of 7 boys and 3 girls (autistic and Down's Syndrome children of similar age, 6-12 years, and normal 2- to 4-year-olds) matched on Peabody Picture Vocabulary Test mental age (PPVT MA) range (21-47 mo.), and MDN (30 mo.). In each of 2 individual sessions, 4 plaything-pairs (4 animate toys, 2 paired with realistic and 2 with substitute accessories) were presented as a group in initial and final 4-min. free play periods, and as separate pairs on intervening 1-min. structured play trials (2 baseline, 2 test trials each for modelling and transfer of symbolic play employing realistic or substitute accessory). Occurrence of play, stereotypy, and off-task behavior was sampled at 30-sec. intervals and detailed play descriptions were made. Nonparametric tests showed that autistic children played less; showed lower level play on baselines (but not in initial free play); and imitated, but not as well as the other children. No group's play level improved on transfer trials. The type of accessory had no effect. Down's did not differ from normal children except in showing fewer substitute symbolic uses; on structured play trials they showed more than the autistic group. Level of play was most strongly correlated with PPVT MA in the normal group. For the autistic group, number of substitute uses was positively correlated with PPVT MA, and also with Leiter International Performance Scale IQ.

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The syndrome of early infantile autism was first delineated by Leo Kanner in 1943. The behavioral abnormalities which he considered to be of basic importance in making a diagnosis were, as summarized by Wing (1976):

1. A profound lack of affective contact with other people.
2. An anxiously obsessive desire for the preservation of sameness.
3. A fascination for objects, which are handled with skill in fine motor movements.
4. Mutism or a kind of language that does not seem to be intended to serve interpersonal communication.
5. The retention of an intelligent and pensive physiognomy and good cognitive potential manifested in those who can speak by feats of memory, and in mute children by their skill on performance tests, especially the Seguin Form Board.

Since that time much research has been devoted to the autistic child, yet no underlying pathology has been discovered. The syndrome remains an entity which is clinically inferred from a specific pattern of behavior. Although workers in the field differ in their emphasis on the importance of the various symptoms, and in their tendency to interpret Kanner's criteria more or less broadly, his description of the syndrome is still considered authoritative. Some of the inferences he drew from his observations, however, are less well accepted. One example is his assumption that because of the presence of isolated skills dependent either on rote memory or ability to manipulate objects, these children had "good cognitive potential". Today it is quite widely recognized that the autistic pattern of behavior is frequently found in association with retardation, although many autistic children do exhibit certain assembly and rote

memory abilities which contrast significantly with the low level of their other attainments (Wing, 1976).

Criteria set out by Rutter (1971; Rutter & Lockyer, 1967) will be used in the present paper as an operational definition of autism. These criteria were derived on the basis of a study (Rutter & Lockyer, 1967) of a large sample of psychotic children meeting Kanner's basic criteria, but including retarded and organically involved children with the appropriate symptomatology. The four essential features are: autism as a symptom; ritualistic, compulsive behaviors; deviant speech development; and an age of onset of less than 30 months. Autism as symptom refers to an appearance of aloofness and an apparent lack of interest in other people, failure to join in group play, avoidance of eye to eye contact, infrequent exhibition of emotions or humor, and relative lack of sympathy or empathy for other people. The ritualistic, compulsive phenomena include strong attachment to certain objects, peculiar preoccupations, and resistance to changes in routine or placement of objects. Deviant speech development refers to muteness or speech which is characterized by echolalia, pronomial reversal, and concreteness, and is not frequently used for social communication. Stereotyped hand, finger, and body movements are not considered as essential features, but they are not uncommon.

There is no consensus of opinion concerning which characteristic or symptom is of primary significance to the autistic syndrome, nor concerning the underlying etiology. Many researchers have focussed on the central importance of a cognitive deficit of language and language related functioning in autistic children (Churchill, 1978; DeLong, 1978; Hermelin, 1978; Menyuk, 1978; Rutter, 1978; Wing, 1978). They believe that these children cannot understand or relate to the environment as a result of

this global deficiency of language. Both Rutter and Wing have suggested that the underlying cause probably is organic, while DeLong has been more specific in postulating a failure of the left hemispheral memory or integrative learning function. DeMyer (1976) has postulated a dysfunction of the central nervous system, particularly of the language center, but argued that severe problems in visual-motor imitation are primary as well. Ornitz and his colleagues (Ornitz, 1978) have focussed on motility disturbances in these children as indicative of a deficiency in the physiological modulation of sensory input, which prevents proper integration of experience. Ornitz has suggested that the sensorimotor dysfunction is vestibular in origin. There have been numerous psychogenic theories which attributed the cause or one of the causes of autism to family factors (e.g., Bettleheim, 1967; Goldfarb, 1961), but the bulk of evidence has revealed little difference between autistic children and children with other psychological handicaps in terms of early life experience and parental characteristics (Cantwell, Baker & Rutter, 1978). Des Lauriers and Carlson (DesLauriers, 1978) have considered lack of affective and sensory responsivity of primary significance, and propose that an imbalance of arousal systems is the underlying cause. Similarly, but from an ethological perspective, Hutt and Hutt (1970) have argued that the autistic child has a low threshold of arousal which results in social avoidance and stereotypic behavior. Tinbergen and Tinbergen (1972) have put forth the notion of an innate hypersensitivity to ordinary social influences; Richer (1978) has suggested that because of their propensity to avoid social contact autistic children are "dyscultural" and that our cultural response to them only perpetuates the avoidance.

It seems prudent to reserve judgment on these issues, since the overall lack of agreement appears to be due to insufficient evidence, differences in selection of autistic samples, and in some cases inadequate research methods (Yule, 1978). Causation may be singular or multiple in nature, and it is not even clear whether there is a single pathologic mechanism involved for all cases of what is presently referred to as childhood autism (Ornitz, 1978; Rutter, 1978).

There appears to be agreement, however, that play is one of the activities in which both the social and cognitive deficiencies of autistic children are manifest. The focus of the present paper will be on symbolic play in autistic children; clinical impressions or descriptions of autistic children's play suggest that it is symbolic or pretend play which is in some sense deficient in these children (Ricks & Wing, 1975). Autistic children seem to be skillful with objects or toys such as puzzles, which can be understood as "suggesting their own solutions" and requiring little imagination or representational ability. Apart from this, nonmeaningful stereotyped use of objects is considered characteristic of the autistic child.

The significance of symbolic play in normal cognitive development has been demonstrated by Piaget (Flavell, 1963; Piaget, 1951; Piaget and Inhelder, 1969). Symbolic play is seen as one of the early manifestations of the general function of mental representation, (or the semiotic function) which includes all behavior where an object or event is represented, or "signified", by something else, a "signifier". It is by means of this semiotic function that intelligence advances beyond the sensori-motor period, where representation exists in the form of physical acts, or imitation, but not in thought. Language is ultimately

one of the most important aspects of the semiotic function and, according to Piaget it is only acquired once the child has acquired the use of private, non-verbal symbols such as those observed in symbolic play (e.g., a piece of cloth used to represent a pillow). It is different from symbolic play, however, in that it is a system of signifiers made up of codified, social signs. From the Genevan perspective, Sinclair (1970) has pointed out the relevance of systematic observation of the development of symbolic play for understanding both the general semiotic function, and the appearance of language in particular. The fact that in the normal child the capacity for symbolic play and for language develop in close association with one another would support investigating the capacity for symbolic play of the autistic child who is also characteristically deficient in language skills.

Developmental Studies of Symbolic Play

A systematic study of the development of symbolic play was conducted by Inhelder, Lezine, Sinclair, and Stambak (1972). Their study involved observation of individual children at various ages, between 10 and 41 months, as well as longitudinal observation of a smaller group. The children were presented with typical household objects (feeding and grooming utensils, housecleaning objects), toys of an "animate" nature (doll, teddy-bear and baby doll), and, to facilitate symbolic substitution, pieces of paper and cloth - which have no determined use. The successive steps noted by the authors will be described briefly.

From 10 to 12 months, there was little differentiation in the relationship between objects, and actions performed. The same action-pattern was applied indiscriminately to numerous successive objects and inversely the same object could be manipulated in diverse ways. Between 12 and

14 months, the beginnings of differential treatment were seen: an object was manipulated in the course of activities close to those which would imply its conventional use, and particular actions were applied to a smaller number of more appropriate objects (mainly the broom, dustmop and hairbrush were used for rubbing or scraping actions).

Beginning at approximately 16 months, objects were more competently handled in an "adultomorphic" way. At first, the object acted upon was not consistently appropriate although the instrument-object was. For example, a child might brush (with the hairbrush) the floor, a book, his leg, and finally his hair. By 18 months, both object acted upon and the object used as an instrument were generally appropriate. During this same period, make-believe activities involving the child's own body attitudes developed. Objects without precise functions and animate toys were not often manipulated - when animate toys were used, they were merely hugged or placed upright.

Inhelder et al. suggested that discriminative use of objects develops by means of imitative acts of previously observed adult behaviors. This could only have been unquestionably confirmed observationally by continuously monitoring children; but they argued convincingly that it is unlikely that the child discovers such uses by trial and error or by deducing an object's conventional use from an analysis of its particular properties. Along the same Piagetian lines, Sinclair stated that "the first behaviors that cannot be explained without the supposition of a mental image seem to be imitative acts, especially in the case of imitations that do not take place while or immediately after a child perceives something - an object, a movement, a series of sounds - but after a certain lapse of time" (p. 121). Thus the ability to use objects

in a conventional way or to perform "signifying acts", to use the Piagetian term, is seen as an essential precursor of symbolic activity.

After 18 months, coherent behavior sequences of increasing length were observed in contrast to earlier brief, rapidly changing activities. (From this point on the child seems to have used the animate toys in most of his play and illustrations given always involve these toys.) At first the toys were merely held, hugged, and kissed. A few months later (21-24 months), the child began systematic exploration of the body of the animate toy, poking its eyes, pulling its foot, placing a finger in the toy's ear. Simultaneously, the first real symbolic behaviors appeared; a spoon or bottle was placed in the doll's mouth, and its hair was brushed. The child quickly became capable of combining these behaviors, for example feeding, then grooming the doll, or feeding several animate toys in succession. Soon after this stage, the doll was given a more active role, being placed in relation to feeding utensils as if it could feed itself, or given a mirror in order to observe itself being groomed. The final behaviors to manifest themselves were use of substitute objects to represent absent objects, or representation of an object without a support (in the first case, using torn paper as food, in the second, scooping imaginary food with cupped hands and feeding a doll).

From their observations the writers suggested a hierarchy of deferred imitations as the basis of representational thought. The representation of the functional relationship between action and object-instrument develops before that of object-instrument and object acted upon. They consider that perception of the object-instrument evokes an earlier observed action related to the object and necessitates a "representational

act" - in other words, an imitation where action and object are inseparable. Only after the child understands and imitates the conventional use of objects in relation to each other, thus having made a differentiation between his own actions and the objects of his actions, does symbolic play appear. There is an increasing differentiation which can be seen to occur as symbolic play develops. At first pretend play is related to the child's own activity (pretending to sleep, for example), next there is make-believe activity using objects which play only a passive role (drinking from a cup, hugging a doll). Finally, animate toys are endowed with independent activity to a greater and greater degree (the doll is fed and groomed, then assumed to do so itself), and one object is substituted for another. It would seem that once objects are endowed with stable, independent attributes, the child can perform symbolic substitutions, attributing the properties of one thing onto another. It is at this point that the symbolic function is considered well established.

Inhelder et al. were mainly interested in the events leading up to the appearance of symbolic play and thus do not describe in any detail their observations of children older than 24 months. A study by Lowe (1975) is of interest because she observed the play behavior of children from 12 to 36 months, at seven age levels. The children were presented with four sets of miniature objects: Girl-doll, spoon, cup, saucer, comb, and brush; Girl-doll, bed, blanket, and pillow; Boy-doll, table, chair, plate, fork, knife, and tablecloth; Man-doll, truck, trailer, and four small wooden logs. Only conventional uses made of the objects, based on the child's overt activity and irrespective of his verbalizations, were reported. In addition, a behavior was considered present

at a specific age only if 50% of the children in that age group displayed the behavior.

All of the objects were used meaningfully by the age of 30 months; at 12 months the child was able to use the feeding utensils appropriately, at 15 months the grooming objects and the truck or trailer were added, at 18 months the doll was handled with more discrimination (cuddled, stood upright), and so on. The development considered of most significance by Lowe was the transition from predominantly self-related behaviors, which increased until 18 months, to doll-related behaviors, which equalled self-related activity at 21 months. At 24 months doll-related behavior predominated and more integrated activity sequences began to be manifest (e.g., "putting the doll to bed" included elaborations such as tucking in the blanket or trying to take off the doll's shoes). With increasing age, doll-related behavior also began to differentiate itself in the direction observed by Inhelder et al., towards greater independence of action. At 30 months, children frequently placed the man-doll behind the steering wheel of the truck, whereas earlier it has been placed indiscriminately in the truck or trailer. The doll was also made to "walk to bed", "hold" a knife and fork, or "mend" a wheel; earlier the child had fed it, etc. This tendency to activate the dolls was even more pronounced at 36 months, when the doll was observed to be made to "lay the table", or the man-doll to "load" and "unload" the truck. Also in accord with the basic sequence observed by Inhelder et al., the child began at 30 months to make symbolic substitutions and combine action sequences into coherent wholes (e.g., the child could act out a sequence of meal and bedtime).

Any sex differences observed by Lowe in activities which could be taken as of major significance in indicating the level of symbolic play, seem to be transient ones. For example, "implied doll feeding" was more frequent in girls than boys at 24 and 30 months, but by 36 months, the two sexes were equal in this activity. A stable difference was that girls continued more often to feed and groom the doll at the older age levels than boys. At 30 months boys placed the man-doll in the driver's seat more frequently than the girls, but at 36 months this difference was no longer evident. Boys tended to "move the truck about" more often than girls but only at 15 months. There was a more persistent difference in play of a mechanical nature with the truck. As well, only boys were seen to "mend" wheels or to put "petrol" in the truck.

The progression with animate toys observed by Lowe is almost identical to that described by Inhelder et al. Lowe suggested that a process of "decentration" takes place which eventually leads to the doll symbolizing a person. At first objects have meaning for the child only in relation to himself. When objects can be meaningfully related to the doll, the child is demonstrating his ability to transfer (separate) actions from himself onto another object and therefore true symbolic capacity. Lowe also suggests a link between the development of this type of symbolic thought and the beginning of self-awareness and awareness of other.

Nicolich (1977) has presented an actual scale of the sequence of levels of play with a similar Piagetian orientation. She points out that "the successive levels of play are distinguished by increased distancing of the symbolic act from the sensorimotor action" (p. 95). Her suggested five levels of play, meant to assess "symbolic maturity" were validated by videotaped longitudinal observations of five female

children between the ages of 14 and 27 months. The first two levels involved the child's demonstration of the conventional use of an object, the second distinguishing itself by the "pretending, playful" nature of self-related activity. A higher level of abstraction was inferred when the child (level 3) extended his actions to include others, (e.g., feeding or grooming doll or adult), or imitated the activities of other people or objects (dogs, trucks, trains, etc.). This was considered the first true symbolic behavior because "representation of the pretend scheme as an abstract mobile entity no longer fused with the child's own action is indicated" (p. 95). Level 4 was characterized by combinations of these symbolic activities, either by applying the same scheme or action to several recipients, or by combining different schemes, not necessarily in a realistic or conventional sequence. Activities which included "planned elements" were at the highest level (5). Planning indicated a prior representational act and was thus evidence of "further distancing of the played symbol from realistic activity". Use of the child's verbalizations often needed to be made in order to infer planning (e.g., the child picked up the play screw driver, said "toothbrush", then made the appropriate motions). Planning might also be inferred from a child searching for a specific object to complete a game or from the speed of a child's action toward a distant object which was then used in a symbolic game. Nicolich stated that according to Piaget, symbolic identification of one object with another or of the child's body with some other person or object was also included at this level although it was not mentioned as having been observed by her. Extrapolating from the observations of Lowe and Inhelder et al., it seems that play behaviors where the doll is endowed

with an active role would also be included at Nicolich's fifth level.

