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The Miller Method®: A Cognitive-Developmental Systems Approach for Children with Body Organization, Social, and Communication Issues[1]

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WHAT IS THE MILLER METHOD®?

The Miller Method is an integrated approach that addresses problems of body organization, social interaction, and communication in school, clinic, and home settings as presented by children on the autistic spectrum as well as those with significant challenges in learning or communication. Integrated means that, in this approach, each person working with the child—while focusing on one aspect of the child's functioning—also addresses other areas of concern. It is also a coordinated program in that each person working with the child is in close touch with and contributes to others working with that child. It is an action-oriented program, which assumes that children learn best when they move and make direct physical contact with things and people. It also assumes that children learn best when they are taught or treated by those who understand that they require a combination of both support and demand. Greenspan and Wieder (2000) refer to the present approach as "semistructured," in that the people working with a child are guided both by the initiatives of the child and by certain developmentally organized interventions introduced by teachers and therapists.

The Miller Method is guided by a cognitive-developmental systems theory with links to the work of Piaget (1948, 1954, 1962), von Bertallanfy (1968), Vygotsky (1962), Werner (1948), and Werner and Kaplan (1963) and is adapted to the needs of children with severe developmental challenges. It was developed by the authors during the last 40 years (Miller, 1963, 1968, 1991; Miller & Eller-Miller, 1989; and Miller & Miller, 1968, 1971, 1973). Current outcome research includes studies by Cook (1998), Messier (1971), Miller and Miller (1973), and Warr-Leeper, Henry, and Lomas (1999).

The approach is cognitive because it deals with the manner in which children organize their behavior, develop concepts of time and space, problem solve, and form

[1]The Miller Method is currently in practice at schools and clinics within six States as well as in Canada and other countries, under videoconferencing consultation arrangements with the Language and Cognitive Development Center in Boston, Massachusetts. For additional information, contact the Language and Cognitive Development Center at (800) 218-5232 or through its website: www.millermethod.org.

relationships with people. It is developmental because it deals with the ability of children to shift from action stages of functioning to communication and representation of reality through various symbolic forms. It also is a systems approach because it views the formation and use of systems as indispensable to the entire array of human performance.

The goals of the Miller Method are to:

- Assess the child's capacity to interact with people and objects, adapt to change, and learn from experience.
- Build the child's awareness of her own body as it relates to objects and people.
- Guide children from closed, disconnected, or scattered ways of being into functional, social, and communicative exchanges.
- Provide the necessary transitions from concrete to more abstract symbolic functioning.

Unique Aspects of the Miller Method®

Among the novel features of the Miller Method are its pragmatic use of two major strategies. The first is the exploitation for developmental gains of the aberrant systems, or "part systems," the children bring. The assumption behind this strategy is that all organized behaviors—even those that are aberrant—have within them the potential for developmental gain. For example, atypical behavior systems of children with disorders (e.g., lining up things, flicking light switches, or flushing toilets) can often be transformed into functional, interactive behaviors.

The second major strategy is the systematic introduction of developmentally relevant spheres (repetitive activities concerned with objects and people) to repair developmental lags and restore developmental progressions. For example, children who have never experienced picking up and dropping objects or who have not learned that they can push over an object with their hands or with a stick can be taught to do so in a way that helps fill in a developmental gap by establishing, often for the first time, their ability to act on and influence objects and events in their surroundings.

Another important strategy is having the therapist narrate, with signs and spoken words, what the children are doing *while* they are doing it. We find that such narration helps the children relate the words and signs to their own actions. As this happens, they seem to become more aware of themselves and to begin to develop the inner speech so important in communicating both with themselves and with others.

This process is facilitated by elevating the children $2^1/_2$ feet above the ground on an Elevated Square or similar structure. Elevating the children seems to enhance not only word-sign guidance of behavior but also to induce an awareness of body/self and others, more focused and organized planning of behavior sequences, and better social-emotional contact. It also provides a framework in which the children can more readily be taught to transition without distress from one engaging object or event to another. In addition to work on the Elevated Square and other such structures, special programs are introduced during the day to help children develop both spoken and written language. These programs are described later in this chapter.

DEFINING CENTRAL CONCEPTS

Before discussing assessment and intervention, it is desirable to define and discuss the concept of systems and the various roles that systems play in the economy of both typical children and those with disorders.

Systems

Systems are organized, coherent "chunks" of behavior that are, initially, quite repetitive.

They involve the child acting with the body on or with some object, event, or person in a predictable manner. A 10-month-old baby repetitively involved in picking up and dropping everything on the food tray is involved in a system, as is the 15-month-old toddler repeatedly filling and emptying a sand bucket. There are also interactive systems, such as when the12-month-old plays peek-a-boo with her mother, an 18-month-old child realizes that after the ball is rolled to her she is to roll it back, or when the small child holds up his arms to communicate a desire to be picked up. Systems also are involved in symbolic play, such as when children begin to feed their dolls in the manner in which they themselves are fed. When children are able to indicate objects by pointing, gestures, or words, these gesture/word relations to various objects, events, or people are systems that may be regularly reactivated by the sight of particular referents.

Systems vary in their complexity from the simplest one-component systems such as pick up/drop, which are referred to as *mini-systems*, to more complex, multistep systems leading to a particular goal. The latter are referred to as *integrative* systems as, for example, when a child learns to climb up steps to go down a slide or to open a cupboard door to get something inside. Children who are able to address previously developed (internalized) systems in new ways (*spontaneous expansions*) have a basis for problem solving and creative thought and play.

The hallmark of all systems is the investment the child has in maintaining or continuing them. This investment becomes apparent when a particular system is interrupted. For example, a 15-month-old child involved in a system of putting on and taking off a series of bracelets on her arm became very distressed when a bracelet was taken—crying, pointing at the desired bracelet and even trying to say the word—in an effort to have it replaced on her arm to restore the interrupted system. As discussed later, the careful interruption of systems is an important technique for helping children initiate actions or words to help repair their "broken" systems.

Interrupting systems is also used to motivate a child. For example, one child who at first refused to use a rake to get a disc that was out of reach did so when the therapist proceeded as follows. First, the therapist helped the child establish a disc-in-bottle system by having the child repeatedly put discs in the slit on top of a bottle until the child did this completely on his own. Then, the therapist interrupted this system by placing the disc out of the child's reach while placing the rake between the child and the disc. At this point, the child immediately used the rake to bring the disk closer so that he could restore the interrupted system by continuing to place the disks in the slit on top of the bottle.

Unlike typical children, those on the autistic spectrum as well as those with other developmental issues show system aberrations that interfere with their performance and development: They may, for example, tend to become so overinvolved with things and events that they are unable to detach from them, as does the child who perseveratively flicks on and off light switches or television sets. Alternatively, these children may be so uninvolved or disconnected from things and people around them, that there is little basis for building or sustaining relations with either things or people. This means that before such children can progress, careful attention must be given to their system problems.

Steps in the Early Formation, Maintenance, and Expansion of Systems

For children with disorders to develop, it is important that many different kinds of

systems form, expand, and, increasingly, come under their control. There is a progression in the manner in which systems are formed. At first, system formation is driven by the external properties of objects, events, and people, with the child reactive to the process. Later, the formation, expansion, and combination of systems come increasingly under the child's active control as the child uses previously developed systems in the service of various ends. The following sections outline the progressive steps of forming, maintaining, and expanding systems.

Orienting

Systems begin to form as a salient sound, motion, or a particular property of an object, event, or person induces the child to "'turn toward," or orient, toward the source of the stimuli (Goldstein, 1940; Pavlov, 1927; Sokolov, 1963). Orienting has been shown to make the stimulus that the child is turning toward more salient for the reacting child. However, even at this initial phase of system formation, aberrations are evident among many developmentally challenged children. For example, some children with disorders are so driven that they orient to any stimuli that they see, hear, or feel in a way that keeps them helplessly reacting to so many stimuli that they have difficulty with the next step in system formation—engagement.

