Tangible Symbol Systems™

Second Edition

Making the Right to Communicate a Reality for Individuals with Severe Disabilities

Charity Rowland, Ph.D.
Philip Schweigert, M.Ed.

About the Authors

Charity Rowland and Philip Schweigert are associated with Design to Learn Projects of the Oregon Health & Science University in Portland, Oregon. They have conducted extensive research and demonstration projects on the development of communication and cognitive skills in individuals with severe disabilities. Widely published, they have developed, researched and applied pre-symbolic communication strategies and Tangible Symbol Systems™ with many children and adults who have severe communication disorders.

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Dedication

This work is dedicated to the memory of Betty Brummett.

Acknowledgements

Thanks to the educational staff, students and families who participated in the research that formed the basis for this book.

Preparation of this book was supported in part by U.S. Department of Education grant #GOO8530113 to the Teaching Research Division of the Oregon Department of Higher Education and by U.S. Department of Education grant #H180E30056 to Washington State University.

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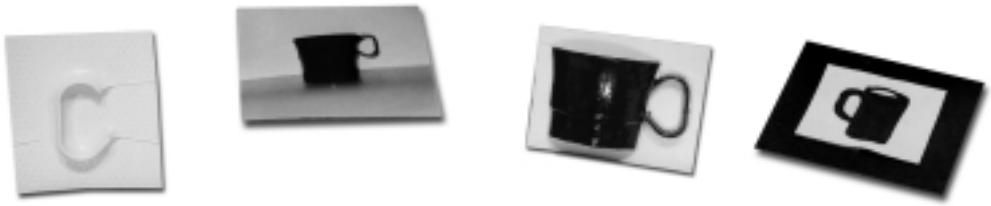
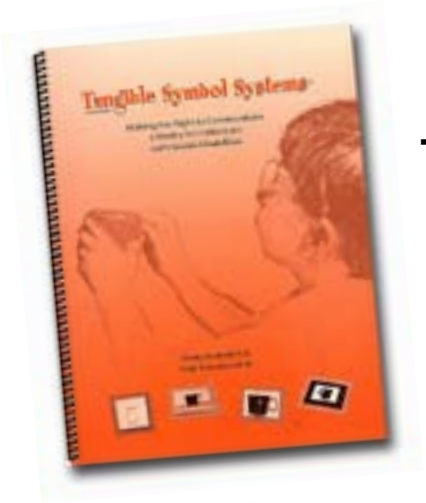


"After seeing how he does use the symbols, and understands them, it's really made me think of him in a different light, you know like, wow!" (Mom)
"We won't sell him short any more!" (Dad)

– Parents of Lewis



Tangible Symbol Systems™ is available for purchase in coil-bound hard copy through our web site: **www.designtolearn.com**

A 75-minute **videotape/DVD** on Tangible Symbol Systems™ is also available. It illustrates the instructional process and presents detailed case studies of five children, showing how they learned to use tangible symbols.

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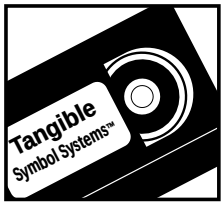
1 Our Purpose

Tangible Symbol Systems™ is not just a mode of communication, but a systematic instructional sequence. In this book, we discuss the use of tangible symbols for communication throughout the day. This book was designed to accompany a 75-minute videotape entitled Tangible Symbol Systems™ (Rowland & Schweigert, 1996). We strongly encourage you to view the videotape before reading the book. The videotape provides many illustrations of individuals using tangible symbols and also provides case studies showing how five children learned to use tangible symbols. The book summarizes the techniques illustrated in the videotape and provides additional background and technical information as well as data forms to assist in the implementation of these techniques. Occasionally the book refers the reader to specific scenes from the videotape.



These references will be flagged by this symbol. The Appendix includes a table of contents for the videotape to help you find the sections that are referenced.

Target audience

These products are designed for teachers, speech-language pathologists, other clinicians, and family members who are working to encourage communication skills in nonspeaking individuals with severe or multiple disabilities.