A study by Zelazo and Kearsley (1977) was directed at assessing the development of "functional play" - or what has been referred to in previous studies as meaningful use of objects according to their conventional, adult functions. Play behaviors of children at the ages of 9-1/2, 11-1/2, 13-1/2 and 15-1/2 months were observed with six sets of toys. Stereotyped play (mouthing, fingering, waving, and banging objects) predominated in the youngest group, and decreased linearly with age. Relational play (simultaneous association of objects in a non-functional manner) increased from 9-1/2 months, becoming the predominant activity at 13-1/2 months, then declined at 15-1/2 months. Functional play increased over age and predominated at 15-1/2 months. The number of different ideas generated in functional play also increased with age. The authors suggested that a cognitive metamorphosis occurs with the appearance of functional play which enables the child to generate specific ideas for specific situations. Although Zelazo and Kearsley seemed to be suggesting a certain discontinuity between relational and functional play, their results can also be interpreted as supportive of the early steps which prepare the way for symbolic functioning, as Inhelder et al. have proposed.

Studies of Play in Autistic Children

The significance of the quality of play of autistic children was clearly demonstrated by a follow-up study reported by Brown in 1960. Out of 73 children diagnosed as autistic or schizophrenic over a 15 year period, the 20 children with the best outcomes were most significantly differentiated from the 20 children with the worst outcomes by their rated ability at a mean age of 3.6 years to play appropriately

with toys. With the exception of one study (Wing, Gould, Yeates, & Brierly, 1977) the ensuing research on autistic children's play predated the systematic investigations of the normal development of symbolic play, so that findings are not easily interpreted in terms of current developmental play classifications or levels. It should be noted as well that each group of researchers applied its own interpretation of Kanner's definition of autism in selecting autistic subjects for study; this implies that comparison of particular findings must be cautiously made.

Tilton and Ottinger (1964) compared the spontaneous toy play behavior of 13 "untestable" autistic children, 12 mentally retarded children whose IQs were below 55, and 18 normal children; the three groups were of similar chronological ages (mean CA=5 years). Each child was observed individually for 20 minutes in the presence of a passive adult and a large selection of toys. The occurrence of specific, predetermined toy uses were recorded and classified under nine general categories. The autistic children devoted a greater proportion of their play both to oral contact with toys, and to repetitive, manual manipulation of toys (spinning, shaking or tapping toys) than either the retarded or normal children. The autistic children also exhibited fewer specific toy uses than either the retarded or normal children, who did not differ significantly on this measure. Behaviors which fell into the authors' category termed "combinational use of toys" differentiated between all three groups. In developmental terms, this category seemed to include both functional or conventional toy uses, and symbolic play activities. The normal children displayed more specific toy combinations, and devoted a greater proportion of their

play to combinational use of toys than either the autistic or the retarded children; and the retarded children exceeded the autistic children on both of these measures. In fact, only five of the autistic children displayed any combinational use of toys. The authors reported but did not discuss their finding of no difference between groups in the proportion of play activities devoted to "personalized" or self-directed toy use, a category which included symbolic play behaviors such as "puts rim of cup between own lips", and "rocks doll in own arms", as well as nonsymbolic behaviors such as "jumps the rope" and "wraps rope around body parts". This finding suggests that the autistic children might have exhibited some symbolic play behaviors. Tilton and Ottinger concluded that the distinguishing features of autistic children's play were a preponderance of repetitive manual manipulations and oral use of toys, as well as a paucity of combinational uses. They questioned the ability of these children to cognize the possible relations between objects.

DeMyer, Mann, Tilton, and Lowe (1967) used a maternal interview to assess the play of autistic and normal children. The mothers of autistic children reported more perseverative or non-constructive play, and lesser amounts of mature or complex toy play and appropriate use of toys than the mothers of normal children. Assembling of objects did not differentiate normal children from autistic children. Some autistic subjects in this study had also participated in the Tilton and Ottinger study; a comparison was made of findings by the two methods. In general, the results were in agreement, although mothers more often reported elementary forms of dramatic play (dress-up) and doll play (holding) than was observed in the laboratory study. In accord with

Tilton and Ottinger's findings, mothers of autistic children reported infrequent combination of toys to create new uses. DeMyer et al. suggested that development of a more precise developmental scale to assess the level of maturity of the autistic child's play would be useful. They also concluded that the autistic child fails to learn the most complex and creative uses of toys either because of difficulty in abstract thinking or because he eschews the "human" elements of play.

A series of studies by Hutt and Hutt (1968, 1970) provided information concerning the effect of situational complexity on the play behavior of autistic children, although the focus of the research was on stereotypies and their relation to arousal. The behavior of 3- to 5-year-old autistic children with marked stereotypic behavior was observed by the authors in four situations: (1) an unfurnished room, (2) a box of colored blocks was added, (3) the presence of a passive adult was added (4) the adult tried to engage the child in play with the blocks. Stereotypy increased across the first three situations and was more frequently initiated but broken into shorter bouts in the fourth. Hutt and Hutt suggested that autistic children operate at an overly high level of arousal, and that increased complexity provokes stereotypy in an effort by the child to decrease level of arousal. The possibility that autistic children have difficulty coping with (what is for them) large amounts of stimulation is a relevant one which is not unique to Hutt and Hutt (e.g., Ornitz & Ritvo, 1968) and is a possible explanation for the poor performance of autistic children in studies of their play behavior. In this study, only the adult's active interventions provoked any marked increase in attention to the blocks.

The same conditions were investigated in a study of six autistic children with stereotypies, four autistic children without stereotypy and a group of normal children. It should perhaps be noted that mental age was not reported and could be a confounding variable because stereotypy tends to be associated with lower IQ (Rutter, 1967). Once the blocks were introduced the normal children and the autistic children without stereotypy were similar in focussing most of their attention on the blocks, while the autistic children with stereotypies spent the largest percentage of their time performing gestures which included but were not synonymous with stereotypy. In situation (3), the passive adult's presence further increased block play in the normal children, but had a minimal effect on the autistic subjects. The adult's intervention in situation (4) increased block play in both autistic groups so that block play was the most frequent behavior in all three groups. The authors again interpreted their findings in terms of arousal, and suggested a better prognosis for the autistic children without stereotypy. One could conclude from these findings that by focussing the autistic child's attention on the blocks, the intervening adult in the fourth situation provided enough structure to enable the child to play more normally. The presumed social influence of the passive adult, which was sufficient to increase amount of play in the normal children, seemed to have a minimal effect on the autistic children's play. One could further speculate that the adult in the fourth situation, whose behavior was described as attempting "to engage the child in play with the blocks", may have served as a model of appropriate play activity which the autistic children were able to imitate and build upon.

The possible validity of these suggestions is supported by the research of Black, Freeman and Montgomery (1975), who observed autistic children (aged 5 years) together in four different settings. The four environments consisted of the following: (1) an empty room; (2) a theraplay unit designed to facilitate a sequential flow of movement which contained a variety of forms and shapes, such as tunnels and slides; (3) a playroom with a number of age-appropriate toys; (4) an outside playdeck with gross motor play objects such as swings, sandbox, etc. In the playroom the children spent approximately 20% of their time in "appropriate activity", defined as independent selection of a toy and focussing on it for a period of time. The remaining time was characterized by using a toy perseveratively: either carrying it around continually or using it in a repetitive, non-changing way; ignoring the toys; or using the toys negatively by knocking them off tables, throwing, or abusing them. The authors do not further describe the types of toy uses, so it is difficult to infer the possible developmental level of the play observed.

The children responded best to the structured theraplay unit. In this setting, the children followed the initiative of one child and became involved in gross motor play and a game of "monster". This suggests that a structured setting encourages more constructive play in the autistic child. It also supports the possible utility of a model to improve play in these children. The authors themselves suggested that purposeful object play might be facilitated in a confined play area with a minimum of toys and a model. They concluded that "more research is needed to investigate how and under what conditions appropriate play behavior can be taught to autistic children"

(p. 371). The idea of a model for helping autistic children to play has also been put forth by Frankel, Tymchuk, and Simmons (1976).

Wing and her colleagues (Wing, Gould, Yeates & Brierly, 1977; Wing, 1978) were the first to discuss symbolic play in relation to autistic children. As part of an epidemiological study of mentally handicapped children in a district of southeast London, they made what were termed "fairly standardized" observations of the play behavior of a population of 108 mentally handicapped children, supplemented by information from interviews with individuals closely associated with each child. They classified each child's play according to one of three categories: flexible, varied "symbolic" play, "stereotyped", repetitive, symbolic play, or "no symbolic" play. Only four of the 17 children in their population diagnosed as autistic exhibited stereotyped symbolic play, and none of them showed flexible symbolic play. The 19 other children whose play was categorized as stereotyped symbolic showed some autistic symptom(s), with only one exception. In contrast, 41 of the 47 children who were considered to be simply mentally retarded exhibited play classified as flexible symbolic; a large percentage of these children had Down's Syndrome. Flexible symbolic and stereotyped symbolic play were rarely seen in children with a mental age of less than 20 months, and the authors suggested that language comprehension age was probably a more important factor than nonverbal mental age. The authors also concluded that complete absence of flexible, varied symbolic play was "closely linked to the presence of typical early childhood autism, or of simple stereotypies combined with poor social contact" (p. 175, Wing et al., 1977). Their conclusion may have been somewhat biased,

however, since their observations were not entirely systematic. If, for example, the autistic children had simply played less than the other children, their play would have been relatively less varied.

According to the research reviewed, autistic children appear to be quite deficient in their spontaneous use of toys. The autistic children were observed, however, in unstructured, potentially over-stimulating play situations. The present study attempted to take into account the implications of the studies by Hutt and Hutt (1968, 1970), and the suggestion by Black et al. (1975) that autistic children might play better in a structured situation with only a few toys and a model. It was designed to assess the play behavior and the response to modelled symbolic play of autistic children under presumably optimal conditions within the context of a research design which permits the differentiation of behaviors unique to autism from those resulting simply from a low level of cognitive functioning (Yule, 1978). Two control groups were used: one of normal preschoolers matched with the autistic children on the basis of verbal mental age which was considered relevant as a measure of the representational ability necessary for symbolic play; and secondly, a group of mentally retarded children also matched to the autistic group on the basis of verbal mental age, and selected to be of comparable chronological age to the autistic children.

Each child was observed individually for a series of brief, "structured" play trials in which the stimuli presented were limited to two playthings at a time, and in which at set intervals an attentive adult verbally recalled the child's attention when necessary. For purposes of comparison, the experiment included free play periods which also

made provision for the redirection of the child's attention if necessary, but differed from the structured play in two respects: a number of pairs of playthings were available as a group, and the playthings were available for a more extended period of time. The pairs of playthings consisted of an animate toy, and an accessory toy which was either a realistic miniature (e.g., a small plastic spoon); or a substitute object (e.g., a popsicle stick) which by its functionally nonspecific nature and physical characteristics, lent itself to symbolic substitution. The attending adult demonstrated symbolic play with a modelling pair of playthings, endowing the animate toy with independent action by making it use the accessory in an appropriate fashion, (e.g., the toy monkey fed itself with the miniature spoon, or with the popsicle stick). Thus the child had the opportunity to learn both to animate toys and to perform symbolic substitutions. The benefit derived by the child from observing the model was assessed by examining his imitation response with the modelling pair of playthings, by his response on a transfer test with a different pair of playthings, and by his subsequent free play behavior.

It was expected that the autistic children would play relatively more on structured play trials than in free play periods, and that they would play less than the other two groups of children, at least in free play periods. In addition, it was predicted that so long as the index of play level was independent of play frequency, the level of play of the autistic children would be consistent with their verbal mental age and thus would not differ from that of retarded and normal children of comparable mental age. Finally, it was predicted that even though

DeMyer and her colleagues (DeMyer, Alpern, Barton, DeMyer, Churchill, Hingtgen, Bryson, Pontius & Kimberlin, 1972) have suggested that autistic children have some difficulty with imitation, the autistic children would demonstrate the ability to imitate as well as the other children, since the ability to imitate at 1-1/2 years has been shown to be related to mental age at 2-1/2 years, at least in normal children (Wachs, 1975).

METHOD

Subjects

There were three groups of 10 subjects, each consisting of seven boys and three girls. Two control groups were selected for the purpose of comparison with the autistic group. A group of retarded children with Down's Syndrome were chosen with chronological and mental ages similar to the autistic group. The second control group consisted of normal children whose mental ages were comparable to the other two groups. The Peabody Picture Vocabulary Test (PPVT) was used as the basis for matching because it can be administered with ease in a brief span of time and does not require a verbal response from the subject. Characteristics of the three groups are presented in Table 1.

Autistic group

Subjects in this group were selected from special education classes for disturbed children in two institutions. All of them met the criteria set out by Rutter (1971) for the diagnosis of autism: before the age of 30 months they displayed 1) lack of interest and involvement in the environment, particularly the social one; 2) some obsessive or ritualistic behaviors; and 3) deviant language development. Three of the autistic children were considered "untestable" on the PPVT because they did not grasp the essential principle of the test, which requires pointing to the picture of the object named by the examiner. They were arbitrarily assigned the lowest possible MA of 1 year, 9 months. Because of these untestable children and the fact that autistic children tend to be weaker in verbal than in nonverbal functioning, the Leiter International Performance Scale (LIPS) was also administered. The LIPS

TABLE 1

Chronological and Mental Age Characteristics of the Groups

	Group		
	Autistic	Down's	Normal
CA (years, months)			
MDN	9, 8	9, 5.5	2, 9.5
Range	6, 10 - 12, 10	6, 11 - 12, 8	2, 0 - 4, 5
Q.D.	1, 4.75	1, 4.75	0, 5.13
PPVT (years, months)			
MDN	2, 6	2, 5	2, 6.5
Range	1, 9 - 3, 11	1, 9 - 3, 11	1, 9 - 3, 10
Q.D.	0, 9	0, 7.75	0, 7.25
LIPS MA (years, months)			
MDN	4, 10	-	-
Range	3, 11 - 7, 3	-	-
Q.D.	0, 6	-	-

Note: Medians, Ranges, and Quartile Deviations are based on an N of 10 in each case except for the LIPS which is based on an N of 9.

is a performance test of general intelligence which correlates with the Stanford-Binet (Leiter, 1948). On this test only one child was untestable; the IQs for the remaining nine children ranged from 41 to 64, and the median IQ was 55. The autistic children's PPVT MA showed a correlation (Spearman's Rho) of .545 with LIPS MA, and a correlation of .558 with LIPS IQ. It was considered possible that the nonverbal level of these children might be meaningfully related to their play performance in the experiment. Appendix A contains descriptions of relevant features of individual autistic subjects.