Engagement

Once a child orients toward a salient stimulus, the next step in system formation entails the child moving toward and becoming physically and emotionally involved or engaged with the stimulus properties of the object, event, or person in his immediate surroundings. In cognitive-developmental systems theory, orienting plus engagement provides the precondition for the formation of systems which, in turn, provides the framework for not only making functional and emotional contact with things and people but for maintaining and expanding that contact. However, engagement by itself does not ensure the development of a system.

From Engagement to System Formation

Engagement is to system formation as a casual encounter between one person asking another for the current time is to a life-long friendship between the two people. The initial brief encounter (engagement) is a necessary prerequisite for a relationship (system) to develop between people or objects, but such a relationship may or may not develop from the initial encounter. The system develops only through a more prolonged and repetitive engagement with an object, event, or person.

For example, a 16-month-old girl who stumbles over a bucket half filled with sand is momentarily *engaged* with that bucket. However, she has not formed a system with that bucket until she repetitively addresses it in any of a variety of ways: Having stumbled over it, she may form a system by repeatedly kicking the bucket across the sand or by repeatedly filling and emptying the bucket, and so forth. Once her behavior with the bucket follows a predictable pattern she has transformed her initial engagement with the bucket into a system. At that point, her behavior is internalized as a way of being with that object.

The decisive indication that an internalized system has developed occurs when, following interruption of the child's system by removing her bucket or preventing her from acting on or with it, the child becomes *compensatorily* driven to maintain or restore action with that object by reaching for the bucket, yelling, pointing, and otherwise indicating her urgent need to continue that system. When interruption of an activity *does*

not induce a child to continue or restore that activity, a system has not yet developed.

However, if systems are to move beyond mere rituals, there must be both a means of recalling or reactivating them when they have not been used for a time *and* a means of extending their influence to other aspects of a child's surroundings. Two principles—*inclusion* and *extension*—suggest how this occurs.

The Inclusion Principle

This principle states, "Whenever the child, engaged by a stimulating object or event, is concurrently stimulated by a background aspect of the situation, that background aspect soon becomes part of the total, engaging system which emerges. Subsequently, when only the background aspect appears (partial interruption), the child compensatorily behaves as he/she had toward the originally engaging object" (Miller & Eller-Miller, 1989).

For example, if while an infant is nursing at the breast (nursing system), the mother simultaneously croons and strokes the infant's cheek, then subsequently, in the absence of the breast, the mother's crooning or cheek-stroking, by itself, will elicit vigorous sucking by the infant. In a similar fashion, a small child who has not previously responded to the term "Push!" or to a pushing gesture will do so if, while the child is pushing a wagon (pushing-wagon system), the child repeatedly hears the therapist saying, "Push ... push ... push!" accompanied by pushing gestures. As this occurs, both word and gesture soon become included within the child's pushing-wagon system so that when the therapist later introduces either word or push-gesture in the presence of the wagon (partial interruption), the child feels compelled to push the wagon to complete the system.

The following outline summarizes the steps involved in system formation and expansion via the inclusion principle:

1. **Orienting**
   Child orients (turns toward) the introduction of a large object (a wagon) within her visual field.

2. **Engagement to system forming**
   Child approaches and pushes the wagon, which moves and then stops in a way that induces him to push it again and again until a pushing-wagon system forms.

3. **Inclusion process**
   a. *Introducing new parts to the system.* Therapist uses words and gestures to introduce the word "push" while the child is repeatedly pushing the wagon. At first, the child orients toward the sounds and gestures (indicating that she still experiences them as separate from her pushing-wagon system).
   b. *Assimilating new parts to the system.* As the spoken word and gesture continue to accompany the pushing-wagon system, the child no longer orients toward them as if they were separate entities but experiences them as part of the pushing-wagon system. In other words, the child now experienced it as a pushing-wagon + "push" (word) + (gesture) system.

4. **Partial interruption**
   Later, when *only* the spoken word or gesture part of the system is introduced (partially interrupted system), the child compensatorily searches for a wagon or other moveable objects to push.

The Extension Principle

The extension principle comes into play when the child has already developed some gestures, utterances (natural signs), or spoken words that are closely related to a particular referent located in the child's immediate surroundings. This principle explains how the familiar meanings attached to these expressive systems become extended to an initially neutral entity, which then becomes part of the child's expressive system. This occurs by the child's expressive system acting upon the neutral property.

The principle states, "Whenever a system with which the child is engaged acts upon a new property of an object or event, that property becomes an extended part of the original system. The child then maintains the integrity of the newly extended system when it is interrupted just as with the original system" (Miller & Eller-Miller, 1989).

Two examples illustrate the operation of the extension principle. In one, the child has established the natural sign "ch ch" to refer to his small train. Subsequently, the parent introduces the term "train." The child responds by saying, "ch ch train," clearly extending the rhythmic "ch ch" cadence to include the new term. In the second example, a 2-year-old child sees a bird land on the fork of a branch and begin pecking on it. The child points and exclaims, "Bird!" (word "bird" plus bird-pecking-on-forked-branch system). Abruptly, the bird disappears (interruption) behind the fork in the branch. Nevertheless, the child continues to point at the forked branch (where the bird had been pecking) and to exclaim, "Bird!" On subsequent occasions when the child passes that forked branch, the child points at the branch and says "Bird!" even though no bird is present.

Because the bird had acted upon the forked branch, it had assumed bird significance for the child. In other words, the "bird system" had been extended for this child to include not only the bird but the forked branch on which the bird had been pecking. However, the bird valence of the forked branch only became evident when the bird disappeared behind it (interruption) and left only the forked branch part of the system, which the child continued to designate as "bird." This extension principle, as illustrated later in this chapter, plays an important role in the transfer of meaning from spoken words to the arbitrary forms of printed words in the Symbol Accentuation Reading Program (Miller & Eller-Miller, 1989).

Executive Function

The system expansions discussed so far have largely depended on external events driving the system. Early in a child's life, such externally driven expansions are the primary mode by which systems are expanded. They entail minimal intention or initiative on the part of the child. Gradually, however, this reactive mode of expanding systems is accompanied by a new mode whereby the child deliberately forms systems as well as new combinations of systems based on an inner plan. This emerging capacity is referred to as the development of *executive function.*

Early examples of executive function may be noted as a child decides that he no longer wishes to go down the slide in the sitting position but prefers, instead, to slide down on side, back, stomach, etc. These *spontaneous expansions* of the slide system are possible because of the newly emerging executive function. It appears that executive function is only possible when children have developed sufficient awareness of their bodies to self consciously direct them in different ways. When this occurs, they find that they have the ability to choose one system over another, to alter systems, or to combine previously developed systems in new ways. Perhaps the best known

indication that executive function is well established occurs when the typical 2-year-old responds to her mother's request to do something with a defiant "No!"—a statement that marks both awareness of self and other as well as the notion of choice.

The failure of this shift to fully occur among developmentally challenged children accounts for many of the dramatic differences in behavior between typical and compromised development. The following examples of children's activities with blocks during an unstructured period contrasts the functioning of a 3-year-old who has developed executive function with the functioning of two children on the autistic spectrum who demonstrate little or none of this capacity.

