

## Object Lessons

Major findings from: *Functional Problem Solving Skills for Children with Pervasive Development Disorders* (U.S. Department of Education grant # 84.024B60120)

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Dates: October 1, 1996- September 30, 2002

### The Questions

What skills do young children with Autism Spectrum Disorders (ASD) use as they interact with objects, for example when playing? How do their skills compare with the skills of typically developing children of the same age? Do parents' perceptions of the skills of their children with ASD mirror those of their teachers? Can teachers target object interaction skills in regular instructional routines?

### Why Did We Ask these Questions?

Most research and intervention efforts involving children with ASD have focused on their social and communication skills with other children and adults, not on the skills involved in early play. Yet the skills involved in play are important for cognitive and social development. The ability to initiate play with an object and use it appropriately, to find a way to get an object one wants, and to use objects in play with other children helps a child understand and function in the physical world and understand the intentions and actions of other people. Learning more about these skills and their development in children with ASD could provide information as to which specific skills or skill groups are most affected by ASD and highlight those areas in which intervention would be most productive.

### What Do We Know About Children's Play?

Studies of object play generally divide play into three basic types:

- *Sensorimotor*: the earliest form of play, including simple actions like mouthing a toy or banging objects that are not concerned with the intended use of the object.
- *Functional*: playing with an object in the way it was intended.
- *Symbolic play*: pretending an object is something else or pretending that you are something or someone else.

Typically developing children learn object related skills in a predictable manner over time. They start with play involving single objects, then move on to play in which they combine two or more objects. The play starts with the most basic touching, shaking and mouthing kinds of exploration and develops

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into play appropriate for the intended use of the toy. As they mature the play develops into sophisticated games in which children may pretend to be someone or something else, or they may play elaborate games, for example 'house' or 'store'.

### **What Is Already Known About the Play of Children with ASD?**

Little is known about children with ASD under the age of two because children are rarely diagnosed until after this age. However, one study attempted to learn about younger children with ASD by looking at home movies of them taken before they were two. The movies suggested children with ASD may show more mouthing behavior and more repetitive actions like banging than typically developing children. Studies of children with ASD over two years of age also found generally more sensorimotor play, limited functional play, and less symbolic play even as they grew older. However, the research on the play of children with ASD is limited and concerned with only the most general descriptions of behavior.

### **So What Did We Hope to Add?**

We wanted to gather information about the specific object interaction skills of young children with ASD, ranging from the most basic interactions to symbolic and social uses of objects, and to compare them to the specific object interaction skills of typically developing children of the same age. We also wanted to compare the assessments done by parents and teachers noting the specific object interaction skills of children with ASD to see the level of agreement or disagreement between them. Finally, we wanted to see whether children would learn new object interaction skills if they were targeted in classroom routines.

### **How Did We Do This?**

The children were drawn from classrooms that contained both typically developing children and children with a diagnosis of ASD or Pervasive Developmental Disorder (PDD). Thirty-six children with PDD or ASD between the ages of three and five and thirty-seven children without disabilities between the ages of two and five participated. Data on nine one-year-olds without disabilities were also collected to determine what object use skills they demonstrated. All participants' object use skills were evaluated using *Hands-On Learning at Home* and *Hands-On Learning at School*. Packets containing the *At Home* assessment and a consent form were sent to interested parents by the teacher for the parents to complete. The teachers completed the *At School* assessment at school.

### **About the Assessments**

The *Hands-On Learning* assessments were designed by the researchers of this project to evaluate early object interaction skills used to negotiate the physical and social environments.

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One was specifically designed for the classroom and the other for use in the home.

The assessments are checklists containing 39 items in four strands. Strand I (Obtaining Objects) includes 12 skills needed to gain access to a desired item that is inaccessible for some reason (for example, it is in a box). Strand II (Practical Uses of Objects) includes 12 skills needed to use everyday objects appropriately (for example, turning on a flashlight). Strand III (Representational Uses of Objects) includes 8 skills involved in understanding how one object relates to another and how objects may be used to represent concepts (for example, doing a puzzle). Strand IV (Social Uses of Objects) includes seven skills that involve the use of objects in social contexts (for example, playing catch). All of these items have been chosen to be applicable to children who may neither use nor understand speech. The skills required are not dependent on highly developed fine or gross motor skills, so motor delays will not influence the outcomes. And imitation, a skill that is widely acknowledged to be impaired in children with ASD, is not necessary for any of the items. All the items are accompanied by several examples that demonstrate use of that skill and all are commonplace actions that occur at home or school. Each skill is evaluated by the parent or teacher as **Mastered, Emerging, or Not Present** with a possible total score from 0 to 100.