Down's Syndrome group

Down's Syndrome children were used for the mentally retarded control group since they are the most numerous retarded group and their behavior would be more homogeneous. Children with Down's Syndrome who fell within the same age range as the autistic group were taken from classes in two educational institutions for the mentally retarded and given the PPVT. Then the group was selected so that it would match the autistic group in terms of PPVT MA median and range. Simultaneous matching on the basis of sex, CA, and PPVT MA was not feasible in view of subject availability.

Normal group

The 10 normal subjects were drawn from a day care nursery catering to the children of predominantly working class parents. This group was selected on the basis of comparability with the autistic group for PPVT MA median and range. As with the Down's group, the available pool of subjects did not allow for simultaneous matching based on sex and PPVT MA.

Experimental Setting

Because the children were from several different institutions, it

was not possible to test them all in the same room. An experimental room was selected in each institution that was relatively free from distractions; this meant in each case that the room chosen was one not generally frequented by the children. On entering the experimental room the child was faced with a semicircular table on which the toys for that session were displayed. The arrangement of the table and the small chairs for the observer, experimenter, and child is shown in Figure 1.

Equipment

To contain toys not in use during certain periods of each session, a black carrying case (43 cm x 30 cm x 20 cm) was kept on the floor to the right of the experimenter's chair. A Panasonic cassette tape recorder, Model RQ209S, and a cassette tape, on which was recorded a brief piano note at 30-sec. intervals, was used for timing observations. In addition, a Sony Port-a-Pac, Model AV-3400, was employed to make video tape records of experimental sessions for seven of the autistic children at one institution where circumstances permitted such recording.

Experimental Toy Groups

Four different groups of toys and objects, consisting of 1 modelling set and 1 transfer set each, were used in a fixed order for all subjects. Groups 1 and 2 were used in Session 1, and Groups 3 and 4 in Session 2. The experimental toys and objects were chosen after extended observation of pilot subjects for their interest, ease of manipulation, and suitability for eliciting symbolic play. Each modelling or transfer set consisted of an animate toy and either a realistic accessory toy, to be used for subjects in the realistic accessory condition; or a substitute object, to

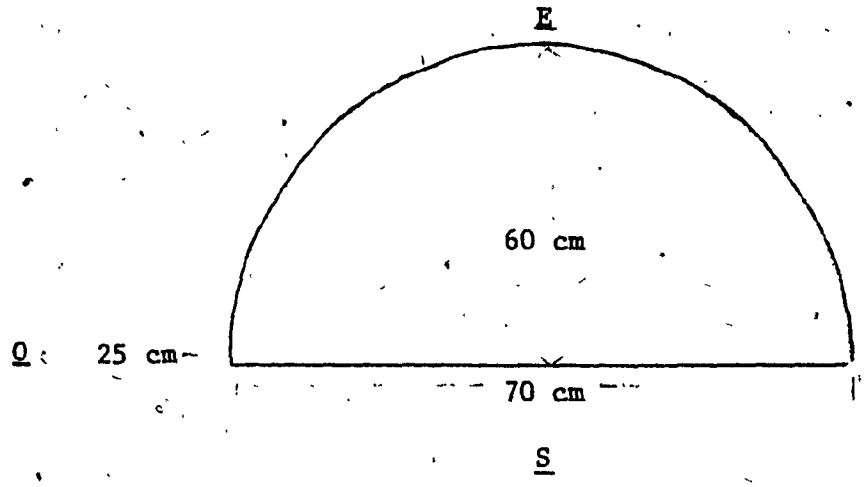

Figure 1. Arrangement of furniture for experimental sessions

be used for subjects in the substitute object condition. The substitute object in each set was selected because it could reasonably be substituted for the realistic accessory, although of course other symbolic uses were possible, and were in fact seen in pilot work.

TOY GROUPS

Group 1

	Modelling Set	Transfer Set
Animate Toy	plush monkey length: 22.5 cm	baby doll length: 34 cm
Accessory	plastic spoon length: 10 cm	plastic cup ht: 25 cm/diam. 3 cm
Object	popsicle stick 11 cm	pill container ht. 5 cm/diam. 2.5 cm

Group 2

	Modelling Set	Transfer Set
Animate Toy	pink panther length: 47 cm	girl doll length: 37 cm
Accessory	whisk broom length: 15.5 cm	plastic hairbrush length: 13 cm
Object	stiff cardboard 18 cm x 10 cm	tapered plastic object length: 13 cm

Group 3

	Modelling Set	Transfer Set
Animate Toy	muppet frog length: 42 cm	cloth and vinyl monkey length: 37 cm
Accessory	washcloth 12 x 11.5 cm	toothbrush length: 13 cm
Object	print material 18 cm x 14 cm	wooden dowel length: 13 cm

Group 4

	Modelling Set	Transfer Set
Animate Toy	stiff vinyl doll length: 17 cm	plush baboon length: 30 cm
Accessory	wooden cart 15 cm x 12 cm ht. 8.5 cm	small dictionary 8 cm x 5 cm
Object	plastic container 12 cm x 10 cm ht. 3 cm	corrugated cardboard folded into a V-shape 16 cm x 11 cm

Observational Measures

Play observation schedule

Brief, written descriptions (Play Descriptions) of the child's use of the playthings were made by a trained observer using a standard format and terminology at 30-sec. intervals during each free play period and structured play trial. The observer, a female honours psychology undergraduate who was uninformed with respect to the experimental hypotheses, also classified the child's response to the playthings according to one of nine response categories. The categories were intended to be sensitive to the wide range in play behaviors seen during pilot observation and to ensure that the observer's record would contain the information necessary for later classification and analysis of level of play. They were developed in pilot work with children representative of the three experimental groups, with the participation of a third qualified observer (a developmental psychologist). The nine response categories included two off-target behaviors - stereotypy and fiddling;

three classifications of motor acts--exploration, relational acts, and "other" motor acts; and four classifications for symbolic play--possible symbolic acts, single symbolic acts, serial symbolic sequences, and integrated symbolic sequences. The definitions used for the response categories are given in Appendix B. Further provision was made on the observer's record sheet for characterizing behaviors as fast or slow, vigorous or gentle, or as repeated or isolated. Provision was made as well for noting sounds appropriate to symbolic play: relevant noise, such as lip smacking while giving a doll a drink; or relevant vocalization, such as saying "skate" while skimming a doll across the table. Finally, both serial and integrated symbolic sequences could be characterized as either elaborated (acted out in exaggerated detail), schematic (performed in a quick abbreviated way), or vividly realistic (representing a real life scene with great naturalism).

The experimenter also made brief notes of the child's activity at 30-sec. intervals. In addition, since the purpose of the observations was to provide an index of the highest level of play, any possibly significant behavior (such as spontaneous use of a substitute object or animation of an animate toy) was noted by the observer and by the experimenter whenever they observed it. This was done because in pilot work significant play in the autistic children was so rare that it might only be seen during an interval.

Time sampling of frequency of Play, Stereotypy, and Off-Task Behavior

Time sample observations at 30-sec. intervals of the occurrence of Play (any use of a plaything as long as a child was attending to it), Stereotypy (repetitive flipping, tapping, or twiddling of objects; or flapping, flicking of the hands; or rocking, or jerking movements of

the body), or Off-Task Behavior other than Stereotypy (including fiddling, daydreaming and running away) were made by the experimenter throughout the free play periods and during each structured play trial. These observations were included to assess the relative frequency of such behaviors under the different experimental conditions. Immediately following a time-sampling entry of Stereotypy or Off-Task Behavior, the experimenter redirected the child's attention to the playthings by saying, "(child's name), can you play with the toys? Go ahead and play with the toys!" Simply to aid in verification of the observer's recorded Play Descriptions and response categories which were discussed at the end of each session, the experimenter also noted more specifically whether Play was symbolic, motor, or exploratory; whether Stereotypy was object- or body-related; and whether Off-Task Behavior was fiddling or no involvement at all with the playthings.

Ratings of attitude and involvement

Ratings of the extent to which a child manifested behavior on five scales of attitude and involvement were made by the experimenter at the end of each free play and structured play period using a scale of 1 (never) to 5 (almost always). The five characteristics rated were: cooperativeness or in-seat behavior and acceptance of the presentation and removal of playthings; interest or general attentiveness to the playthings; remoteness, or gazing or daydreaming; happy smiling involvement in play; and serious or intense, sober absorption in play. These measures were taken so that the extent and emotional quality of the autistic children's involvement during the different play periods could be evaluated in relation to the other groups.

Reaction-to-Modelling Checklist

Behavioral observations of the occurrence of specific behaviors reflecting the extent of the child's interested attention during modelling of symbolic play were made by the observer who recorded the child's reaction by means of a Reaction-to-Modelling Checklist. The checklist contained the following behaviors, selected on the basis of pilot observation: draws closer, stands up, reaches out, smiles, face "lights up", verbalizes, watches, glances away. While this checklist was applied to every child, it was included because in pilot testing some autistic children were responsive on this level although they did not imitate.

Observer Training and Reliability

Training of the experimenter and observer was accomplished during the extensive pilot work required to develop the response categories and other measures used, with the third observer providing consensual validity for their observations. To insure a useful record, the observer's recorded descriptions and response categories were discussed at the end of each experimental session and clarifications were added as necessary. Reliability ratings were made, using the videotape records of Session 1 for the first four autistic children tested, before further subjects were tested. The experimenter and observer fulfilled the observer's role making simultaneous, independent recordings from the taped records. The resulting percent of agreement ranged from 80% to 93% agreement for the Play Descriptions; 85% to 96% agreement for the response categories; and 88% to 100% agreement for the Reaction-to-Modelling Checklist. To provide for future validation of recorded data, videotaped sessions for seven of the autistic children were made.

Procedure

Each subject underwent two sessions with a minimum interval of two days between sessions. The two sessions were essentially replications with different groups of toys which were intended to increase the reliability of the observations. Although each child experienced the animate toys in the same order, for each group of children the order of the realistic accessory/substitute object conditions was counterbalanced across subjects for each session, and across sessions for each child. More specifically, in Session 1, S's #1, 3, 5, 7, and 9 (S#1 in each group having the lowest PPVT MA, S#10 having the highest MA) in each group underwent the substitute object condition first, and the realistic accessory condition second; while the other half, S's #2, 4, 6, 8, and 10 received the realistic accessory condition followed by the substitute object condition. For Session 2 the order in which the two conditions were administered was reversed for each child. All subjects completed both sessions with the exception of one autistic girl (S#8). This child completed Session 1, but was uncooperative despite several attempts at Session 2. The counterbalancing schedule is shown in Appendix C.

Each session consisted of two structured play periods: one with the appropriate animate toys and realistic accessory toys, and one with the appropriate animate toys and substitute objects. The structured play periods were designed to test for the effectiveness of modelling in eliciting imitation, as well as for transfer in terms of a higher level of play. The session began and ended with a 4-min. freeplay period in which all the playthings used in the two structured play periods were available. The free play periods were included to assess the quality of play in an unstructured situation involving a variety of playthings, and

to test for generalization of any effects obtained in the structured play periods. An outline of the sequence of events experienced by each child in one session is given in Appendix C.

Each structured play period consisted of four separate 1-min. observation periods or trials. Trials 1 and 2 were baseline trials for transfer and modelling, respectively; while trials 3 and 4 were test trials for modelling and transfer, respectively. On a given trial only the designated animate toy and the appropriate realistic accessory or substitute object was presented. To initiate the baseline trials the experimenter said, "Now, you can play with these toys." To make the transition between the two baseline trials and also between the two test trials, the experimenter simply said, "Would you like to play with some other toys now?" and waited for the child to agree before removing the playthings.

At the end of trial 2 (modelling baseline), the experimenter initiated the modelling sequence by taking the pair of playthings back from the child saying, "May I play with them now? I want to show you something." The experimenter then manipulated the animate toy so that it "used" the accessory toy (or substitute object) in an appropriate way, thus modelling the highest level of symbolic play. For example, she put the spoon or popsicle stick in the monkey's hand and made it feed itself. The specific manipulations performed for each modelling set of playthings are listed in Appendix D. The well elaborated actions modelled by the experimenter were designed to be both distinctive, and appropriate only for a given object pair, so that an imitation elicited in one play period could not appropriately be carried over to another, and any imitation would be readily recognized. While modelling with the toys, the experimenter

smiled at the child commenting, "Look what the monkey (or the doll, frog, etc.) is doing!" She performed the manipulations with the comment twice and then repeated if necessary if the child had not paid attention initially.

To initiate the modelling test trial (trial 3), the experimenter returned the playthings to the child saying, "O.K., now you can play with them." After one minute the experimenter exchanged the transfer playthings for the pair used in modelling and initiated the transfer test trial (trial 4) by saying, "Now you can play with these toys."

The observer did not interact with the child except to greet him at the beginning of a session, and to respond in a minimal but natural fashion to any overture he happened to make. She was responsible for operating the tape recorder which was played continuously during the 4-min. free play periods, but was stopped at the end of each 1-min. trial during structured play periods while the playthings were exchanged by the experimenter, and then started again for the next trial. The first recordings (the observer's Play Descriptions, and the experimenter's brief notes and time-sample recordings) were made several seconds into the first interval of each free play period and of each structured play trial to capture the child's initial response to the toys; the remaining observations were then taken on the 30-sec. intervals. Thus there were nine observation points for each free play period, and twelve for each structured play period with three observation points--an initial, middle and final one--for each structured trial. If a child was uninvolved or distracted during the entire first minute of the initial free play period of either session, it was discounted and the 4-min. period was begun again.

Assessment and Rating of Level of Play

Once all of the data had been gathered (29 S's for 2 sessions and 1 S for 1 session), the criteria for the levels of a five-level play scale were finalized by the rater (the developmental psychologist) on the basis of the unidentified Play Descriptions and experimenter's notes for the free play of all the children. In this way, the general levels suggested by the developmental research on symbolic play were adapted to the play seen in the children of the sample with the particular playthings used. The five levels of the play scale are listed below. In applying the play scale, the frequency or number of behaviors at a given level was disregarded; a single instance was sufficient for classification. The play level scores for each child thus represented the highest level of play, not necessarily the characteristic level. The rater assigned each child a play level score representing his highest level of behavior in each free play period and in each structured play trial. The experimenter's notes, supplemented by the observer's more detailed Play Descriptions, were read in random order to the rater in three blocks: the 118 initial and final free play periods (2 periods per session per child); the 236 modelling and transfer baseline and test trials with toy and realistic accessory (4 trials per session per child); and the 236 modelling and transfer trials with toy and substitute object (4 per session per child). Since the Play Descriptions and notes were read without identification of group, play period or trial, and with references to stereotypy deleted, the autistic children's protocols in general could not be easily distinguished from those of other children.

Play Scale

Level 1: Motor play.

Exploratory--handling, manipulating, and/or close visual examination of playthings.

Simple relational acts--stacking playthings; or placing one inside, or on top of another.

Other--banging, squeezing, tapping, or throwing playthings.

Note: one Down's child was given a level of 1 for both final free play periods, and for the test trials in Session 1 with toy and substitute object where his only involvement was throwing and shoving playthings off the table; although this was disruptive behavior, at least initially it also appeared to be playful activity.

Level 2: Transitional play.