Children With and Without the Capacity for Executive Functioning

- *Jack, a typical 3-year-old with capacity for executive function.* As soon as Jack received the pile of assorted blocks, he began to build a connected structure of ramps and towers. He picked up each block, examined it, selected a place for it in the block structure, and inserted it carefully. Needing a block of a particular size, he scanned the blocks and spotted an appropriate one near the foot of the observing adult about 6 feet away. He looked at the adult, pointed at the block, and exclaimed, "Block, please!" After receiving the block, he smiled at the adult, added the block to his structure, and took another block. Next, while making "rmm" car sounds, he "drove" his block up the ramp and around the block towers. Finished with car-block play, he got up and set off for something else to do.

- *Damon, a 3-year-old boy on the autistic spectrum with minimal capacity for executive function.* Damon, seeing the pile of blocks, immediately began to build a connected structure. But, unlike Jack's construction, his structure consisted only of a row of rectangular blocks carefully placed so that each block abutted the previous one. Curved or triangular blocks were not attended, and he did not make the sounds that other children made as they played.

  Damon worked with rapid intensity, regularly scrambling from the end of the row of blocks to get another block so that he could continue extending the structure. At no time did Damon acknowledge the existence of the adult seated nearby. When the adult tried to hand him a block, Damon rapidly turned his body so that his back was between the adult and the blocks. When the adult removed one block from the row, Damon screamed, then frantically sought another block to close the gap in the structure. Damon continued to extend the row of blocks until it reached the wall. Confronted by the wall, he made a right angle with the next block and continued placing blocks along the wall until there were no more blocks. Then he began rocking back and forth while twiddling his fingers in front of his eyes. Except for his scream when the adult altered his block structure, he uttered no sound.

- *Brian, a 3-year-old boy on the autistic spectrum who demonstrates little or no executive function.* Presented the blocks, Brian was momentarily drawn to the clattering sound they made when they were placed in front of him. What Brian saw and heard, however, seemed quite disconnected from what his hands were doing. Even though he picked up a block, it soon slid from his hands, forgotten, as he was "caught" by the movement and sound the

adult made as she seated herself in a nearby chair. When the adult offered him another block, he seemed not to notice it because he was now turned toward the sound of a bus starting up outside the building. At no time did Brian spontaneously explore his surroundings or examine the manner in which blocks stacked or things worked. Instead, time and again, he turned toward or began to move toward a stimulating object or event only to be diverted by another new stimulus, which "drove" his behavior.

An Analysis of the Children's Executive Functioning and System-Forming Ability

Although both Jack and Damon produced systems, their systems differed dramatically. Jack, the typical child, had a complex, integrative system composed of towers, ramps, and cars. As Jack played with the blocks, it became evident that he experienced himself as the executive or master-builder *with an inner plan* to which both the blocks and the adult contributed. This allowed him to form a complex, integrative system with the blocks (towers and ramps) that he could exploit in different ways. He could, for example, turn a block into a car and move it, car-like, up and down the ramps. He could also turn from the main block structure to request a block from an adult and turn back to his structure without losing touch with his goal. In carrying through his plan, Jack demonstrated that he could integrate several smaller systems into a larger one.

In sharp contrast, Damon, the autistic child with a *closed-system disorder*, had a single, minisystem composed of lining up blocks. Damon's system was not driven by any inner plan but by the way each block abutted the next one. He changed the structure only when the physical barrier of the wall required such a change. This change, however, came about not through any executive decision on Damon's part, but because the wall required the change. Finally, there was no decision to stop connecting blocks; Damon stopped when he ran out of blocks. When this occurred, he had no means of directing himself to a new activity. Apparently, the only means he had of filling the void left by the end of the block-connecting system was rocking and hand twiddling.

For Brian, the observing adult seemed to exist only momentarily as the adult moved and made sounds. Brian's constant tendency to be driven by transient stimuli (sudden sound or motion) interfered with the prospect of a deeper relationship with either people or objects. Brian oriented but seemed unable to become physically engaged with the stimuli. Because of his "drivenness," Brian formed only fleeting contact with objects and events as he was driven from one source of stimulation to another—never lighting long enough to physically engage the stimulating source. The unfortunate outcome is that he failed to develop either coherent systems or the executive capacity required to explore their properties. In short, like Damon, Brian lacked the executive functioning to guide his own behavior, but unlike Damon, he also lacked coherent, compelling systems.

The different ways the children related to the observing adult illuminates the extent to which they dominated or were dominated by their systems. Jack, needing a block to complete his block structure and seeing a block near the adult, was able to turn toward the adult and ask her for the block. In doing this, Jack creatively brought together the world of relationships with people with his world of objects. The situation was very different for Damon: for him, the observing adult did not exist except as a momentary threat (when removing a block from his lined-up blocks) to

the integrity of the structure being built. Clearly, he lacked the executive function required to draw upon relationships with people. Stated differently, his closed-system tendency precluded people from being part of his system.

After children make the shift to executive function, their relation to the systems they have formed changes radically. *Systems previously triggered only by properties of the environment are now at the disposal of the executive capacity of the child.* The distinction between systems that dominate the behavior of children and those which children dominate is evident in the comparison of Jack, who has made the shift to executive function, with Damon and Brian, who have not.

Closed-System and System-Forming Disorders

There are two broad system dispositions among children having autistic spectrum as well as those with other developmental disorders: *closed-system disorders* (Miller, 1991; Miller & Eller-Miller, 1989) and system-forming disorders. Both kinds of *system disorders* are divided into Type A and B forms to indicate the nature and limitations of their systems and the extent to which executive function plays a role.

Type A of the *closed-system disorders* refers to those children, like Damon, who become so involved with one or two action-object systems that they are unable to notice or respond to any stimuli unrelated to the system with which they are engaged. These are the children who are so unresponsive to being called that parents often have the children's hearing checked. They are also unable to scan their environment, tending to "live" quite close to their bodies. Not surprisingly, these children have great difficulty shifting from one object or event to another. Equally important, children with Type A closed-system disorders tend to prohibit parents or others from entering and participating within their object or event systems. In other words, having only minimal executive function, these children are quite dominated by their few systems. Clearly, children with such closed systems are restricted in their social interactions and ability to communicate with others about things and events in the immediate environment.

Children with Type B closed-system disorders share some but not all dispositions with Type A closed-system children. Similarly, they resist having people enter their systems. However, unlike Type A children, Type B children are able to demonstrate executive functioning in a circumscribed domain composed of action-object systems. In contrast to Type A children who tend to remain engaged with one or two objects from which they cannot extricate themselves, Type B children have sufficient executive function to scan their surroundings and to move without difficulty from one object or event system to another. However, their executive functioning does not yet permit them to allow people to participate in their systems. In other words, they have *child-object* systems but not *child-object-person systems*. Should a person attempt to enter one of their systems, the children show the same kind of resistant behavior (although to a lesser degree) found with Type A children with closed-system disorders.

Children with *system-forming disorders* are very different from those with closed-system disorders. Children with system-forming disorders have great difficulty forming any systems. Brian (described earlier), with his tendency to be "driven" by every salient stimulus, falls into a Type B system-forming disorder. Children such as Brian are repeatedly driven to orient toward stimuli from objects and events but fail to engage them physically.

However, there is another group of children, designated Type A system-forming disorder, whose difficulty forming systems stems largely from their poor sensory-motor coordination. Such a child may orient toward a particular salient object or event but have difficulty relating his body to that object or event in a way that forms either mini- or multistep integrative systems.

It is interesting to note that children with Type A system-forming disorders can, with proper intervention, learn to form integrative systems, such as climbing up steps to slide down a slide. The problem is that the child's sensory-motor coordination is often so sluggish that by the time the child has climbed the stairs and slid down, she has completely lost contact with the location of the stairs and so, having slid down, continues straight ahead. Failing to return to the stairs, the child at first cannot repeat and "own" that system without continuing physical support. However, with many repetitions and rapid pacing, the child *will* begin to anticipate the various parts of the step-slide system. Nevertheless, the rigid, circumscribed quality of the integrative systems, which these children achieve through repetition, is very different from the creative and complex integrative systems achieved by the typical child, such as Jack. Because Jack had achieved executive functioning, he could creatively combine systems following his inner plan. In contrast, children with Type A system-forming disorders, who lack executive function, can form integrative systems only in a rigid, unvarying manner by virtue of having been repeatedly led by a therapist through the system until it "takes."