### **What Did We Learn About the New *Hands-On Learning Assessments*?**

It is important in doing research to make sure that the research instrument used is measuring what we think it is measuring and is appropriate to the group being evaluated. Only one (of 68) children with ASD scored 100% and none of them scored 0%. This suggests that the range of skills contained in the assessments is useful to describe the skills of children with ASD.

We learned that while parents generally scored their children higher than the teachers did, their scores were still very similar, with agreement about 80% of the time. Establishing that there is a strong overall agreement between assessments done by the teacher and by the parent suggests that the differences that do occur result from the different opportunities in the homes versus schools. This also suggests that asking a parent to provide information from his/her personal knowledge of the child broadens the picture of the child's abilities for the teacher and provides a point of connection in planning goals. It supports our belief that a parent's intimate and extended experience with a child provides valuable information for diagnosis, assessment, placement and educational decisions.

When we prepared to compare the results of the assessments of the children with ASD and children without disabilities we wanted to have as detailed a picture of their abilities as possible. For this reason we divided the children into two groups, 2-3 year olds and 4-5 year olds, and compared the children with ASD and the children without disabilities within those age groups. We found that the 2-3 year olds without disabilities scored significantly higher than the 2-3 year old children with ASD and that the 4-5 year old children without disabilities scored significantly higher than the 4-5 year old children with ASD.

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We also found that the children with ASD scored particularly low in Strand III (Representational Uses) and Strand IV (Social Uses). We then looked at the assessments done on the 1 year olds without disabilities. We found that their scores fell squarely between those of the 2-3 year children with ASD and the 4-5 year old children with ASD. We also found that as all the children grew older, whether or not they had disabilities, their object use skills increased.

The older children (4-5 years) with ASD could do many of the skills in the *Hand-On Learning* assessment, for example, using objects in the way they were intended to be used, finding ways to get access to an object, and using objects with others. Their skills were much more developed than those of the younger children with ASD. But despite this progress, they showed a striking overall delay in gaining those skills compared to the typically developing children. We had expected strong differences in the skills involved in Strands III and IV (Representational and Social Uses of Objects), as much of the research shows delays in communication and social skills for these children. But the large differences even in Strand I (Ways to Obtain Objects) and Strand II (Practical Uses of Objects) suggests that all the skills necessary for using objects in the physical and social world appropriately are seriously affected for children with ASD. However, the development **pattern** shown by children with ASD closely resembles that of typically developing children. They learn most of the skills in the same basic order; they just learn most of the skills later. As the children with ASD grew older the differences in their skills compared to the typically developing children became smaller, but the difficulties with the social use of objects remained great.

**How Did Use of the New Assessments Affect Classroom Instruction?**

Ultimately, developing ways to accurately measure a child’s repertoire of skills and pinpointing those areas where skills are slow to develop is only a means to an end, the true goal being to maximize the child’s progress. The last years of this project (years 4 and 5) focused on developing how the teacher can best apply the information learned from the assessments in the classroom. To do this the teachers and parents completed *Hands-On Learning at School* and *Hands-On Learning at Home* assessments on the ten participating children in two new classrooms at the beginning of each year to determine their current skill level. The classroom assessment *Design to Learn* was also used. *Design to Learn* evaluates how well a classroom promotes or restricts the development of object use skills (as well as other skills). Based on the results of these assessments, instruction in object use skills was planned for each child and classroom modifications were made to increase opportunities for object use. As the children mastered new skills, instruction for other object use skills was begun.

At the end of the school year the *Hands-On Learning at School* assessment was again given to the children and the data collected by the teachers and classroom staff during skill instruction were

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gathered so that we could evaluate the performance of each child. We did this in several ways. First, we compared the children's initial *Hands-On Learning at School* scores to their final scores. The children showed a mean gain of 17% and all showed gains of at least 8%. Then we compared their gains on *Hands-On Learning at School* to the gains of another, similar group of five children with PDD who had received no instruction specific to object use at all. This comparison enabled us to separate the learning that resulted from the instruction from the learning that occurred naturally as the children matured. The children who had not received specific skill instruction in object interactions showed a mean gain of only 5%. Finally, we coded videotapes of the children engaged in object interaction routines at the beginning and end of our involvement with their classrooms. The greatest changes we found were increases in the variety and complexity of the children's object interaction skills and increases in the number of cues for object interaction that their teachers provided.

These instruments are all available through our website, <http://www.designtolearn.com>. A Teacher's Guide for using the assessments to plan instruction is also available.

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