Possible animation--deliberately standing or sitting an animate toy upright, usually looking into its eyes.

Recognition of animate toys--differential treatment of animate toys compared to accessory toys, e.g., hugging or kissing an animate toy.

Possible or ambiguous symbolic play--play with possible or somewhat ambiguous symbolic content, e.g., touching the dowel to the doll's mouth (possible feeding?); or pulling the doll's hair but at the same time saying, "shampoo" (washing doll's hair?).

Appropriate use of a realistic accessory--use of a realistic accessory by the child not directed to an animate toy, e.g., brushing his own hair with the hairbrush, or using the whisk on the table.

Tertiary circular reaction--repeating acts for their effect with systematic variation, e.g., tossing and flipping the whisk in the air

to various heights, each time attempting to catch it.

Level 3: Symbolic play.

Simple animation--holding an animate toy upright and moving or "jiggling" it in place.

Toy directed use of realistic accessory--appropriate use of a realistic accessory vis à vis an animate toy, e.g., bringing the cup to the doll's lips, or holding the book open to toy's face.

Symbolic use of a substitute object--performing a clearly interpretable self- or toy-directed action using a substitute object, e.g., tilting the pill tube to the child's own lips, or holding the plastic handle tip to the doll's mouth.

Level 4: Complex symbolic play.

High level animation--giving an animate toy independent action, e.g., making the monkey hold the toothbrush and brush its teeth, or making an animate toy walk across the table.

Symbolic sequences--combining two or more symbolic acts in a serial or integrated sequence, e.g., feeding a toy, then himself with the spoon; or dipping with the stick or spoon from an imaginary container to feed the doll.

Level 5: Animated sequences

Using the highest level of animation combined with a sequence, e.g., making the monkey dip the stick or spoon from an imaginary container to its mouth, or making the doll walk to the pink panther, kick it, then making them dance together.

Assessment and Rating of Quality of Imitation

Since a child might show higher level play on modelling test trials than on baseline trials without imitating, the following scale was developed to assess the quality of each child's imitation response to modelled symbolic play:

Imitation Scale

0 none: child makes no attempt to reproduce the modelled action.

1 possible imitation of action: child appears to perform the modelled action on toy, but his action is very brief or poor in quality;

or

possible imitation of animation: child sits or stands the animate toy upright as modelled, or appears to place the accessory in the toy's hand.

2 clear imitation of action only: child himself uses the accessory plaything, performing the modelled action on the animate toy without attempting animation.

3 clear attempt to animate the toy followed by imitation of action: child makes a clear attempt to imitate animation, e.g., places the accessory in the toy's hand, but then performs the modelled action himself as in 2.

4 reasonable imitation of action combined with clear animation: child manages to make the toy perform the modelled action, perhaps clumsily.

5 imitation of action and animation, plus variation in the action or the accessory's use with animation maintained: child copies the model accurately, and either elaborates the action, e.g., makes the frog wash its face and body with the cloth; or uses the accessory in another way, e.g., makes the frog wash itself, then has it eat the cloth.

Imitation scores were assigned by the experimenter on the basis of the Play Descriptions from each of the four modelling test trials (2 test trials per session per S). In order to assess the reliability of these scores, an independent rater, a developmental psychology graduate student, scored the 30 test trials with modelling playthings from toy group 2 (15 S's with the pink panther and whisk, and 15 S's with the pink panther and rectangular cardboard piece). The play descriptions of these 30 trials were read to the rater in random order, and she assigned each an imitation score without knowledge of any subject's group. The rater's and experimenter's imitation scores were highly correlated when subjected to a Spearman's Rank Order Correlation, $\rho = .98$, $n = 30$, $p < .02$. They disagreed in three cases where the rater assigned a score of 5, while the experimenter had assigned a score of 4.

RESULTS

The obtained data were either ordinal (scales), or did not meet the assumption of a normal distribution (time-sampling), and thus required the use of nonparametric tests. Accordingly all statistical comparisons were performed for within-groups differences using the Wilcoxon Matched-Pairs Signed Ranks Test, and for between group differences using the Mann-Whitney U Test. Significance levels reported are based on two-tailed tests. Tests were calculated with N=9 for the autistic group and N=10 for the other two groups, except for comparisons using data only from Session 1 where N=10 for all groups, unless otherwise indicated. The median ratings on the five scales of attitudes and involvement for each group for the free play and structured play periods of each session are contained in Appendix E. The total play frequency, highest level of play score, and highest imitation score, as well as the specific substitute symbolic uses observed for each autistic child are shown in Appendix A.

Attitudes and Involvement in the Experimental Setting

Cooperativeness was generally high for most children since median ratings for the three groups ranged from 4 (frequently) to 5 (almost always). The median ratings for cooperativeness for the autistic, Down's, and normal groups were 4.25, 4.81, and 4.92, respectively, for the four free play periods combined; and 4.0, 4.75, and 4.95, respectively, for the four structured play periods combined. Between-groups comparisons revealed that the autistic children were rated less cooperative than the normal children both for free play periods, $U=15.5$, $p < .02$, and for structured play periods, $U=15$, $p < .02$; they did not, however, differ significantly from the Down's children in cooperativeness either in free play periods, $U=24.5$, or in structured play periods, $U=26.5$. The Down's group did not differ from the normal children in free play periods, $U=41$, or in structured play periods,

U=35.5. The only significant within-groups difference between free play and structured play was the unexpected one that the autistic children were more cooperative in free play periods than in structured play periods, T=0, n'=6, $p < .05$. No tests of within- or between-session differences were significant for any group, although the Down's children tended to be less cooperative in the final free play period, MDN 4.75, than in the initial free play period of Session 2, MDN 4.94, T=0, n'=5, $p < .10$.

The ratings for interest indicated that the autistic children were sometimes interested, while the Down's and normal children were frequently interested. The median interest ratings for the autistic, Down's, and normal groups were 2.89, 4.21, and 4.18, respectively, for the combined free play periods; and 2.75, 4.04, and 4.44, respectively, for the combined structured play periods. The autistic children showed less interest than the Down's and normal children both in free play periods, U=1, U=0, respectively, $p < .002$; and in structured play periods, U=3.5, U=2.5, respectively, $p < .002$. The Down's and normal groups did not differ significantly on rated interest either for free play periods, U=49.5, or for structured play periods, U=35. Interest ratings for free play periods compared to those for structured play periods did not differ significantly for any group. While the autistic children tended to show more interest in the initial free play period of Session 2, MDN 3, than in the initial period of Session 1, MDN 2.7, the difference was only marginally significant T=1, n'=5, $p < .10$. The only significant within-subjects comparison was that the Down's children were less interested in the final free play period of Session 2, MDN 3.75, than in the initial free play period of Session 2, MDN 4.94, T=0, n'=7, $p < .02$.

There were marked differences in the occurrence of remoteness, gazing and daydreaming between the autistic children, who displayed such behavior sometimes, and the Down's and normal groups, who did so infrequently. The median remoteness ratings for the autistic, Down's and normal groups were 2.89, 1.31, and 1.38, respectively, for the combined free play periods; and 2.63, 1.38, and 1.25, respectively, for the combined structured play periods. These differences were highly significant both for free play periods, autistic/Down's U=1, autistic/normal U=0, $p < .002$, and for structured play periods, U=0, U=4, respectively, $p < .002$. No significant differences in remoteness were found between free play and structured play periods for any group.

Play characterized by either happy involvement, or serious absorption was infrequently observed even in the normal subjects. The median ratings on the scale for happy play for the autistic, Down's and normal groups were 1.0, 1.08, and 1.25, respectively, for the combined free play periods; and 1.0, 1.13, and 1.5, respectively, for the combined structured play periods. The only significant difference between groups was that in structured play periods the normal children engaged in more happy play than the autistic children, U=16, $p < .02$. Comparisons of happy play between free play and structured play periods revealed a tendency for the Down's children to engage in happy play more frequently in structured than free play periods, T=1, $n=5$, $p < .10$. No other within-group differences were detected. The median combined session ratings for serious play for the autistic, Down's and normal groups in free play periods were 1.0, 1.13, and 1.25, respectively; and in structured play periods were 1.0, 1.05, and 1.25, respectively. The only between-group difference was that the normal children displayed serious absorption in play more often than the autistic children in free play periods, U=21, $p < .10$.

No group differed significantly in amount of serious absorption in play between free play and structured play periods.

Time Sampling of Play, Stereotypy, and Off-task Behavior

The proportions of play, stereotypy, and off-task behaviors other than stereotypy observed at 30-sec. intervals in initial and final free play periods for the combined sessions are shown for the three groups in Table 2. The autistic children were involved in play, stereotypy, and off-task behaviors approximately 50%, 20%, and 30% of the time, respectively. In contrast, the Down's and normal children engaged in play 90% of the time and in off-task behaviors 10% of the time. Tests of significance were performed on play, stereotypy and off-task behavior scores for initial and for final free play periods of each session.

The median play scores in free play periods are shown in Table 3 for the three groups. The autistic children consistently played less than the others. When the autistic group was compared to the Down's group, the Mann-Whitney U values for Sessions 1 and 2 in order were: initial free play $U=1.5$, $p < .002$, and $U=2$, $p < .002$; and final free play $U=20$, $p < .05$, and $U=8.5$, $p < .01$. The Mann-Whitney U values for the autistic group compared to the normal group for Sessions 1 and 2 in order were: initial free play $U=2.5$, $p < .002$ and $U=4.5$, $p < .002$; and final free play $U=16.5$, $p < .02$, and $U=6$, $p < .002$. There were no significant differences, however, in the amount of play observed in the Down's and normal children: initial free play Session 1 $U=50$, Session 2 $U=31.5$; and final free play Session 1 $U=38$, Session 2 $U=49$. The one within-group difference was only a marginally significant one: the Down's children tended to play more in the initial free play period of Session 2 than in the final one, $T=4$, $n=7$, $p < .10$.

Table 2

Proportions of Play, Stereotypy and Off-Task Behavior other than Stereotypy of the Three Groups in Free Play Periods, Combined for Sessions 1 and 2

	Group					
	Autistic[a]		Down's[b]		Normal[b]	
	Free Play Period		Free Play Period		Free Play Period	
	Initial	Final	Initial	Final	Initial	Final
Play	.519	.537	.922	.850	.889	.878
Stereotypy	.111	.179	0	.011[c]	0	0
Off-Task Behavior	.370	.283	.078	.139	.111	.122

Note. Based on 18 time-sample observations per S (9 in each period of each session).

[a] N=9

[b] N=10

[c] Two observations of Stereotypy in S #2

Table 3

Play Score Medians, Quartile Deviations, and Ranges of the Three Groups in Free Play Periods of Both Sessions

	Group					
	Autistic		Down's[a]		Normal[a]	
	Session		Session		Session	
	1[a]	2[b]	1	2	1	2
Period						
Initial						
MDN	4.0	6.0	8.1	8.78	8.16	8.16
Q.D.	1.17	1.51	.50	.54	1.13	.42
Range	2-7	1-7	6-9	7-9	6-9	6-9
Final						
MDN	5.5	6.0	7.25	7.83	8.5	7.75
Q.D.	1.58	2.31	1.0	.84	1.04	.63
Range	0-9	0-7	6-9	6-9	6-9	7-9

Note. Scores based on 9 observations per S in each period of each session.

[a] N=10

[b] N=9

The median off-task behavior scores for all three groups and the median stereotypy scores for the autistic group are given in Table 4. Although five autistic children engaged in stereotypy in at least one of the free play periods, the difference between the autistic children and the other two groups was only significant in the final free play period of Session 2. The Mann-Whitney U values for the autistic compared to the Down's group for Sessions 1 and 2 in order were: initial free play U=40, and U=30; and final free play U=40, and U=23.5, $p < .10$. The Mann-Whitney U values for the autistic compared to the normal group for Sessions 1 and 2 in order were: initial free play U=40, and U=30; and final free play U=40, and U=20, $p < .05$. Off-task behavior typically included gazing or daydreaming, watching the experimenter or observer, and running away. In general, the autistic children engaged in such behavior more frequently than the Down's and normal children, although their off-task behavior did not differ significantly from that of the Down's group in the final free play period of Session 1. The Mann-Whitney U values for off-task behavior score comparisons of the autistic and Down's groups for Sessions 1 and 2 in order were: initial free play U=10, $p < .002$, and U=10, $p < .01$; and final free play U=27.5, and U=22, $p < .10$. The Mann-Whitney U values for comparisons of the autistic and normal groups for Sessions 1 and 2 in order were: initial free play U=10.5, $p < .01$, and U=16, $p < .02$; and final free play U=21.5, $p < .05$, and U=23, $p < .10$. Consistent with findings for amount of play, the Down's and normal children did not differ significantly in amount of off-task behavior observed: initial free play Session 1 U=50, Session 2 U=31.5; final free play Session 1 U=38, Session 2 U=42. The only within-group difference was that the autistic children tended to show

Table 4

Stereotypy and Off-task Behavior Score Medians, Quartile Deviations and Ranges for the Three Groups in Free Play Periods of Both Sessions

	Autistic[a] Session		Down's[a] Session		Normal[a] Session	
	1	2[b]	1	2	1	2
Initial Period						
Stereotypy						
MDN	.125	0	-	-	-	-
Q.D.	.469	.481	-	-	-	-
Range	0-7	0-5	-	-	-	-
Off-task						
MDN	4.5	2.0	1.10	.214	.83	.83
Q.D.	1.12	1.25	.605	.339	.75	.50
Range	0-6	0-5	0-3	0-2	0-3	0-3
Final Period						
Stereotypy						
MDN	.125	1.0	-	.06[c]	-	-
Q.D.	.469	1.813	-	-	-	-
Range	0-6	0-9	-	0-2	-	-
Off-task						
MDN	3.0	2.0	1.75	.83	.50	1.25
Q.D.	1.50	.875	1.068	.75	.948	.813
Range	0-9	0-3	0-3	0-3	0-3	0-2

Note. Scores based on 9 observations per S in each period.

[a] N=10; [b] N=9; [c] 2 instances of Stereotypy in S #2.

fewer off-task behaviors in the initial free play period of Session 2 than of Session 1, T=2, n=6, $p < .10$.

Statistical comparisons of play, stereotypy, and off-task behavior of the three groups in structured play periods were made on the basis of scores derived from each of the two baseline trials, and from the transfer test trial; the modelling test trial was excluded since it was preceded by modelling of symbolic play and thus was not comparable to the other trials. Thus each structured play period score was the result of 9 observations, taken at 30-sec. intervals (3 per trial), and comparable with scores for free play periods. The proportions of play, stereotypy, and off-task behavior which occurred in the three groups with toy and realistic accessory, and with toy and substitute object in structured play periods are shown in Table 5 for the combined sessions. The autistic children appeared to play more often in structured play periods than in free play periods; they were involved in play, stereotypy and off-task behaviors approximately 65%, 10% and 25% of the time, respectively. As in free play periods, the Down's and normal children played 90% of the time, and engaged in off-task behaviors 10% of the time.