While children with both Type A and Type B system-forming disorders have difficulty forming coherent systems with objects and events in their surroundings, their challenges come from different sources. Type B children are "too sensorily driven" by various stimuli to readily form systems, whereas Type A children have physical coordination problems that interfere with the sequencing and motor planning they need to form their systems. (See Table 1).

Finally, there is a developmental sequence in the formation of systems. Least developed are children such as Brian, whose drivenness

Table 1. Contrasting Children with Closed-System and System-Forming Disorders

Disorder	**Children**	
	Type A	Type B
Closed system	Minimal executive functioning and few systems. Poor shifting/scanning. People excluded from systems.	Executive functioning with many object systems. Ability to shift from one to another system. People excluded from systems.
System-forming	Minimal executive functioning. Poor sensory-motor coordination limits system forming.	Little executive functioning. Salient properties of many sources induce repeated orienting, but not engagement.

results in aborted system formation and an almost total lack of executive function. More developed, but still compromised, are those closed-system, Type B children whose modest executive function enables them to shift from one closed system to another but who still exclude people from their systems. Most developed are children such as Jack, who have the executive capacity to creatively assemble a variety of minisystems into an integrative system (involving people) that they can modify as they choose in accord with their inner plans. Table 1 captures the major distinctions between the two types of disorder and their subcategories.

ASSESSMENT

Before therapists can intervene effectively, they need to assess the nature of each child's system functioning. The following sections explore different assessment strategies.

Assessing the Children

One of the goals of the Miller Method is to assess each child's capacity to interact with people and objects, adapt to change, and learn from experience. An Umwelt assessment was developed to determine how best to intervene with children on the autistic spectrum (Miller & Eller-Miller, 1989). An Umwelt (Uexküll, 1934) refers to the "world around one." Consequently, in performing an Umwelt assessment for a particular child, we try to determine the nature of the systems the child brings to a new situation by first examining his behavior in unstructured situations where he has access to both people and a variety of objects, but where the adults are passive. We also examine the child's ability to become engaged in new systems that the examiner introduces. Recently, influenced by the work of Greenspan and Wieder (1998), we have been paying more attention to affectively driven systems between the child and others. Now, just as we examine the child's resourcefulness in coping with objects via detours or by using tools, we seek to determine the child's emotional resourcefulness in initiating and maintaining ongoing interactive systems supported by the adult.

This means that we now examine three kinds of interaction with a particular child: (1) the child's response to unstructured situations (adults passive); (2) the child's ability to maintain an interactive system with the examiner when the examiner actively builds on the child's initiatives, and so forth; and (3) the child's ability to accept and participate in examiner-initiated systems. Table 2 captures the three different ways of examining the child.

Each of the adult stances is important in determining how well a child can cope with

Table 2. General Strategies Used During the Umwelt Assessment

Assessment Strategies	Adult Stance	Child's Task
Unstructured	Passive	Child to initiate without support.
Child-initiated	Interactive	Child initiates and cyclically builds on adult's response to his or her initiatives.
Adult-initiated	Active	Child to accept adult-initiated interaction and expansions.

people and things in her immediate surroundings. The child who, during the unstructured period, can—without support—initiate actions toward people and things in unfamiliar surroundings demonstrates a repertoire of organized behaviors (systems) that enable her to engage with people or objects. In this condition, the relative emphasis on people or objects, and the quality of interaction or exploration (if it exists at all) tells much about the coping resources available to that child. On the other hand, child-driven interactions tell more about the emotional capacity of the child to initiate and to sustain more prolonged interactive systems with the examiner (Greenspan & Wieder, 1998). How well the child can sustain shared attention and involvement with the adult is an important indication of the relationship potential of the child.

However, since many circumstances, such as school, entail teaching the child from the adult's and not the child's agenda, it is also important to determine how well the child can accept adult-driven interactions. How the child responds to an adult setting up, expanding, and directing shifts from one system to another provides important clues about how well the child will learn in school-related or similar situations. Further, the importance of therapist- or teacher-initiated systems (called spheres) lies in their potential for remedying serious developmental lags.

Different tasks from the Umwelt assessment help clarify the unique way in which each child with disorders experiences reality as well as her adaptive potential. The following example indicates how one of the Umwelt tasks throws light on a child's ability to interact with both a person and an object in a simple game.

Assessing the Capacity to Interact with a Person and an Object: The Swinging Ball Task

Figure 1 illustrates the manner in which the examiner assesses the child's ability to form an interactive system involving an object and another person.

Figure 1a represents a child enjoying a repetitive pushing-game (a child-object-adult system) in which adult and child push a swinging ball back and forth. The dotted lines to both ball and adult indicate that the child's system includes awareness of both the ball and the adult. Figure 1b, reflects a more limited child-object system that includes the ball, (which the child pushes whenever it arrives) but does not include the adult. Figure 1c shows an even more circumscribed system. Here, the child fails to react even when the ball bumps into him, which infers that the child lacks that object system.

Typical children as young as 2 years of age will behave interactively with ball and person as illustrated in Figure 1a. Children with closed-system disorders will interact with the ball but not with the person, as shown in Figure 1b. Children with system-

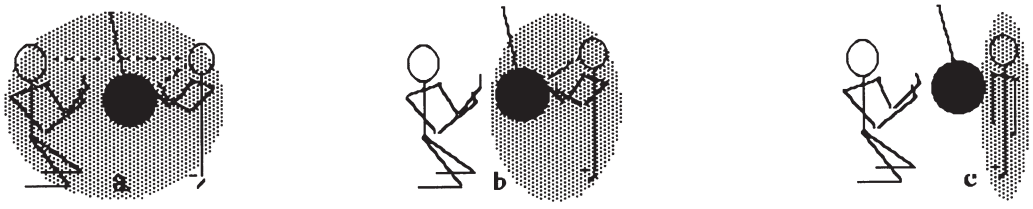

Figure 1a, b, c. Assessing a Child's Ability to Form an Interactive System:
a. Child-object-adult **b. Child-object** **c. No object system**

forming disorders may respond as shown in Figure 1c because they have difficulty coordinating with the ball's trajectory.

Assessing the Capacity to Adapt to Change: Stacking Cups and Bowls

Successfully coping with surroundings requires the child to adjust her approach to changing circumstances. To get at this capacity during the Umwelt assessment, the child is required to stack cups and bowls in different ways. The task is graduated from simple stacking of cups (then bowls) with their openings facing upwards to those involving progressively more complex adjustments. At the most complex stacking level, the child is required to alternately stack cups and bowls, with the cup presented upside-down over the bowl and the bowl presented right-side-up over the right-side-up cups (Figure 2).

Figure 2. Asymmetrical Inversion

The final sequence tests the child's ability to shift from a stacking mindset to one in which he is required to place a cup in each of six bowls spread out in front of the him (Figure 3). Closed-system Type A children typically show such a strong perseverative tendency that they persist in stacking the cups given them—instead of placing a cup in each bowl—even after the examiner has modeled placing one or two cups in the bowls in front of them. Often, we will repeat the set-up in Figure 3 with additional cues to determine how close a child is to making the shift from one kind of organization (vertical stacking) to another (lateral).

Figure 3. Breaking the Stacking Set

Problem Solving and Learning from Experience: The Elevated "Swiss Cheese" Board

The next two tasks examine, although in different ways, the child's ability not only to adjust to changing circumstances but to learn from the experience. One task examines the child's response to the elevated "Swiss Cheese" Board (Figure 4); another, called "Croupier" (Figure 5), examines the child's manner of coping with progressively more demanding tasks involving the use of rakes and obstacles to gain a desired object.

Figure 4. "Swiss Cheese" Board

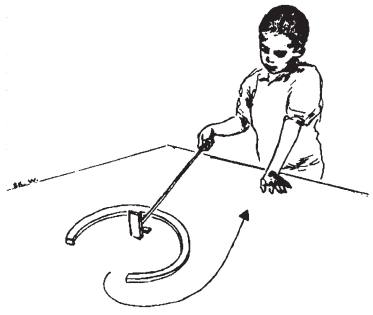

Figure 5. "Croupier"

The ability to learn from experience comes into play when the child on the "Swiss Cheese" Board inadvertently steps in a hole (care being taken that the child does not fall). Then, as the child continues to cross the board, we are able to determine whether or not the child now avoids the holes by stepping over them. In the rake-obstacle task, we seek to determine if the child—shown pulling a desired object toward himself—can learn to push it away from himself through the gap and then toward himself. Often we will test the limits by placing the desired object closer and closer to the gap to determine at what point the child will understand the need to first push the object away before it can be brought closer. Once the child pushes the object away, we return the next object to the center of the horseshoe ring to determine if the child has generalized this understanding to the new object given or will revert to the original, unsuccessful effort to bring the object toward himself.

INTERVENTIONS

Before a child can achieve executive control of his own systems, he must first achieve a certain awareness of his body and the distinction between his body and that of others, as well as the object or event system with which his body is engaged at a particular moment. If there is little or no awareness of the body or body-self as a separate entity independent of what the body is engaged with, then the child becomes so captured by the ongoing body-object system in play at that time that he cannot spontaneously detach from the ongoing system. Only as the child develops the notion that his body and its parts have an existence independent of the object or event system with which he is engaged can the executive function emerge (which makes possible a child's spontaneous expansion of his systems). In other words, body-world polarity is a prerequisite for executive function.

Among typical children, this capacity emerges gradually in the course of the first 2 years of development. For example, by 6 months of age, the child has achieved sufficient differentiation between her body and others to demonstrate a clear preference for her mother over others. Between 6 and 9 months of age, the child is able to relate to (establish systems with) either a person or an object. By 9 or 10 months of age, the child can relate to another around an object (child-object-person system) as evident in the ability to give an object to a caregiver on request (Trevarthen & Hubley, 1979). And, of course, by 24 months of age, the child becomes self-consciously aware of her ability to accept or refuse requests.

Children whose development has been compromised often fail to achieve these basic body-object-other capacities. For example, they may not differentiate between one person and another, and they may not be able to give an object on request. They remain fixed in a "single track" involvement with a particular property of an object or event and show striking difficulties in relating their bodies to people and objects in their surroundings.

The following section details some ways in which these difficulties become apparent.

Body-world problems may become apparent with child-object systems, child-person systems, and child-object-person systems. For example, picking up and dropping an object or flicking a light switch on and off are *child-object* systems, while peek-a-boo and chase games are *child-person* systems. On the other hand, rolling a ball back and forth with mom or dad is a *child-object-person* system that combines both object and people worlds. The problem for developmentally challenged children stems from the unusual way they form or fail to form systems in the world of objects and the world of people and their difficulty in forming systems that combine the two worlds.

Strategies for Developing Body-World Awareness

Strategies for developing body-world awareness include "rough and tumble" activity, mutual face-touching, estabilization, deep pressure, swinging, elevation, and introducing causal systems. One goal of these strategies is to guide children from closed, disconnected, or scattered ways of being into functional, social, and communicative exchanges.

An Intervention Case Example: Damon

Damon, the 3-year-old described earlier, is a child on the autistic spectrum with a closed-system disorder, Type A. His various problem areas are:

1. Poor human contact (won't look at people) or include them in his systems.
2. Perseverative tendency—has great difficulty shifting from one action-object system to another.
3. Does not seem to hear or follow directions ("word deaf").
4. Does not communicate his needs except by pulling the adult toward the desired object.
5. Does not participate in "make-believe" play.

The following illustrates the treatment approach Damon received at the Language and Cognitive Development Center (LCDC), in Boston, MA. Although children at LCDC participate in both school classes (limited to six children with three teachers), as well as individual therapies guided by the Center's orientation (cognitive-developmental systems therapy, speech/language therapy, movement and occupational therapies as well as manual arts), for clarity, this discussion relates only to the child's work in cognitive-developmental systems therapy. (A chapter appendix outlines a typical daily curriculum for nonverbal or limited verbal children.) The word "we" refers to all the therapists at the Center who worked with Damon.

Improving Damon's Human Contact

We begin each 45-minute therapy session with about 5 to 10 minutes of big-body work. This entails a combination of pleasurable "rough and tumble" activity, guided bouncing on a trampoline, and swinging him in a sheet. We follow this activity by gentle, mutual face touching coupled with subtle destabilizing (i.e., tugging him front and back and left to right in a way which makes it necessary for him to constantly "right" himself).

Our experience with these procedures is that—when introduced carefully—they result in the child smiling or laughing and in improved eye contact. Then, when certain big body systems (jumping, swinging, "rough and tumble") are abruptly interrupted, the child often indicates by natural signs a wish to continue the activity.

Working with Damon's Perseverative Tendency and Difficulty Following Directions

Following the big body work just described, we introduce Damon to the Elevated Square. Before describing work on

the Square, it is important to understand why we used it.

The Elevated Square

The Elevated Square we have designed (see Figure 6) is about 5 feet by 8 feet, with boards about 14 inches wide. The structure is 2½ feet high, which places most 3- to 6-year-old children at or near eye level with most adults. The short side pieces of the square are removable, making it possible for the therapist to stand in the middle in easy reach of the child. Removing the side pieces also creates the conditions in which the child must make a detour in order to get to a person on the opposite side. The steps used with the Elevated Square are attached to each other with Velcro and—because they are designed to fit snugly in the channels of the Elevated Square—are readily used as obstacles or small platforms placed around the square so that the child can respond to "Up!," "Down!," and "Around!," as well as "Get up!" and "Sit down!" Finally, there are stations at each corner of the square, which can be adjusted to the child's height to provide the best possible conditions for effective eye-hand coordination with the various tasks placed on these stations. The last piece of equipment is the slide, which connects to the Square but can be readily removed.

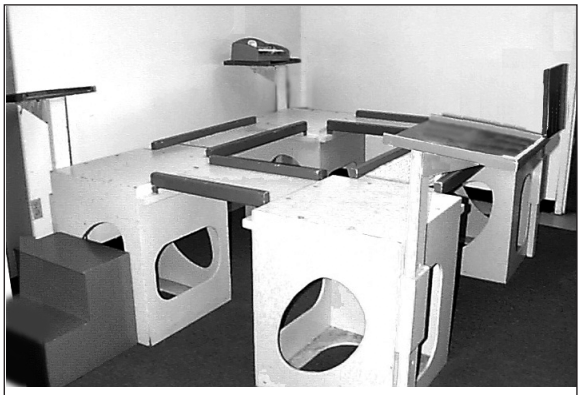

Figure 6. Elevated Square

Placing the child on the Elevated Square effectively limits the child's options for movement because of the constraints the Square places on movement. The Square serves different purposes for different kinds of children. For easily "scattered" children with system-forming disorders, the Square provides the external organization the children desperately require in order to function. However, for children with closed-system disorders, such as Damon, the Square provides the framework in which they can be taught to expand their systems, learn to move from one system to another, and to include people within these systems. Contributing to these changes is the enhanced awareness of body and other that the elevation seems to induce. This changed state is evident not only in the improved eye contact almost immediately evident but in the finding that many children who toe-walk on the ground walk with their feet firmly grounded when elevated.