Table 6 gives the median play scores of the three groups in each structured play period. The autistic children consistently played less than the Down's and normal children, as they had in free play. The Mann-Whitney U values for the autistic and Down's group comparisons for Sessions 1 and 2 in order were: toy and realistic accessory U=11, $p < .01$, and U=12.5, $p < .01$; and toy and substitute object U=21.5, $p < .05$, and U=8, $p < .002$. The Mann-Whitney U values for the autistic compared to the normal group for Sessions 1 and 2 in order were: toy and realistic accessory U=19, $p < .02$, and U=18, $p < .05$; and toy and

Table 5

Proportions of Play, Stereotypy and Off-Task Behavior other than Stereotypy for the Three Groups in Structured Play Periods, Combined for Sessions 1 and 2.

	Autistic[a]		Down's[b]		Normal[b]	
	Accessory Playthings		Accessory Playthings		Accessory Playthings	
	Realistic	Substitute	Realistic	Substitute	Realistic	Substitute
Play	.654	.636	.950	.900	.900	.917
Stereotypy	.080	.093	0	.011	0	0
Off-task Behavior	.265	.272	.050	.089	.100	.083

Note. based on 18 observations per S (9 in each period of each session)

[a] N=9

[b] N=10

Table 6

Play Score Medians, Quartile Deviations and Ranges for the Three Groups in Structured Play Periods of Both Sessions with Toy and Realistic Accessory, and with Toy and Substitute Object

	Autistic		Down's[a]		Normal[a]	
	Session		Session		Session	
	1[a]	2[b]	1	2	1	2
Accessory						
Realistic						
MDN	6.0	6.0	8.80	8.64	8.67	8.5
Q.D.	1.75	2.48	.75	.68	1.25	.613
Range	2-9	2-9	7-9	7-9	5-9	5-9
Substitute						
MDN	5.0	5.0	8.5	8.3	8.25	8.67
Q.D.	1.98	1.28	1.30	.54	.69	.76
Range	2-9	3-8	5-9	7-9	7-9	7-9

Note. Scores based on 9 observations per S in each period.

[a] N=10

[b] N=9

substitute object U=18, $p < .02$, and U=10, $p < .01$. Again, the Down's and normal children did not differ significantly in amount of play observed; toy and realistic accessory Session 1 U=42.5, Session 2 U=40.5; and toy and substitute object Session 1 U=49, Session 2 U=47. The amount of play was not affected significantly by the nature of the accessory plaything in any group, although the Down's children tended to play more when the accessory was realistic than when it was a substitute object (Session 1 T=0, $n'=5$, $p < .10$; and combined sessions T=1.5, $n'=6$, $p < .10$).

Table 7 contains the median off-task scores for the three groups and the median stereotypy scores for the autistic children in structured play. Seven of the autistic children engaged in stereotypy in at least one of the structured play periods, but the difference between the autistic group and the other two groups was only significant in Session 2 when the accessory was a substitute object. The Mann-Whitney U values for comparisons of the autistic and Down's groups for Sessions 1 and 2 in order were toy and realistic accessory U=35, and U=30; and toy and substitute object U=34, and U=23.5, $p < .10$. The Mann-Whitney U values for stereotypy in the autistic group compared to the normal group for Sessions 1 and 2 in order were: toy and realistic accessory U=35, and U=30; and toy and substitute object U=30, and U=22.5, $p < .10$. Off-task behaviors were seen consistently more often in the autistic children than in the Down's and normal children. The Mann-Whitney U values for off-task behavior in the autistic group compared to the Down's group for Sessions 1 and 2 in order were: toy and realistic accessory U=14.5, $p < .01$, and U=14.5, $p < .02$; and with toy and substitute object U=22, $p < .05$, and U=21.5, $p < .10$. The Mann-Whitney U values for off-task

Table 7

Stereotypy and Off-Task Behavior (other than Stereotypy) Score Medians, Quartile Deviations and Ranges for the Three Groups in Structured Play Periods with Toy and Realistic Accessory and with Toy and Substitute Object

	Autistic Session		Down's[a] Session		Normal[a] Session	
	1[a]	2[b]	1	2	1	2
Accessory						
Realistic Stereotypy						
MDN	.21	0	-	-	-	-
Q.D.	.29	.38				
Range	0-4	0-5				
Off-task						
MDN	2.16	1.0	.21	.21	.33	.50
Q.D.	1.25	1.25	.25	.41	.75	.43
Range	0-6	0-6	0-2	0-2	0-4	0-4
Substitute Stereotypy						
MDN	.33	1.0	-[c]	-[c]	-	-
Q.D.	.50	.58				
Range	0-2	0-4				
Off-task						
MDN	3.0	2.0	.33	.50	.75	.33
Q.D.	2.12	1.63	.75	.58	.81	.63
Range	0-6	0-4	0-4	0-2	0-2	0-2

Note. based on 9 observations per S for each period

[a] N=10

[b] N=9

[c] S #2 showed 1 instance of stereotypy

behavior in the autistic group compared to the normal group for Sessions 1 and 2 in order were; toy and realistic accessory $U=23.5$, $p < .10$, and $U=21.5$, $p < .10$; and with toy and substitute object $U=19$, $p < .02$, and $U=20$, $p < .05$. As in play score comparisons, the Down's and normal children did not differ significantly in amount of off-task behavior observed in structured play: toy and realistic accessory Session 1 $U=42.5$, Session 2 $U=40.5$; and with toy and substitute object Session 1 $U=47$, Session 2 $U=49.5$. No group's off-task behavior was significantly affected by the nature of the accessory plaything.

The total play scores for free play periods compared to those for structured play periods were not significantly different for any group. The underlying data base was 36 observations (9 per period) for each total free play score, and each total structured play score; and as was previously the case, observations from the modelling test trials were not included in calculations of structured play scores. The median free play scores per free play period, and the median structured play scores per structured play period in order were: autistic group 4.75 and 5.25, $T=9$, $n'=9$; Down's group 7.98 and 8.38, $T=9$, $n'=8$; and normal group 7.95 and 8.38, $T=10$, $n'=9$. Although the proportion of stereotypy for the autistic group was .15 in free play and .09 in structured play, both medians were .5 and no significant difference was found, $T=13$, $n'=8$. As well, the total amount of off-task behavior observed in the autistic children in free play, $MDN=3$, was not significantly greater than in structured play, $MDN=2.75$, $T=11$, $n'=9$.

Level of Play, Imitation, and Transfer

All of the children exhibited at least one clear symbolic behavior (level 3) in at least one free play or structured play period (exclusive of modelling test trials). No autistic child ever showed level 5 animation

in a sequence. Seven children in this group, however, received a level 4 rating in at least one period or trial either for endowing an animate toy with independent action (1 S), or for combining two symbolic acts into a serial or integrated sequence (4 S's), or for both types of level 4 behavior on separate occasions (2 S's). The remaining three autistic children displayed single, level 3, symbolic acts at least once. Five Down's and three normal children used level 5 animated sequences on one or more occasions, and all others in these groups engaged in level 4 play behaviors at least twice.

The level of play analyses were calculated with an N of 10 for each group. The play levels of the two sessions were combined for each child for each free play period, and for each structured play trial, in order to have a more reliable estimate of level of play. There were, however, three children whose level of play for only one session was used in some or all analyses. Autistic S #2 showed no involvement with the playthings except to glance at them during Session 1 in the final free play period, and on the modelling and transfer baseline trials with toy and realistic accessory. Thus, his Session 1 data was dropped for between-group comparisons of final free play periods, and those of baseline trials with toy and realistic accessory; and for within-group comparisons of initial and final free play periods, and those of baseline and test trials with toy and realistic accessory. In Session 1 Down's S #7 showed no involvement with the playthings except to point and say "what?" on the transfer baseline trial with toy and substitute object, so his Session 1 data was dropped for the between-groups comparison of that trial; and for the within-group comparison of transfer baseline and test trials with toy and substitute object. Only Session 1 data for autistic S #8 was

used in all play level analyses because she refused to participate in Session 2.

The median level of play for free play periods is shown in Table 8 for the three groups. The autistic children's median level of play in initial free play periods was lower than that of the Down's and normal children. Given the original hypothesis that the three groups would not differ on level of play, a Kruskal-Wallis Analysis of Variance by Ranks of the children's initial free play level was performed and the resulting H value was not significant: $H=4.5$, $N=30$, $df=2$. The Mann-Whitney U value for the comparison of the autistic and Down's group was, however, marginally significant $U=23.5$, $p < .10$; while the initial free play level of the normal children did not differ significantly from that of either the autistic or Down's children $U=33.5$ and $U=37$, respectively. The normal children's level of play was higher in the final free play period than in the initial one, Wilcoxon $T=0$, $n'=7$, $p < .02$, but the autistic and Down's children's level of play did not change significantly from initial to final free play, $T=10$, $n'=7$, and $T=17$, $n'=8$, respectively. Between-group comparisons for final free play revealed that the autistic children showed lower level play than the normal children $U=10$, $p < .002$, while the comparison with the Down's group was only marginally significant, $U=24$, $p < .10$. The Down's and normal groups' play level was not significantly different, $U=49$.

The median play level of the three groups in structured play periods on modelling baseline and test trials is shown in Table 9. The autistic children showed lower level play with toy and realistic accessory on the modelling baseline trial than either the Down's, $U=16$, $p < .01$, or the

Table 8

Medians, Quartile Deviations and Ranges for Level of Play of the Three Groups in Initial and Final Free Play Periods, Combined for Sessions 1 and 2

	Autistic[a]	Down's	Normal
Period			
Initial Free Play			
MDN	2.25	3.5	3.25
Q.D.	.594	.687	.625
Range	1.5-4.0	2.0-4.5	1.5-4.0
Final Free Play			
MDN	2.25[b]	4.0	3.88
Q.D.	.406	1.25	.409
Range	1.0-3.5	1.0-5.0	2.0-5.0

Note. N=10 for all groups

[a] only Session 1 levels used for S #8

[b] only Session 2 levels used for autistic S #2

Table 9

Medians, Quartile Deviations, and Ranges for Level of Play of the Three Groups on Modelling Baseline and Test Trials with Realistic and Substitute Accessory Playthings, Combined for Sessions 1 and 2.

	Autistic Trial		Down's Trial		Normal Trial	
	Baseline	Test	Baseline	Test	Baseline	Test
Accessory						
Realistic						
MDN	2.25[a,b]	2.90[a,b]	3.35 (3.38)[c]	4.38 (4.5)[c]	3.08	4.25
Q.D.	.876	.613	.600	.406	.378	.500
Range	1.0-3.0	1.0-4.0	1.5-4.0	3.5-5.0	2.5-4.0	3.0-5.0
Substitute						
MDN	1.75[a] (1.88)[a,b]	2.85[a] (2.85)[a,b]	3.0[c]	4.35[c]	3.25	4.08
Q.D.	.500	.813	.375	.913	.625	.250
Range	1.0-2.5	1.5-4.0	1.5-4.0	2.5-5.0	1.5-4.0	3.5-4.5

Note. N=10 for all groups

Values based on one trial per session per S with toy and realistic accessory, and one trial per session per S with toy and substitute object.

[a] only Session 1 levels used for S #8

[b] only Session 2 levels used for S #2

[c] only Session 2 levels used for S #7

normal children, U=16.5, $p < .02$; the same trial comparison of the Down's and normal children's play levels was not significant, U=48.5. Similarly, the autistic children's play level with toy and substitute object on the baseline trial was lower than that of both the Down's and normal children, U=8, $p < .002$, and U=10.5, $p < .01$, respectively, while there was no significant difference between the play level of the Down's and normal groups, U=47.5. In addition, the realistic or substitute nature of the accessory playthings had no significant effect on modelling baseline trial level of play for any group: autistic T=11, $n'=8$; Down's T=16.5, $n'=9$; and normal T=14, $n'=8$.

Within-groups comparisons of the baseline and test trials revealed that the model's demonstration of symbolic play significantly raised the level of play with modelling playthings in all three groups. The Wilcoxon T values for modelling baseline to test trial comparisons of level of play for the autistic, Down's and normal groups in order were: with toy and realistic accessory T=0, $n'=7$, $p < .02$; T=0, $n'=10$, $p < .01$; and T=1.5, $n'=9$, $p < .01$; and with toy and substitute object T=4, $n'=9$, $p < .05$; T=0, $n'=7$, $p < .02$; and T=0, $n'=10$, $p < .01$. Between-groups comparisons of level of play on modelling test trials, however, revealed that the autistic children still showed lower level play than the Down's and normal children: with toy and realistic accessory U=3, $p < .002$, and U=8.5, $p < .002$, respectively; and with toy and substitute object U=21, $p < .05$, and U=5, $p < .002$, respectively. Once again, the Down's and normal children's play levels did not differ significantly either with toy and realistic accessory, U=39, or with toy and substitute object U=47.5.

When imitation scores for each child on the four modelling test trials were examined, it was found that while only two autistic children consistently imitated at least the modelled action (scored 2 or above) on all four trials, eight of them did so on at least one trial. Two autistic children never gave a clearly interpretable imitation response (S #8 scored 1 on Session 1 modelling test trials, and S #4 scored 0 on all 4 trials) but according to the Reaction-to-Modelling Checklist, they did respond by "reaching out", and by "watching" during modelling of symbolic play by the experimenter, although they also "glanced away". These in fact were responses typical of the other autistic children as well. Four of the autistic children imitated the modelled action combined with animation (scored 4) and one child attempted animation (scored 3) on at least one trial, but not one of them imitated with variation or elaboration of the modelled play (scored 5). In contrast to the autistic children, five Down's children and nine normal children consistently imitated at least the modelled action (scored 2 or above) on all four modelling test trials. Moreover, six Down's and six normal children scored 5 on one or more trials; with one exception, all of the others in these two groups scored 4 on one or more trials.

For the first between-groups analysis, each child's imitation score for modelling test trials with toy and realistic accessory, and for those with toy and substitute object were combined for Sessions 1 and 2 (one score each per session). The medians of these combined sessions imitation scores are shown in Table 10 for the three groups. The autistic children's imitation scores were lower than those of the Down's and normal children both with toy and realistic accessory, $U=10$, $p < .002$ and $U=7.5$, $p < .002$, respectively; and with toy and substitute object, $U=20$, $p < .05$, and $U=12$,

Table 10

Imitation Score Medians, Quartile Deviations and Ranges of the Three Groups with Realistic and Substitute Accessories, Combined for Sessions 1 and 2.

	Autistic[a]	Down's	Normal
Accessory			
Realistic			
MDN	1.58	3.75	3.75
Q.D.	.625	1.0	.748
Range	0-3.5	2.0-5.0	2.0-5.0
Substitute			
MDN	1.92	4.25	3.88
Q.D.	.875	1.375	.656
Range	0-4.0	1.5-5.0	2.0-4.5

Note. N=10 for all groups

Values based on one score per session per S with toy and realistic accessory, and one per session per S with toy and substitute object.

[a] only Session 1 scores used for S #8.

$p < .01$, respectively. The Down's and normal children's scores were not significantly different either with toy and realistic accessory, $U=49.5$, or with toy and substitute object $U=45.5$. As was true for level of play, the realistic or substitute nature of the accessory did not significantly affect the imitation scores of any group. Results of the within-group comparisons were: autistic $T=9$, $n=6$, Down's $T=16.5$, $n=8$, and normal $T=9$, $n=6$. Since the first analysis used an imitation score that was affected by the autistic children's inconsistency of performance, a second analysis was performed using the highest imitation score for each child. The medians for the highest of the four imitation scores for the autistic, Down's, and normal groups were 2.5, 4.66, and 4.66, respectively. The autistic children's best quality imitation, however, was still poorer than that of the Down's children, $U=10.5$, $p < .01$, and that of the normal children, $U=8$, $p < .002$, and again there was no significant difference between the highest imitation scores of the Down's and normal children $U=48$.