Working the Short and the Long Sides

Once Damon climbs the steps that places him on top of the Square, we begin a systematic process of both expanding his systems and including people within them. First, a parent is placed at one end of the short side of the Square and a therapist on the other side. The parent is instructed to say "Come!" while using the manual sign (beckoning). The vector of the board, coupled with the parent calling and with the therapist's support, quickly allows Damon to move to his mother. She then briefly hugs him, does mutual face-touching with him, turns him around and directs him toward the therapist, who also says and signs "Come!" Once Damon is responding to "Come!" appropriately, the same procedure is used on the long side of the Square. This continues until Damon can respond to "Come" from mother and therapist from both the short and long distances on the Square.

Once Damon develops the appropriate response to a command while on the Square, the next step is for his parents to help him expand his response to their settings. The goal is to get Damon to generalize "Come!" to first short and then longer distances on the ground at both the LCDC and at home until he responds from various distances to everyone in his family.

Turning the Corners

Turning the corners may be difficult for Damon because it requires a sudden shift of direction. However, turning corners to get to a person just around the corner of the Square is an important part of understanding how the body must adjust to changing circumstances. When turning the corner is mastered at one location on the Square, Damon generalizes the skill by performing it at other locations. Successfully coping with corners as well as short and long sides of the Square enables Damon to become quite comfortable working on the Square.

Understanding Detours

Next, Damon is shown how detours work. This is taught by placing Damon on the short side of the Square and removing the short piece. His mother stands on the opposite side and calls and beckons as before. Eventually, Damon, seeing the gap, looks around the Square and then navigates around it until he gets to his mother. In doing so, he demonstrates a beginning understanding of how detours work. He then has to perform detours with others calling him across the gap from both directions and using both short and long sides of the Square.

Using Multispheres to Cope with Damon's Perseverative Tendency

One of Damon's most serious difficulties is his tendency to perseverate with a task, such as lining up blocks, to the exclusion of all else. Once he becomes comfortable with the Elevated Square, we address this issue by setting up a multisphere arrangement designed to reduce Damon's perseverative tendency and to make it possible for him to transition without distress from one system to another.

A sphere is any activity that we introduce repetitively with the expectation that the child will "take it over" and transform it into an internalized system. Therefore, a multisphere setup is one in which the child learns to cope with two, three, or four different spheres. The rationale for the multisphere procedure is that the child perseverates because (a) he lacks knowledge of how to detach from the action-object system, and (b) because the child has no sense of the system's continuing existence once it is left (the "out of sight/out of mind" phenomenon). Based on this rationale, our procedures are designed to teach the child that he can detach from a compelling system and still return to it. The assumption is that by demonstrating this to the child, then the child's perseverative impulse will be attenuated. We do this by first engaging the child in a particular action-object system and then interrupting it by leading the child to a second, then a third, and then a fourth system and repeating the process as follows.

After the child becomes engaged with A—the first sphere (for example, pouring water over a water wheel) —we interrupt this sphere at the point of *maximal tension* (the point at which the child most needs to continue the activity). When this is done, the child experiences—in Lewinian (1935) terms—*a tension state* related to the need to continue that activity. By maintaining that tension state while having the child become engaged with B—a second, entirely different sphere (sending marbles down a zigzag ramp) —the first sphere continues to remain

"alive" for the child even while the child becomes engaged by the second sphere. (It is this duality of experience that begins to make it possible for the child to relate and soon easily shift from one sphere or station to another.) After a number of cycles involving two (AB), then three (ABC, hanging up cups), and four (ABCD, cutting clay) spheres, the child begins to demonstrate by glancing at the different spheres a sense of *possible* relations between them. After a few sessions, he is no longer distressed when one sphere is interrupted because he understands that he will soon return to it.

But merely being able to shift clockwise from A to B to C to D spheres—although important—is not sufficient for Damon to cope flexibly with his surroundings. At this point, we begin to vary the stations. In other words, after A, Damon expects to move from A to B. Instead, Damon—clearly unhappy—is guided past Station B to Station C. This process is continued over a number of sessions until Damon can tolerate shifts from one station to another in all possible combinations—ACBD, DBAC, and so on.

Once Damon can cope with shifting in all possible combinations on the Elevated Square, stations are shifted to the ground. Here, without the support of the Square, Damon generalizes his new ability to shift to various stations set up on the ground. After Damon masters this sequence, he is placed in a position where he can scan all the stations. He is then asked to choose which one he wishes to go to. When he can express a preference for one system over another by pointing, sign, or word, we have evidence of the emergence of new executive functioning.

Developing Damon's Language

Receptive Language

Damon, as described earlier, is "word deaf," which means that it is not possible to guide his behavior solely by using words. He will do better when spoken words are paired with signs, as do most nonverbal children on the autistic spectrum (Konstantareas, 1984; Konstantareas, Oxman, & Webster, 1977; Miller & Miller, 1973).

To increase Damon's capacity to respond to spoken words, we follow the principle of inclusion described earlier under "Defining Central Concepts." By repeating the appropriate word while Damon is performing the relevant action, he soon includes both word and manual sign as part of his action system. We use this technique with the words "Up!," "Down!," "Push!," "Pull!," and "Around!," followed by "Pick up!," "Drop!," "Pour!" and many others. For example, as Damon steps up on the block in his path, we say "Up!" while pointing upward. We continue in similar fashion with Damon's *pushing* and *pulling* actions. Each time that Damon performs the action we also *narrate* what he is doing by saying, "Damon is pushing (going up, down, etc.)."

We support Damon's behavior by using a vocal tone that expresses the delight we feel at the child's performance. We find this affective narration to be far more relevant to the development of the child's receptive language than using the term "Good job!," with its doubtful meaning to the child.

In developing receptive language, we find it important to gain a clear sense of the extent to which the child is guided by just the spoken word in contrast to the word in context. In doing so, we:

- Determine if the child can give an object to us when it is right in front of us and we tap an extended hand while saying, "Give!"
- Determine if the child can retrieve a designated object in plain sight some 8 to 10 feet away.
- Determine if the child can bring a familiar object (out of sight) from an adjacent room after we designate that object.

- Determine if the child can bring a familiar object (out of sight) from an *unusual* location in another room (e.g., "Bring shoe on kitchen table!").
- Place two familiar objects, one in front of the other, directly in front of the child. We then ask the child for the object farthest from him. The child who is word-guided will succeed; the child who is still guided more by context will incorrectly select the closest object to the examiner (Vygotsky, 1962).

Developing Expressive Language from Systems

Before expressive language can develop to any extent, a child such as Damon must first solve the problem of including people within his systems. This is because communication requires the ability to relate to another around a third entity, such as an object, event or person that becomes the "conversation piece." Often, we see children able to relate to their parents *or* to objects but not to both at the same time

The capacity for communication is developing when reciprocal games (such as the swinging ball) become possible or at the earliest level, when the small child at 9 or10 months of age finds it possible to give an object on request (Trevarthen & Hubley, 1979).

A second important precursor of communication is the child's understanding that her actions are influential. In other words, that she can cause things to happen first with hands, then with tools that extend the reach of hands, then by gestures that simulate actions, and finally by spoken words. All the action systems developed on the Elevated Square and on the ground provide a basis for eliciting expressive signs and words from Damon and others like him. However, before the action system can be used in this way it is desirable to expand all the systems so that they are not limited to one context. To do this we make certain that Damon performs an activity with different *people*, in different *locations*, with different *objects*, presented in different *positions*.[2]

It is also desirable to expand from simple minisystems to more complex integrative systems. Once this is accomplished, we can systematically begin to interrupt the system at different points to elicit the signs and words that previously have been introduced with the system. For example, suppose Damon has to *pick up* a box to get a marble to send *down* a ramp. We stop the marble midway down the ramp, inducing Damon to say or sign, "Go!" After such integrative setups are repeated several times, we can then selectively stall (interrupt) at key places to elicit the signs or words the child needs to produce to have the system continue. For example, by preventing the child from lifting the box, the child must sign or say, "Pick up!" Or, after repeatedly opening a box with the word and sign for "open," we interrupt the system by holding the box closed and, in doing so, elicit from the child the word or sign "Open!"

Another important strategy used when the child is responding very well to the sign and word "Come!" entails having the child sit on a box in the middle of the short end of the Square with a therapist behind him, while the mother stands at the other end of the Square (opened to accommodate her). Then, we help the child make the *come* sign, beckoning the mother to move toward him. Mother is instructed to take one step each time her child makes the *come* sign. Often, suddenly, the child becomes aware of the influential nature

[2] We are indebted to Dr. Louise Ross for the acronym "PLOP" to remind staff to perform **P**osition, **L**ocation, **O**bject, and **P**erson expansions with each developing system.

of his *come* sign and will repeat it rapidly to bring mother swiftly toward him. The contagious excitement that goes with this often elicits the vocalized word, "Come!"

Supplementing the work on the Elevated Square is work with the Sign and Spoken Language Program (SSLP), which presents real-life situations of children running, jumping, and performing other activities interspersed with signs that closely resemble these activities. Children sitting around the television monitor are guided in the use of signs in the context of the videos. They then have the opportunity to use the signs with teachers, parents, and the other children. An example of one such sign from the SSLP may be seen in Figure 7.

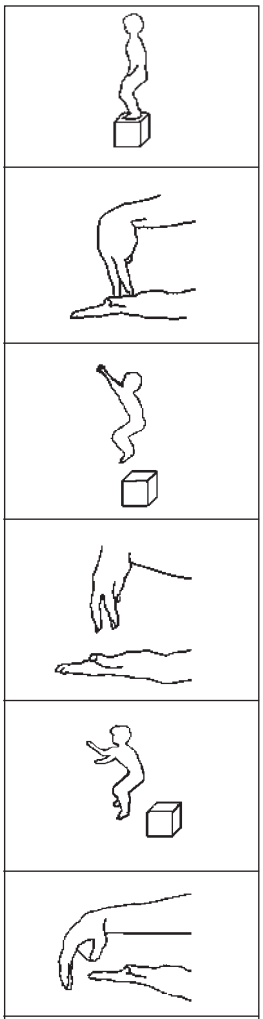

Figure 7. Videotape sequencing of a child jumping and the signs for "jump."

Teaching Order for Developing Communication Using the Miller Method

The following outline summarizes the manner in which we work to help the children learn to communicate:

1. *Teaching action words related to self and others.*
   (a) Begin receptively by having the child learn to respond to certain imperative signed and spoken directions: "Come!," "Stop!," "Get up!," and "Sit down!" The child's capacity to respond immediately to "Come!" and "Stop!" can be a matter of survival.
   (b) Transform receptive sign-words to expressive. After the child understands two or three action sign-words, we help the child use them expressively with others. It is desirable to do this early on so that the child learns that not only do these sign-words compel her to respond, they also can be used to "compel" a response in others. If a child is having trouble using signs expressively (and it does not seem to be a motor-based problem), it may be because the child does not yet understand the influential power of signs. Introducing more causal experiences can be helpful. Parents should be encouraged to find dramatic cause-and-effect toys and to work with their child in using them. Providing the child with many opportunities to experience the self as agent can prepare the way for the child to use sign-words to effect a desired response in others.

2. *Teaching objects and the sign-words that designate them*. The child must learn to designate objects both close to his body and at a distance. To achieve the latter, the child must learn how to scan; that is, to distinguish the desired object from an array of competitive objects and stimuli.
   (a) Begin by using engaging objects close to the child's body. Engage the child with objects that lead to action-object systems and use sounds and intonation both to draw the child's attention to the object and to enrich

the action-object system (e.g., "Rrrm-car" or "Car-rrrm").

Narrate the sequence while and just after the child performs the activity; fo example, "Damon sends car down!" We teach the child to differentiate sequences: Car-down-ramp vs. ball in bucket vs. ring on pole, and so forth. Having differentiated one sign-word-action sequence from another, the child can follow spoken and signed directions appropriately.

Have the child use sign-words to designate different people. Each person working with the child should have their own unique sign paired with their name. The child should also have access to a full-face, 8-by-11 inch picture of each person to assist the child with recall in the person's absence and to help with syntax development.

(b) Teach objects, and the sign/words that designate them, away from the child's body. The strategy is aimed at getting the child to differentiate a distant object from its surrounding field by pointing at it, touching it with a long stick, snaring it, or by squirting water at it with a squirt bottle. The use of sticks or squirting may be thought of as preliminary steps toward perceptually "holding" the object by pointing and, eventually, by designating it via sign-word or picture.

In teaching objects at a distance, we use objects that already have been part of minisystems. By removing an object from a well-established system, we induce an interrupted system that can only be completed by the child acquiring the object part of that system. For example, if the child has been pumping water into a cup, then the cup should be one of the distant objects.

(c) At home, parents or caregivers should use the same principle of narration and interrupted systems to develop object awareness and designation. For example, the spoon required to eat dessert may be located on the wall, a missing shoe can be located on top of a bureau and so forth. We have parents do scavenger hunts with their child. The parents should help their child find various objects (a rusty bolt, a hairpin, a washer, or empty candy box), point at and name them, put them in a sack or other container, and bring them home. At home, they should pour out the contents on a table, examine them together, talk about them, and mount them on boards for future reference.

(d) The parents should perform adjunct procedures for building vocabulary. The parents can videotape their child in action. For example, as he loads a wagon or wheelbarrow, pulls/pushes it to another site, and dumps out the cargo; climbs monkey bars or swings on a swing; pushes a cart in the grocery store; or rides a tricycle. They can narrate what the child is doing, interrupting periodically to see if the child contributes a sign or word. If possible, they should encourage the child to simulate the videotaped activity with miniature toys.

3. *Moving the child toward the naming insight* (Miller & Eller-Miller, 1989). Although we cannot guarantee that a child will achieve the notion that each thing has its name and that the name is actually a category for all things that have those particular properties, we can facilitate the likelihood of the child gaining this insight. One way of doing this is to teach

the critical properties of certain objects on the Elevated Square.

For example, to teach the properties of cup, at one station we have the child place cups on hooks (accenting the handle of the cup); at a second station, we have the child stack cups (accenting their contours); and at a third station, we have the child pour water in and then out of a series of cups (accenting their water-holding property). In a similar fashion, we can teach that a ball is an object that can be thrown, caught, bounced, rolled, placed in a container, and so forth. Each varied use of the object is, of course, accompanied by its sign and name. As children learn the multiple properties of each object subsumed under a unique name, they internalize the criteria for that object to be generalized. In other words, even if a cup or ball has unusual characteristics, if the essential properties are present they may be able to identify it as belonging to the cup or ball category. When children can do this with a number of common objects, they often achieve the generalization that each thing has its own name.