To obtain independent verification that imitation had occurred in the autistic children, the edited video tape records of six of the autistic children's modelling trials in both sessions, and of one autistic child's (S #8) modelling trials in Session 1 were shown to a rater (an experimental psychologist) who had experience in observing autistic children. The video tapes were edited so that the modelling baseline and test trials were unidentified and in random order for each toy group. The rater scored each trial according to the 6-point imitation scale, and on the basis of the written description of the symbolic actions modelled for each toy group. The rater's imitation scores for each of

the seven children were combined across toy groups, and the combined modelling baseline and test trials were compared by means of the Wilcoxon T test. Clear support was obtained for the occurrence of imitation in the autistic group, since the imitation scores assigned by the rater to the modelling test trials (MDN=1.5) were significantly higher than those assigned to the modelling baseline trials (MDN=0), $T=0$, $n'=7$, $p < .02$.

The median play level on transfer trials in structured play periods is given in Table 11 for the three groups. The autistic children showed lower level play on transfer baseline trials than the Down's and normal children; and the Down's and normal children's play levels were not significantly different. The Mann-Whitney U values for the autistic group's baseline level of play compared to those of the Down's and normal groups were: with toy and realistic accessory $U=21$, $p < .05$, $U=18$, $p < .02$, respectively, and with toy and substitute object $U=9.5$, $p < .002$, and $U=24.5$, $p < .10$, respectively. The Mann-Whitney U values for the Down's children's level of play on baseline transfer trials compared to that of the normal children were: with toy and realistic accessory $U=49$, and with toy and substitute object $U=31$. Once again, no significant differential effect of the two kinds of accessories on level of play was found for the autistic, Down's, or normal children; the respective Wilcoxon T values were $T=0$, $n'=4$, $T=10$, $n'=8$, and $T=16$, $n'=9$. This was the case even when transfer and modelling baseline trials were combined for realistic and for substitute accessory trials.

Before testing for transfer effects between baseline and test trials, tests were done to establish the equivalence of baseline play level with

Table 11

Medians, Quartile Deviations, and Ranges for Level of Play of the Three Groups on Transfer Baseline and Test Trials with Realistic and Substitute Accessory Playthings, Combined for Sessions 1 and 2.

	Autistic		Down's		Normal	
	Trial		Trial		Trial	
	Baseline	Test	Baseline	Test	Baseline	Test
Accessory						
Realistic						
MDN	2.25[a,b]	2.25[a,b]	3.0 (3.25)[c]	3.35 (3.35)[c]	2.88	3.33
Q.D.	.75	.875	.625	.538	.344	.375
Range	1.0-3.0	1.0-3.0	2.0-4.5	1.5-4.0	2.5-4.0	2.5-3.5
Substitute						
MDN	2.25[a] (1.75)	2.25[a] (2.0)[a,b]	3.5[c]	3.25[c]	3.0	3.25
Q.D.	.563	.75	.625	1.125	.812	.531
Range	1.0-3.0	1.0-4.0	2.4-4.5	1.0-4.0	1.5-4.0	2.0-4.0

Note. N=10 for all groups

[a] only Session 1 levels for S #8

[b] only Session 2 levels for S #2

[c] only Session 2 levels for S #7.

modelling and with transfer toys. No significant differences were found between play levels on modelling baseline trials and transfer baseline trials; although when the accessory was a substitute object, the Down's group tended to play at a lower level on the baseline trials with the modelling toys than on those with the transfer toys. The Wilcoxon T values for these comparisons for the autistic, Down's, and normal groups respectively were: with toy and realistic accessory T=10, n´=6; T=17, n´=8; and T=2, n´=4; and with toy and substitute object T=9.5, n´=8; T=1.5, n´=6, $p < .10$; and T=10.5, n´=8.

There was no evidence of a transfer effect in any group; in fact, with toy and substitute object the Down's children's level of play deteriorated between transfer baseline and test trials. The Wilcoxon T values for transfer baseline to test trial comparisons of play level for the autistic, Down's and normal groups respectively were: with toy and realistic accessory T=4, n´=4; T=6, n´=7; and T=7.5, n´=7; and with toy and substitute object T=3, n´=4; T=6, n´=9, $p < .05$; and T=13, n´=10. The autistic group's median level of play on transfer test trials remained lower than that of the other two groups, although their play level with toy and substitute object was no longer significantly different from that of the Down's group. The Mann-Whitney U values for the comparison of the autistic and Down's children's play levels on the transfer test trials were: with toy and realistic accessory U=15.5, $p < .01$; and with toy and substitute object U=38. The Mann-Whitney values for the same trial comparison of the autistic and normal children's play levels on transfer test trials were: with toy and realistic accessory U=11, $p < .01$; and with toy and substitute object U=18.5, $p < .02$. As on all other trials, the Down's and normal children's play levels on transfer

test trials were not significantly different either with toy and realistic accessory U=50, or with toy and substitute object U=34.

Although no significant differences were found between the Down's and normal children on frequency and level of play, there were observed qualitative differences apparent in the richness of their play. Accordingly the children were compared on what might be considered an index of symbolic fluency: the number of different substitute symbolic uses of objects they displayed in free play and in structured play periods (excluding all responses on modelling test trials as well as substitute uses which had been modelled). The number of substitute uses was tabulated by the experimenter from the play protocols; only clearly interpretable substitute uses which occurred in periods or trials where the level of play was 3 or more were considered. Each substitute use was counted only once, and was credited to free play or structured play according to when it was first seen. Some of the substitute uses seen were: the pill tube used as a cup to give an animate toy a drink, or as a hat placed on a toy's head; the piece of material or washcloth used as a blanket to cover an animate toy; and a subject's hand used as a container from which he might dip the spoon. Table 12 gives the group medians for the number of different substitute uses in combined free play periods and in combined structured play periods. The normal children displayed more substitute uses than either the autistic or Down's children in free play periods U=8.5, $p < .002$ and U=17, $p < .02$, respectively; and in structured play periods U=6, $p < .002$, and U=20, $p < .05$, respectively. Although the Down's children did not show significantly more substitute uses than the autistic children in free play periods U=29, they did do so in structured play periods U=20, $p < .05$.

Table 12

Medians, Quartile Deviations and Ranges for Number of Different Substitute Uses of the Three Groups in Free Play and in Structured Play Periods, Combined for Sessions 1 and 2

	Autistic[b]	Down's	Normal
Period			
Free Play			
MDN	1.17	2.0	6.83
Q.D.	.69	1.25	1.25
Range	0-2	0-8	0-12
Structured Play[a]			
MDN	1.17	3.5	7.0
Q.D.	.88	1.38	1.75
Range	0-4	1-8	3-11

Note. N=10 for all groups

[a] excluding modelling test trials.

[b] Session 1 uses doubled for S #8.

There were, however, no significant within-group differences on this measure between free play and structured play periods: autistic T=10.5, n=7; Down's T=15, n=9; and normal T=15.5, n=9.

Relation of Play Measures with Measures of Intelligence

Spearman's Rank Order correlations were calculated to assess the relationship of verbal mental age to level of play, imitation, and substitute symbolic use of objects. Average level of play, exclusive of modelling test trials, showed a sizeable correlation with the PPVT MA of the autistic, $\rho = .567$, $p < .10$; Down's, $\rho = .591$, $p < .10$; and normal children, $\rho = .739$, $p < .05$. There was no significant correlation for any group between average imitation score and PPVT MA, although similar weak positive correlations were found in each case. For the autistic, Down's, and normal groups they were: $\rho = .394$, $\rho = .482$, and $\rho = .458$, respectively. In addition, the Spearman's Rho values were not significant for the autistic group even when only the highest out of the four imitation scores was correlated with PPVT MA, $\rho = .470$. The total number of different substitute symbolic uses showed a strong positive correlation with PPVT MA in the autistic group, $\rho = .690$, $p < .05$, while a moderate nonsignificant positive correlation was found for the Down's group, $\rho = .527$. There was no relationship for the normal children between these two measures, $\rho = -.018$.

Correlations of the play measures with the nonverbal intelligence indices were also calculated for the autistic children. The correlations were based on an N of 10, with the subject who was untestable on the LIPS simply being assigned the lowest rank. The correlations with LIPS IQ were generally stronger than those obtained with LIPS MA. There was no relationship between the autistic children's average level of play

and LIPS MA, $\rho = .099$, or IQ, $\rho = .230$. As was true for verbal MA, their average imitation score and their highest imitation score both showed a weak, positive, and nonsignificant realtionship to LIPS MA, $\rho = .327$, and $\rho = .497$, respectively, and to LIPS IQ, $\rho = .436$ and $\rho = .467$, respectively. Finally the most noteworthy finding was that there was a sizable correlation between the total number of substitute symbolic uses and LIPS IQ, $\rho = .621$, $p < .10$, although the correlation with LIPS MA was not significant, $\rho = .393$.

DISCUSSION

The purpose of the present research was to investigate the play behavior and the response to modelled symbolic play of autistic children under presumably optimal conditions, and to differentiate behaviors unique to the autistic child from those common to other children with a low level of cognitive functioning. The autistic children played consistently less than the Down's and normal children, and no more frequently in structured play than in free play. Despite the equivalent mental age of the three groups of children, and even using a measure independent of frequency, the autistic children's level of play was generally lower than that of the other children. The autistic children also showed fewer different substitute symbolic uses of objects, considered to be a measure of symbolic fluency, than the other children. Although the autistic children imitated modelled symbolic play, their imitation scores were lower than those of the other children. In contrast, the Down's did not differ from the normal children in terms of frequency of play or level of play, but did differ in that they showed fewer substitute symbolic uses. The normal children were the only group whose level of play improved between initial and final free play periods. No group's performance was significantly impaired when an animate toy was paired with a substitute object accessory in comparison to when an animate toy was paired with a realistic toy accessory, either in terms of level of play, or in terms of imitation response. Finally, level of play in the autistic group was related to verbal mental age ($p < .10$), while symbolic fluency was related to both verbal mental age ($p < .05$) and performance IQ ($p < .10$); only level of play was related to verbal mental age in the

Down's ($p < .10$) and normal groups ($p < .05$).

It was expected that the autistic children would play relatively more on structured play trials where single pairs of playthings were present during one-minute intervals, than in free play periods where a group of four pairs of playthings were present for four minutes. This hypothesis was not confirmed: the autistic children did not attend more to playthings, nor did they engage less frequently in stereotypy or other off-task behaviors in structured play than in free play. Since the autistic children were able to cope with the greater complexity of the free play situation, perhaps the extent to which the stimuli were limited in the structured play situation was unnecessary except as a context for modelling of symbolic play (Black et \al., 1975). The autistic children were in fact rated more cooperative in free play than in structured play; this finding suggests that the free play situation was the more advantageous one. These results imply that the autistic child's play behavior can be assessed with as much facility (if not more easily) in a situation with a fair number of toys, as in a more limited situation. A free play situation is probably more conducive to a meaningful assessment of play since it can potentially elicit a wider variety of play behavior. These findings do not, however, negate the importance of a structured environment for autistic children because both the free play and the structured play situations can be considered highly structured ones; in both, the child was seated at a table across from a highly attentive adult who redirected him to the playthings at 30-sec. intervals if his attention wandered. The adult's directiveness may have allowed the child to overcome any confusion created by the free play situation.

This explanation is consistent with data presented by Hutt and Hutt (1968, 1970) who found that autistic children engaged in more block play when an adult actively intervened than when the adult was passive, or than when the child was alone in a room with the blocks. One could speculate that without the presence of an active adult, the autistic children in the present study might have played less than they actually did in the free play situation.

The expectation that the autistic children would play less than the other two groups of children was confirmed; this was true not only for free play but for structured play as well. In keeping with the findings of Hutt and Hutt, the autistic children played consistently less, and also were rated as less interested than the Down's and normal children. Unlike the autistic children studied by Hutt and Hutt, however, the autistic children did not engage in stereotypy frequently enough to account for the overall group differences in frequency of play, although nine engaged in stereotypy on occasion. Rather, the autistic children as a group consistently engaged in other off-task behaviors such as gazing into space or looking around the room more frequently than the other children. They also were rated as more remote. The few significant between-groups differences in frequency of stereotypy were seen towards the end of the second session, so that it is unlikely that stereotypic behavior was a result of environmental complexity or novelty as Hutt and Hutt have suggested. Possibly the autistic children resorted to stereotypy due to lack of any more appropriate response, or because they were no longer involved in the situation.

It was also predicted that so long as the index of play level was independent of play frequency, the autistic children's level of play would not differ from that of the Down's and normal children who were matched with the autistic group on the basis of verbal mental age. This hypothesis was essentially not confirmed. The level of play of the autistic children was clearly lower, in terms of a two-tailed test, than that of the Down's children on the four comparisons made of structured play baseline performance; it was also clearly lower than that of the normal children on all but one baseline comparison where the significance level was in fact marginal ($p < .10$). Although in initial free play periods the level of play of the three groups was not significantly different, the level of play of the autistic group still tended to be lower than that of the Down's children. The medians for level of play in both free play and structured play periods indicate that the autistic children tended to show spontaneous play behaviors which were considered transitional to symbolic play (level 2) such as recognition of animate toys, possible or ambiguous symbolic play, appropriate use of realistic accessories, and tertiary circular reactions; while the Down's and normal children were more likely to show symbolic play with clearly interpretable content (level 3). Also unlike the Down's and normal children, no autistic child showed the highest level of symbolic behavior, i.e., a sequence involving maintained animation (level 5). Nevertheless, seven autistic children did on occasion attribute independent action to an animate toy and/or combine symbolic behaviors into a sequence (level 4); and the other three children in the group exhibited at least one clear single symbolic play behavior (level 3). Thus it would appear that all of the autistic children

were capable of symbolic play with at least some of the stimulus playthings; this is consistent with the work of Wing (1977, 1978) who found that symbolic play was generally seen only in children with a minimum mental age of 20 months. The closer resemblance of the play level of the three groups in initial free play than on baseline structured trials may therefore reflect the fact that the larger selection of playthings available in free play provided a greater opportunity for the autistic children to find a toy for which they had a response available in their limited repertoire of play behaviors. This finding seems to suggest that the children were attempting to give a meaningful response. The evidence strongly indicates a limited capacity for symbolic play in autistic children relative to other children of the same verbal comprehension.