4. *Developing syntax.* It is often a challenge to help children who have single signs or spoken words move toward functional syntax. Recently, we have developed effective procedures for achieving this with the help of sign-morphs and pictures. The sign-morphs are cards that, when held at a certain angle, produce an action sign in motion. By tilting the card, the child sees the manual sign for "push" in action, the sign for "jump" seems to jump, the "break" sign makes a breaking motion, and so forth. Since the children are already familiar with these signs from the SSLP and from daily use in class and in therapy sessions, it is not difficult for them to correctly identify the signs. Then, to teach subject plus verb sequences, we pair a full-face picture of the child with the sign-morph and require the child to perform the appropriate action.
   (a) For example, a picture of Damon plus sign-morph for "jump" requires Damon to jump. Then pictures of mother, teacher, or therapist are substituted and placed next to the sign-morph so that Damon expects others to perform the action. We followed this procedure with a range of sign-morphs until the notion is well established that changing the picture next to the sign-morph induces that person to perform the action.
   (b) Once the child fully understands subject plus verb sequences (step one), we shift the emphasis to sign-morph plus noun (step two). For example, we follow the sign-morph for "pour" with either a picture of water or rice. The child demonstrates her understanding of the verb plus noun relation by selecting and pouring the correct material from the bottle.
   (c) The final step in this process is when the child understands subject plus verb plus noun sentences. We teach this by combining strategies from steps one and two. Once the children have internalized this assisted procedure for developing syntax, we find that many can eventually use it spontaneously without picture or sign-morph support.

Providing the Necessary Transitions from Concrete to Symbolic Functioning

Many children with developmental issues—but particularly children on the autistic spectrum—require assistance to achieve

symbolic functioning. Often, for example, there is little evidence of symbolic play, as was the case with Damon. However, we can encourage such play by providing a careful transition from a real-life experience a child has just had to a comparable play experience that relates directly to the real-life situation. We find that we can often induce symbolic play by first having a child perform certain acts on the Elevated Square and then introducing the child to a miniature Elevated Square with dolls. Observing the miniature Square, a number of children have spontaneously moved a doll figure in the same way they have just moved on the large Elevated Square.

Similar transitions may be made for those children who have learned to speak in two- to three-word sentences but who seem stymied when they first confront the arbitrary forms of printed words and are asked by teachers and parents to attribute specific object meanings to these forms. Just as some children have difficulty with the shift from object to picture, so others have difficulty with the shift from picture to printed word. Assisting children with this transition requires another set of strategies.

We derived these strategies from the observation that, unlike the iconic relation between picture and object, the forms of printed words do not resemble their referents. Therefore, before many children can understand that a printed word may convey the meaning of an object to which it bears no resemblance, they require an interim means of investing printed words with object meaning. In a series of experiments, we demonstrated that children previously unable to find meaning in printed words could do so when provided a transition from picture to printed word (Miller & Miller, 1968, 1971). This was first accomplished by having pictures of objects fused with the printed word on one side of a flash card that could be flipped to the other side, revealing the word in its conventional form (Figure 8). Subsequently, even very delayed children could recognize the meaning of the printed word.

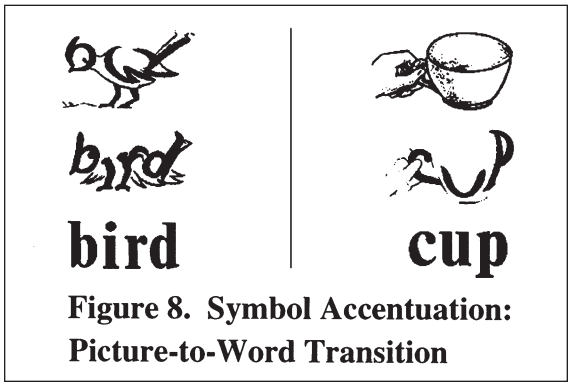

Figure 8. Symbol Accentuation: Picture-to-Word Transition

These procedures have been developed further in the Symbol Accentuation Reading Program (Miller, 1968/1996) so that, with the help of animation to make the transition from picture to printed words and from mouth movements to letters (Figure 9), many children with disorders who were previously unable to read and write have learned to do so.

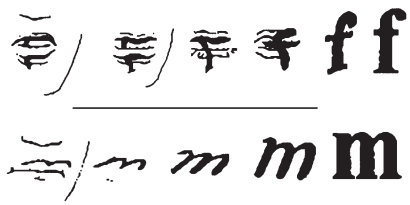

Figure 9. Symbol Accentuation: Mouth-to-Letter Sound

SUMMARY

This chapter described the Miller Method in detail, including its basic concepts and its principles of assessment and intervention. It also presented a case study of a 3-year-old boy on the autistic spectrum to illustrate how this method can be used to improve poor human contact, decrease perseverative tendencies, develop receptive and expressive language, and engage a child in symbolic functioning (or

"pretend play"). Our experience suggests that there are five general factors that play a role in determining how successful the Miller Method will be for a child. These are:

1. *The child's age* (younger children tend to do better than older);
2. *Neurological status* (those without cortical insult or seizure disorders do better);
3. *The child's relationship with his parents* (those with a bond with at least one parent do better than those who have no such bond);
4. *System characteristics* (those with closed-system disorders progress more rapidly than those with system-forming disorders); and
5. *Support demand stance* (parents with a high support/high demand stance have children who progress more rapidly than those who have high support/low demand stance).

Beyond these general impressions, we find that highly motivated families who "live" the program by implementing it in their homes and who form a close alliance with the therapeutic staff frequently have children who make unexpectedly strong gains. ■

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Appendix

LANGUAGE AND COGNITIVE DEVELOPMENT CENTER TYPICAL DAILY CURRICULUM FOR NONVERBAL OR LIMITED-VERBAL CHILDREN

Time	Activity	Areas Developed
8:30 am	*Orienting:* Handing over the child Massage/compression with voice modulation Rough-and-tumble and selective tickling Narrating and predicting imminent events Reciprocal touching, exploration and part naming Tableau calendar for structured transitions	 Interaction Body awareness Body awareness Communication Interaction Interaction
9:00 am	*From One-on-One to Group:* Circle spheres- contagious activity with teachers and children. ("This is the way we pat our head [rub nose, run, walk, jump, fall, stamp feet]," etc.)	Interaction Body awareness Communication
9:30 am	*Sign and Spoken Language Program:* Training Film I (action signs/words: *walk, run, jump, fall, come, go, stop*, etc–receptive and expressive). Generalizing action concepts to other settings.	Communication Interaction
10:00 am	Toileting/washing	Coping
10:20 am	*Snack Time:* Child uses signs/words *give, pour, eat, cookie, drink, spoon, fork*, etc., for desired objects/events	 Coping Communication
10:40 am	*Elevated Board Spheres:* Using Bridge or Template Tunnel and combined board structures including Grand Central sphere. Using multiple orienting to revitalize an inert system.	 Body efficacy/awareness Interaction Coping
	Reciprocal Spheres:	
11:15 am	Using Traveler with terms *push, open, pick up, close*	Interact/communication
11:45 am	Reciprocal ball pushing sphere	
12:00	Lunch	Interaction
12:30 pm	Rest Period	
1:00 pm	*Cooperative Building Spheres:* Boards to build large and small Velcro house Cooperative repair of Broken Table and Chair	Coping Coping Interaction
1:30 pm	*C-D Art Program:* Repetitive circles, lines and dots as minispheres and integrative spheres	Representation
2:00 pm	*Symbolic Play Spheres:* Using Elevated board replicas (small) with dolls	Representation

All children in this category will spend at least 30 minutes each day working on elevated board structures as part of a class of five or six children with three teachers. In addition, each child in the non- or limited-verbal category is scheduled for 45 minutes each week with a therapist and a parent in cognitive-developmental systems therapy, which typically involves work on the Elevated Square. Children also have access to speech and language therapy, occupational therapy, movement therapy, adaptive physical education, and manual arts during the course of the week.