The final hypothesis was that the autistic children would demonstrate the ability to imitate as well as the other children. This hypothesis was not statistically confirmed. Even when inconsistency of performance was ruled out by using each child's highest imitation score, the autistic children's scores were lower than those of the other children. The reason for this difference, however, may not be because the autistic children were generally poorer imitaters than the other children. Six Down's and six normal children's highest imitation score was 5, which meant that they not only accurately imitated both the modelled action and the animation, but that they creatively extended or elaborated what had been demonstrated. Although none of the autistic children added such creative variation, the highest imitation score medians reflected the fact that four of them imitated both action and animation (score 4), and one other autistic child attempted the animation in conjunction with

the modelled action (score 3), thus demonstrating the ability to "literally" imitate as well as the other children. The question remains as to why three of the autistic children never imitated more than just the modelled action (score 2): and two of them never gave any clear imitation response. The explanation does not appear to be one of poor attention: all of the children "watched" the experimenter model symbolic play, according to the Reaction-to-Modelling Checklist; and although many autistic children also "glanced away", this was a behav observed as frequently in children whose subsequent response receiv a score of 4 as in those who scored lower. In addition, the experimenter repeated the demonstration when a child did not initially attend as a safeguard against attentional factors affecting the imitation response. Poor motivation may possibly be the explanation for the two children who never clearly responded, particularly for S #8 who refused to participate in Session 2; but not for the three who responded by imitation of the modelled action. Since autistic children have been found to imitate, and perform other tasks, in a manner dependent on the relative difficulty of the task (DeMeyer et al., 1972), lack of motivation is probably not the best explanation for the poor performance of the children who never imitated endowing the animate toy with independent action. Possibly they were unable to motorically execute all of the demonstrated elements, or they did not grasp the meaning of what was modelled, or both. Because imitation is considered to be an essential prerequisite to symbolic functioning (Piaget and Inhelder, 1969), it would be important to determine at what level the autistic children's difficulty originated. In view of DeMyer et al.'s (1972) finding that autistic and schizophrenic children did not imitate a model's use of objects as well as brain damaged,

mentally retarded children, an inability to execute all of the discrete elements which were demonstrated is a possible explanation for the present findings. This possibility is less convincing, however, when one considers that four of the autistic children were in fact able to execute all of the demonstrated elements, and four of the five "poor imitaters" had had at least six months of training in the use of gestures or signs for nonverbal communication when they participated in the study. Whether each autistic child imitated that which was within his symbolic capacity to comprehend is difficult to determine, but seems unlikely since there was no correlation between imitation scores and mental age. Fein (1975) has argued from her research with normal two-year-olds that they only imitate a symbolic substitution which is meaningful to them. It does appear that the Down's and normal children did not imitate blindly, particularly those who elaborated on the modelled play. Sheridan (1975), however, has stated that the young child initially imitates without comprehension, and at least with regard to symbolic substitution, El'Konin (1964) believes as well that children learn to play symbolically by imitating an adult without comprehension. Wing also takes this view in interpreting the limited symbolic play of autistic children, and the fact that none of the autistic children elaborated on the model's actions is consistent with her position. Perhaps the autistic children tended to avoid the animation aspect because of its human or social implications (DeMyer et al., 1967). The difficulty in interpreting what lay behind the autistic children's imitation responses is illustrated by the exceptional performance of one autistic child (S #1) who was untestable on the PPVT, and whose nonverbal MA was only three years, 11 months. He was observed to imitate even irrelevant gestures of the examiner when

the LIPS was administered, and yet his progress in acquiring signs for nonverbal communication has been very limited. This child did not spontaneously (prior to modelling) endow an animate toy with independent action but he consistently included animation in his imitation responses on modelling test trials, and on some transfer trials he even assimilated the idea of animation to one of his own preferred activities by making an animate toy throw an accessory plaything.

The normal children, but not the autistic and Down's children, appeared to have integrated and generalized something from the demonstration of symbolic play; their level of play in final free play periods was higher than in initial free play periods. There was, however, no significant transfer effect as a result of modelling of symbolic play in the autistic, Down's, or normal groups when their level of play on transfer baseline trials was compared to that of their transfer test trials, although four autistic, five Down's and nine normal children showed higher level play following modelling on some transfer test trials. Since not even the normal children showed a consistent increase in level of play on this measure, it was probably not the most appropriate way to assess the generalization effects of modelling. The children may have tended to be bored or satiated with the transfer pair of playthings on test trials as a result of having already been exposed to them in the initial free play and on the transfer baseline trial. This might also explain why (when the accessory was a substitute object) the Down's children's level of play deteriorated between transfer baseline and test trials. The free play situation was probably less artificial and more appropriate for eliciting general transfer effects because of the greater choice of playthings; it would have allowed for a creative

integration of any ideas generated from observing and imitating symbolic play. In view of the fact that neither the autistic or Down's group showed any clear positive change in level of play, it appears that in general the benefit they derived from the demonstration of symbolic play was limited to their immediate imitation response.

The failure to demonstrate any difference for any group between those trials where the accessory toy was realistic and those where it was a substitute object either in terms of level of play, or in terms of imitation score, was somewhat unexpected. It was assumed that symbolic use of a substitute object would be more difficult than a realistic one, particularly for the autistic and Down's children. These findings suggest, however, that even the autistic children must have had at least some representational ability, since they could apparently attribute the properties of one thing onto another as well as they could symbolically use a realistic object. The three groups might have been differentiated if the substitute objects had not physically resembled the concrete objects which were typically represented by the children (e.g., feeding utensils) or which were represented in modelling. Fein (1975) has demonstrated that normal two-year-olds are more likely to exhibit symbolic substitution with an animate toy and a substitute object than with two substitute objects, but her data appeared to be consistent with the present findings that single symbolic substitutions are not more difficult than symbolic use of realistic playthings.

The final between-groups comparison was made on the basis of the number of different substitute symbolic uses exhibited by each child; this was considered to be a means of measuring a child's symbolic fluency or ability to create and manipulate symbols in the context of his play

with objects. It seemed necessary because of an intentional bias which was intrinsic to the way in which the level of play scale was applied. Level of play was determined according to the highest level behavior a child exhibited during an entire free play period or structured play trial, regardless of how many different behaviors at that level were observed. In addition, since within a session the same plaything pair was available during both the initial and final free play period, and during two of the structured play trials, a child could show the same symbolic play behavior each time he was presented with a specific pair of playthings, and receive the same credit for level of play as a child who displayed different symbolic behaviors each time that pair of playthings was presented. The measure of symbolic fluency clearly differentiated the groups: the normal children exhibited the most substitute symbolic uses, the Down's children showed an intermediate number, and the autistic children the least substitute uses. While the normal children showed more substitute symbolic uses than the autistic and Down's children in both free play and structured play periods, the Down's children showed more different uses than the autistic children in structured play periods only. The lack of difference between the autistic and Down's children in free play would seem to be a result of the tendency of the Down's children to focus and elaborate on the same theme which would have been facilitated when they had access to the same playthings throughout the four-minute free play periods. Under more demanding circumstances when different pairs of playthings were presented successively, however, they were able to produce more substitute uses than the autistic children. These findings point to a very limited ability in the autistic children to manipulate symbols in play even in comparison to mentally retarded

children with similar verbal comprehension. This again suggests a very limited knowledge of things and their properties, since so few were represented symbolically. These findings also support Wing and her colleagues in their belief that autistic children are impaired in their ability to play imaginatively. It might be argued that the autistic children merely exhibited fewer substitute uses than the other children because they played less with the playthings. In order to consider this possibility, a Spearman's Rho value was calculated for the autistic children's total number different of substitute symbolic uses and their total play frequency scores (exclusive of modelling test trials): there was in fact no correlation between number of substitute uses and play frequency.

The sizeable correlation between PPVT mental age and average level of play found for the normal group ($p < .05$), and also the more moderate ones for the autistic and Down's children ($p < .10$), would seem to demonstrate that a child's level of language competence is reflected in the developmental level at which he shows symbolic play behaviors. This is consistent with the Piagetian notion that the different aspects of the symbolic or semiotic function are interdependent and that the capacity for language is not a distinct, separate ability which is unrelated to other types of symbolic functioning. It does appear, however, that at least in the autistic children nonverbal ability is not related to capacity for symbolic play, since their LIPS mental ages and IQs showed no relationship to their level of play.

The most interesting set of correlations were those relating to symbolic fluency. In the autistic children the number of different substitute symbolic uses was clearly associated with verbal mental age

($p < .05$), and also with nonverbal IQ ($p < .10$). There was also a modest, nonsignificant correlation in the same direction for verbal mental age in the Down's children. In contrast, there was no relationship whatsoever for the normal children between verbal mental age and number of substitute symbolic uses. These patterns of correlations seem to imply that the autistic child must painstakingly apply whatever general cognitive ability he has to acquire even a limited "vocabulary" of symbolic substitutions. In the normal child, however, it appears that once a certain level of symbolic functioning is established, the ability to fluently generate and manipulate symbols in play develops rapidly regardless of verbal comprehension or mental age. This would suggest that in the autistic children the cognitive structures by which the semiotic function normally develops are impaired so that they must acquire symbolic concepts by a different, less efficient process. It appears that this is a cognitive deficiency specific, at least in its severity, to the autistic children, and not one which is a function of subnormal intelligence, since the correlation for the Down's group was not significant. If nonverbal measures for the Down's group had been available, they might have provided additional evidence with regard to this interpretation.

The overall findings appear to indicate that autistic children, at least those who are generally retarded (Rutter, 1978), and whatever their other deficits, have a unique cognitive deficit which impairs their ability to function symbolically. Although the present study was not designed to determine the central or primary problem of the autistic child, it provides evidence consistent with Wing's interpretation that autistic children are severely impaired in their "ability to abstract concepts

from experience, to give these abstractions symbolic labels, to store the concepts in symbolic form and to draw on them for relevant associations when thinking of the past, reacting to the present and planning for the future" (Wing, et al., 1977, p. 168). Even given their apparent deficit, the autistic children did respond to modelling; this technique might be pursued in attempting to teach symbolic play to these children perhaps by also adding reinforcers, although its effectiveness may be limited (Lovass, 1973). To better understand the imitation responses of autistic children, future research with the present paradigm might compare their responses to modelled symbolic play with their imitation of equally complex motor and social tasks without symbolic content (e.g., patticake), or their responses to symbolic and motor tasks with and without social or human elements. It would also be of interest to examine any qualitative differences in the kind of symbolic substitutions used and imitated by the different groups of children by the inclusion of more "dissimilar" substitute objects than those which were used (Elder & Pederson, 1978), and of pairs of substitute objects rather than a "realistic" animate toy with a substitute object (Fein, 1975). Eventually, a refined version of the experimental play situation may prove to be a useful clinical tool for assessment of the autistic child's level of symbolic functioning, and general cognitive capacity. The present paradigm appears to be a valid one, and could be used to extend and clarify not only the findings on symbolic play and imitation, but current understanding of the nature of autism as well.

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APPENDIX A

DESCRIPTION OF THE AUTISTIC CHILDREN

The information contained in this appendix includes a brief description of each child's past and present functioning, as well as characteristics of his play behavior in the present study. An attempt has been made in the descriptions to present a general picture of each child on the basis of information available from professional files (which was sometimes limited or incomplete), interviews with parents (when possible) and teachers, and direct observation. Information which might contribute to loss of confidentiality has been omitted. All of the children live at home except S #5 and S #8, who live in specialized institutional settings, and all attend daily special education classes for disturbed children following programs geared to their individual abilities and needs. All of their programs are highly structured, and utilize various forms of behavior modification.

S#1

Age: 9 years, 4 months[a]

PPVT MA: 1 years, 9 months (untestable)
LIPS MA: 3 years, 11 months
LIPS IQ: 43

This boy avoided physical contact and appeared mostly oblivious to his surroundings as a toddler. He had a fascination for mechanical things, and he still enjoys using the vacuum cleaner at home. He engaged (and still does) in body rocking, and he stares at slight movements of his palm held close to his face. Speech which had developed by the age of four consisted of infrequent echolalia. His vocalizations at present consist of repetitive, loud and unarticulated sounds, e.g., "um" and "ah". He is experiencing great difficulty in acquiring signs[b] for communication despite conserted efforts by his teachers, and his apparent eagerness to please; he imitates even meaningless gestures of others when he does not comprehend what is required of him. Tearful, sometimes aggressive tantrums are periodically characteristic, particularly when he does not grasp a task or when a routine is upset. Playing catch is a favorite activity--one of the few in which he interacts with others.

Educational placement: Simultaneous Communication class, preschool skills.

Neurological findings: no evidence of organicity

Play Characteristics

play frequency: 21/32 min.

highest level of play: 4

highest imitation score: 4

1 substitute symbolic use:

Washcloth used to wipe the plastic container inside and out, as if it were a dish- or dust-cloth.

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[a] age at time the present research was undertaken

[b] on this and the following pages "signs" refers to Sign Exact English, which is used in the method of Simultaneous Communication. The child is taught the gesture or sign, and encouraged to verbalize at the same time.

S#2

Age: 9 years, 2 months

PPVT MA: 1 year, 9 months (untestable)
LIPS MA: 4 years, 10 months
LIPS IQ: 55

This child was a difficult, active infant who did not respond to cuddling; once he was able to do so, he would squirm away. As a young child, he was rather fearful of certain things such as the shower. He is still very active and difficult to manage, but on his own terms will seek physical contact in an infantile way. He often rocks in his chair or jumps out of his seat, running away or jumping up and down in place. Language development was very limited, and by the age of three he did not speak at all. Presently he verbalizes, with difficulty, for some of the basic signs he has acquired, e.g., "cookie" or "school". He produces meaningless series of sounds for no apparent reason. He generally appears uninvolved with his environment, although he shows an interest in taking things apart, and repetitively taps small objects with his fingers and on his teeth.

Educational placement: Simultaneous Communication class, preschool skills.

Neurological findings: Abnormal EEG, not epileptiform; some signs of spastic diplegia; some suggestion of absence episodes.

Play Characteristics

play frequency: 15/32 min.

highest level of play: 4

highest imitation score: 2

2 substitute symbolic uses:

1. tapered plastic object held or poured over the cup, and then the spoon was used to stir in the cup.

2. tapered plastic object squeezed over girl doll's hair, and then in the child's ear, as if it were a spray bottle.

S#3

Age: 10 years, 0 months

PPVT MA: 1 year, 9 months (untestable)
LIPS MA: 5 years, 8 months
LIPS IQ: 59

This child never responded to physical closeness, and usually manages to agilely avoid such contact. His parents noted that he never showed an interest in his social environment, preferring to watch television, or look at his collection of torn magazine pictures and leaflets - which he did not allow to be disturbed. He often passes objects past the side of his face, squinting at them out of the corners of his eyes. Speech never really developed; his vocalizations consist mainly of a prolonged, monotonous "ahhhh" which sometimes escalates into a high pitched yell if he is asked to perform an unpalatable task. He has begun to verbalize faintly with some of the signs he has mastered, and has a relatively large signing vocabulary. On the PPVT he was not able to point to the pictures named by the examiner, but signed for a few of the pictures he recognized at the beginning of the test, e.g., tree, baby, car.

Educational placement: Simultaneous Communication class, preschool and primary skills.

Neurological findings: EEG - nonprogressive, diffuse encephalopathy

Play Characteristics

play frequency: 14/32 min.

highest level of play: 4

highest imitation score: 2

3 substitute symbolic uses:

1 & 2. popsicle stick was used to stir in the pill container as if they were a spoon and a dish.

3. washcloth was used to wipe or dust the table, as if it were a dustcloth.

S#4

Age: 6 years, 10 months

PPVT MA: 1 year, 9 months
LIPS: Untestable

This little girl was described by her mother as having been an extremely good baby, who almost never cried or fussed. Although she would not hold a spoon or grasp a proffered toy, she could dexterously flick objects in her hand. As a toddler she spent a great deal of time staring out the window and flicking at the curtains. She never developed normal communicative speech, but uses echolalic, singsong phrases. People hold little interest for her, although she responds with great pleasure to singing and music. She is not yet completely toilet trained, and has great difficulty remaining seated to do a task--often jumping up and down and flapping her hands.

Educational placement: Class for autistic children, preschool level.

Neurological findings: no evidence of organicity

Play Characteristics

play frequency: 11/32 min.

highest level of play: 3

highest imitation score: 0

0 substitute symbolic uses

S#5

Age: 10 years, 10 months

PPVT MA: 2 years, 2 months
LIPS MA: 4 years, 4 months
LIPS IQ: 41

This girl, unlike the other autistic children, has spent much of her life in various institutions (since the age of three years). Early reports of this child frequently mention avoidance of eye contact, lack of interest in play with toys or children, and very minimal, echolalic speech. She has a history of uncontrollable tantrums and an obsession with having her clothes changed, which she would bring about by soiling and wetting. She has developed some verbal language, along with a few functional signs for communication, but has great difficulty in articulation. She generally ignores people unless they directly engage her in a task, and appears to enjoy cuddling when she is the initiator. Educational placement: Simultaneous Communication class, preschool skills. Neurological findings: no evidence of organicity.

Play Characteristics

play frequency: 18/32 min.

highest level of play: 4

highest imitation score: 2

2 substitute symbolic uses:

1. pill container tilted to girl doll's and child's own mouth as if drinking from a cup.

2. popsicle stick end brought to baby doll's mouth as if it were a spoon.

S#6

Age: 12 years, 10 months

PPVT MA: 2 years, 10 months
LIPS MA: 5 years, 8 months
LIPS IQ: 44

This boy was considered as an unusually good baby who rarely fussed or cried. During his first two years he was passive and uninvolved with his environment, ignoring toys in his playpen. As an infant he seemed most content when being rocked to music, and as he grew older he spent long periods rocking himself to music. Speech development was delayed and is still mainly echolalic. He has always been fascinated by mechanical objects; much of his spontaneous speech is reflective of his obsession with such objects, e.g., electric heaters, vacuum cleaners, hairdryers. He presents himself as an apathetic boy who requires highly structured encouragement to perform even minimal academic or social tasks.

Educational placement: Class for autistic children, preschool skills.

Neurological findings: no evidence of organicity

Play Characteristics

play frequency: 11/32 min.

highest level of play: 4

highest imitation score: 4

3 substitute symbolic uses:

1. tapered plastic object squeezed and held over baby doll's back, as if applying liquid from a squeeze bottle.
2. tapered plastic object tip held to girl doll's and his own mouth, as if it were a baby bottle.
3. print material piece used under muppet frog in sitting and lying positions, as if it were a blanket or mat.

S#7

Age: 11 years, 11 months

PPVT MA: 3 years, 1 months
LIPS MA: 6 years, 4 months
LIPS IQ: 55

This boy was an apparently normal baby, but became unresponsive in his third year. Some speech developed but had disappeared by the age of 3 years. His use of specific toys and objects was repetitive, and unchanging. At present he is mute except for occassional high pitched, unarticulated sounds. He has a basic signing vocabulary, but rarely initiates communication or other social interactions. Although he is responsive to certain familiar adults and children, he seems to take little note of what is going on around him. Hand flapping and twiddling objects are characteristic stereotypic behaviors.

Educational placement: Simultaneous Communication, preschool and primary skills.

Neurological findings: suspected absence attacks, but no supporting evidence on EEG.

Play Characteristics

play frequency: 11/32 min.

highest level of play: 3

highest imitation score: 3

1 substitute symbolic use:

pill container held to baby doll's mouth as if it were a cup.

S#8

Age: 9 years, 6 months

PPVT MA: 3 years, 5 months
LIPS MA: 4 years, 9 months
LIPS IQ: 51

This child's early developmental history is unclear because of difficulties within the family. In her third year, however, there was concern because of her persistant withdrawn behavior, over-attachment to her mother, and minimal speech development which was mainly echolalic. Although toys and other objects held little attraction for her, she enjoyed the touch of soft, smooth materials. At present, she communicates her basic needs to familiar others through signing, on occasion verbalizing two or three word phrases, but is generally unresponsive to the social environment. She is subject to frequent, often inconsolable tantrums. A favorite activity is listening and rocking to music for extended periods of time.

Educational placement: Simultaneous Communication class, preschool skills.

Neurological findings: mild EEG abnormality

Play Characteristics (Session 1 only)

play frequency: 6/16 minutes

highest level of play: 4

highest imitation score: 1

3 substitute symbolic uses:

1. dipped spoon from tapered plastic object as if it contained food, then fed baby doll with spoon.

2 & 3. dipped tapered plastic object on table, as if using a spoon to pick up food, then brought it to her own mouth.

S#9

Age: 7 years, 11 months

PPVT MA: 3 years, 6 months
LIPS MA: 4 years, 10 months
LIPS IQ: 64

As an infant this child appeared unaware of his surroundings, and seemed content to be left alone. He did not develop speech for communication, but was echolalic, and had a repertoire of songs and commercials which he seemed to enjoy singing. He used toys and objects in a stereotyped fashion, and still tends to turn objects over and over in his hands. He would remain quiet and still for long periods of time, but at other times would display difficult to manage hyperactivity. Although he tended to cling to his mother, he was generally uninterested in others, even those with whom he was quite familiar. In the last few years he has shown an interest in following and imitating other children and adults--at times he is inappropriately, but apparently not maliciously, aggressive. After two years in a Simultaneous Communication class, he has begun to use full sentences for communication, although his speech is monotone and uninflected. There is still a tendency toward echolalia, which is usually eliminated by having him use signing.

Educational placement: Verbal class, preschool and primary skills.

Neurological findings: no evidence of organicity.

Play Characteristics

play frequency: 19/32 min.

highest level of play: 4

highest imitation score: 4

5 substitute symbolic uses:

1. pill container held to baby doll's mouth as if it were a cup.

2. popsicle stick brought to plush monkey's mouth as if it were a spoon.

3. toothbrush used as a hairbrush to brush cloth and vinyl monkey's hair.

4. corrugated cardboard (V-shaped) used to rub and whisk baboon's body as if it were a clothes brush.

5. washcloth laid over muppet frog's trunk as if it were a blanket.

S#10

Age: 11 years, 11 months

PPVT MA: 3 years, 11 months
LIPS MA: 7 years, 3 months
LIPS IQ: 64

This child was an apathetic, unresponsive infant. He developed only a few words after his third birthday but then became mute until very recently. At present, he verbalizes single, barely audible words with great difficulty and only when his signing is not understood by his interlocutor. He does, however, use his large signing vocabulary to communicate an interest in events and people in his environment. He has always had a particular fascination for mechanical objects, and also for fixtures, and nuts and bolts; his room at home contains a large collection of such items which he has assembled himself. Ear flicking and finger twiddling were predominant mannerisms which are presently much reduced, but still manifest themselves when he becomes excited. He examines new objects closely, tapping and flicking at them with his fingers.

Educational placement: Simultaneous Communication, primary skills.

Neurological findings: no evidence of organicity

Play Characteristics

play frequency: 21/32 min.

highest level of play: 3

highest imitation score: 4

4 substitute symbolic uses:

1. stiff cardboard set with the spoon and cup on it, as if it were a placemat or table cloth.
2. tapered plastic object tip held to girl doll's mouth as if it were a baby bottle.

3. tapered plastic object squeezed over cup as if filling the cup from a squeeze bottle.

4. wooden dowel end held to cloth and vinyl monkey's mouth as if it were a baby bottle.

APPENDIX B

RESPONSE CATEGORIES AND DEFINITIONS

Off-target behaviors

Stereotypy--repetitive flipping, tapping, or twiddling of objects; or flapping, flicking of the hands; or rocking, or jerking movements of the body.

Fiddling--handling a plaything in an absent way without much visual orientation to it.

Motor acts

Exploration--close visual examination of a plaything, usually held and/or fingered.

Relational acts--behaviors like lining up playthings or putting one inside of another.

Other--simple nonsymbolic behaviors such as sliding, throwing, tapping or squeezing playthings. These behaviors included in addition to single motor acts, behaviors which would be referred to by Piaget as secondary or tertiary circular reactions (Piaget, 1963). These were acts repeated for their effect either without variation, or with systematic variation. For example, one pilot subject in a free play period repeatedly made a tower of the animate toys by placing one on the shoulders of another until they fell over, each time repeating the process closer and closer to the table's edge to determine when they would fall on the floor rather than on the table.

Symbolic play

Possible symbolic acts--behaviors not clearly interpretable as symbolic, but suggestive of symbolic behavior. Holding an animate toy upright on its feet for example might mean that the child was thinking of it as an animate entity, or that he was simply attempting to balance the toy

for the sake of balancing it; or moving a stick up and down in a cup might represent stirring with a spoon, or simply be a manipulation for its own sake.

Single symbolic acts--behaviors interpretable as symbolic representations (e.g., stirring a stick with a circular motion like a spoon in a cup, or placing a cup to a doll's mouth.).

Serial sequences--the same symbolic act performed consecutively on two or more recipients (e.g., feeding self, then doll, then monkey.).

Integrated sequences--two or more different related symbolic acts performed in sequence (e.g., scooping with a spoon in a container, then using the spoon to feed a doll.).

APPENDIX C

SEQUENCE OF EVENTS

EXPERIENCED BY EACH CHILD

Sequence of Events in One Session

Initial Free Play Period (4 min.)

Display: All playthings to be used in the session--4 animate toys, 2 realistic accessories, and 2 substitute objects.[a]

Structured Play Period (Toy Group 1 or 3)

Trial 1 transfer baseline (1 min.) Display: transfer plaything pair.

Trial 2 modelling baseline (1 min.) Display: modelling plaything pair.

Symbolic play modelled by Experimenter (untimed)
Display: Modelling plaything pair used in trial 2. Observer completes Reaction-to-Modelling Checklist.

Trial 3 modelling test (1 min.) Display: modelling plaything pair used in trial 2.

Trial 4 transfer test (1 min.) Display: transfer plaything pair used in trial 1.

Structured Play Period (Toy Group 2 or 4)

Procedure of previous period repeated.

Final Free Play Period (4 min.)

Display: re-presentation of all playthings used in the session.

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[a]Plaything pairs from Toy Groups 1 and 2 were presented in Session 1, and plaything pairs from Toy Groups 3 and 4 were presented in Session 2. A child either received animate toys with their realistic accessories from Toy Groups

Counterbalancing Schedule

S#	MA (months) A	D	N	Session 1 Acces./Gp 1	2	Session 2 Acces./Gp 3	4
1	21	21	21	sub	real	real	sub
2	21	21	23	real	sub	sub	real
3	21	24	23	sub	real	real	sub
4	21	25	28	real	sub	sub	real
5	26	26	29	sub	real	real	sub
6	34	30	32	real	sub	sub	real
7	37	35	37	sub	real	real	sub
8	41	41	38	real	sub	sub	real
9	42	45	38	sub	real	real	sub
10	47	47	46	real	sub	sub	real

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1 and 4, and animate toys with their substitute objects from Toy Groups 2 and 3, or vice verse.

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APPENDIX D

ACTION (SYMBOLIC PLAY) MODELLED BY EXPERIMENTER WITH MODELLING TOYS

Session 1

Toy Set 1. Plush monkey with plastic spoon or popsicle stick: Spoon or popsicle stick held in monkey's hand; monkey made to bring spoon/stick to its mouth, tilting the spoon/stick as if sipping liquid from it.

Toy Set 2. Pink panther with whisk broom or cardboard piece: Whisk handle, or small end of cardboard, held in panther's hand; panther made to brush its legs and feet with short, rapid whisking motions.

Session 2

Toy Set 3. Muppet frog with washcloth or material: Cloth folded, placed in frog's hand; frog made to scrub with circular motions both sides of its face and back of its neck.

Toy Set 4. Girl doll with wooden cart or tupperware container: Doll's arms raised, made to push cart/container across table, its hands against back end of cart/container; doll's feet tap up and down ("walking") as moves along table.

APPENDIX E

MEDIAN RATINGS OF ATTITUDES AND INVOLVEMENT FOR THE AUTISTIC, DOWN'S, AND NORMAL CHILDREN IN FREE PLAY AND STRUCTURED PLAY PERIODS OF BOTH SESSIONS

TABLES A THROUGH E

Table A

Median Ratings of Cooperativeness for the Three Groups in Free Play and Structured Play Periods of Both Sessions

Period	Autistic Session 1[a]	Autistic Session 2[b]	Down's[a] Session 1	Down's[a] Session 2	Normal[a] Session 1	Normal[a] Session 2
Free Play						
Initial	4.5 (5)[b]	5.0	4.94	4.94	4.94	5.0
Final	4.5 (5)[b]	4.0	4.79	4.75	4.94	4.79
Structured Play						
Realistic Accessory	4.5 (5)[b]	4.0	4.94	4.5	4.94	4.79
Substitute Object	4.17 (4)[b]	4.0	4.7	4.5	5.0	4.79

[a] N=10

[b] N=9

Table B

Median Ratings of Interest for the Three Groups in Free Play and Structured Play Periods of Both Sessions

	Autistic Session		Down's[a] Session		Normal[a] Session	
	1[a]	2[b]	1	2	1	2
Period						
Free Play						
Initial	2.7 (3)[b]	3.0	4.5	4.94	4.1	4.7
Final	2.75 (3)[b]	3.0	4.5	3.75	4.5	4.07
Structured Play						
Realistic Accessory	2.7 (3)[b]	3.0	4.17	4.1	4.5	4.5
Substitute Object	2.7 (3)[b]	3.0	4.25	3.5	4.5	4.75

[a] N=10

[b] N=9

Table C

Median Ratings of Remoteness for the Three Groups in Free Play and Structured Play Periods of Both Sessions

Period	Autistic Session 1[a]	Autistic Session 2[b]	Down's[a] Session 1	Down's[a] Session 2	Normal[a] Session 1	Normal[a] Session 2
Free Play						
Initial	2.75 (3)[b]	2.5	1.5	1.13	1.67	1.25
Final	2.9 (3)[b]	2.5	1.21	1.5	1.13	1.67
Structured Play						
Realistic Accessory	3.25 (3)[b]	2.0	1.13	1.5	1.33	1.5
Substitute Object	2.9 (3)[b]	3.0	1.21	1.06	1.33	1.21

[a] N=10

[b] N=9

Table D

Median Ratings of Happy Involvement in Play for the Three Groups in Free Play and Structured Play Periods of Both Sessions

Period	Autistic Session		Down's[a] Session		Normal[a] Session	
	1[a]	2[b]	1	2	1	2
Free Play						
Initial	1.0	1.0	1.13	1.06	1.33	1.33
Final	1.06	1.0	1.06	1.13	1.33	1.06
Structured Play						
Realistic Accessory	1.13	1.0	1.33	1.21	1.5	1.33
Substitute Object	1.13	1.0	1.33	1.13	1.7	1.75

[a] N=10

[b] N=9

Table E

Median Ratings of Serious Absorption in Play for the Three Groups in Free Play and Structured Play Periods of Both Sessions

Period	Autistic Session		Down's[a] Session		Normal[a] Session	
	1[a]	2[b]	1	2	1	2
Free Play						
Initial	1.0	1.0	1.13	1.21	1.13	1.21
Final	1.06	1.0	1.06	1.06	1.5	1.33
Structured Play						
Realistic Accessory	1.06	1.0	1.06	1.13	1.21	1.33
Substitute Object	1.06	1.0	1.06	1.06	1.21	1.21

[a] N=10

[b] N=9