Target population

The techniques described in this book may be appropriate for nonspeaking individuals of all ages — including youngsters at home, children and youth at school and adults at work and home. People who might benefit from using tangible symbols are individuals who lack the skills to communicate clearly using speech or other abstract symbol systems such as sign language. Potential candidates would include individuals with severe mental retardation, autism spectrum disorders, severe sensory impairments (including deafblindness), severe developmental disabilities, orthopedic impairments, or a combination of these disabilities.

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2 By Way of Introduction

Research on the development of communication in infants without disabilities has shown that parents and infants communicate with each other soon after the infant is born. This knowledge has helped us to understand that speech is not the only way to communicate and that we can teach individuals with severe communication disorders to communicate using a variety of other means.

Development of presymbolic and symbolic communication

It is now widely assumed that a generic ability to communicate, realized initially through presymbolic communication, is the basis for later language acquisition. Children without disabilities go through a period of communicating using gestures and vocalizations before they learn to use spoken words. Gestures may be used to make reference to physically and temporally present topics—referents that may be pointed to, looked at, or touched. For instance, we may point to or touch the food that we want to eat if it is physically present. Although this presymbolic communication can be extremely effective, it limits the communicator to the "here and now". How do we communicate that we want a drink if there is no cup or drinking fountain close by that we can point to or touch? How do we talk about what happened yesterday? Symbolic communication allows us to refer to physically and temporally distant entities. Symbols, in other words, can be used to refer to objects and events outside the bounds of the immediate context. Typically, children begin using abstract symbols in the form of spoken words in their first year.

The ability to use presymbolic communication is not necessarily a sufficient basis for the acquisition of abstract symbolic communication for some individuals who have severe disabilities (Rowland & Schweigert, 1989, 1998, 2000; Wilcox & Shannon, 1998). Many individuals with severe disabilities who learn to communicate through gestures are not able to make the leap to communication using abstract symbols such as spoken words or manual signs (McLean, Brady & McLean, 1996; Rowland & Stremel-Campbell, 1987). These individuals seem to stumble over the concept of a one-to-one correspondence between an arbitrary sound (a spoken word) or motion (a manual sign), and its referent. The problem that many individuals have in bridging the gap between gestures and abstract symbols may be affected by cognitive impairments involving memory capacity and representational ability. Other factors that may impair the use of speech or sign language for expressive communication include motor limitations and sensory impairments.

Research on tangible symbols

A number of augmentative and alternative communication (AAC) systems have been developed for use with nonspeaking individuals. These are thoroughly reviewed by Beukelman and Mirenda (1998). Increasingly, non-speech symbol systems have been used to enable communication by nonspeaking persons with severe dis-

abilities. However, many of these symbol systems require rather high cognitive skills as well as good visual acuity.

Some years ago we conducted studies on the use of a conceptually concrete symbol system that we called "tangible symbols" (Rowland & Schweigert, 1989, 1990, 1996). Tangible symbols are objects or pictures that bear a concrete relationship to the visual or tactile properties of the entities that they represent—that is, they look like or feel like those entities. They are three-dimensional symbols (objects) and two-dimensional symbols (photographs and line drawings). The use of objects as symbols was not an entirely new idea when we began this research: it seems to have been an outgrowth of Van Dijk's work with individuals who are deafblind (1966, 1967), which in turn was based on the theories of Werner & Kaplan (1963). More recently, a number of authors have addressed the use of "objects of reference" (Bloom, 1990; Ockelford, 1992; Park, 1995 & 1997), most frequently within the context of "activity boxes", "anticipation shelves" or "calendar systems" (Joffee & Rikhye, 1991; Stillman & Battle, 1984; Ulmholtz & Rudin, 1981), and often targeting individuals who are deafblind (Engleman, Griffin & Wheeler, 1998). Picture symbols (line drawings and photographs) are more commonly used for both expressive and receptive communication (Bondy & Frost, 1994; Heller, Allgood, Ware & Castelle, 1996; Johnson, 1994; Schwartz, Garfinkle & Bauer, 1998), often in conjunction with voice-output devices (Heller, Alberto & Bowdin, 1995; Stephenson & Linfoot, 1996a and b).

Our initial research (Rowland & Schweigert, 1989) showed that tangible symbols were extremely useful for nonspeaking individuals who are deafblind. Our most recent research (Rowland & Schweigert, 2000) has shown that they are also useful for individuals with a broader range of disabilities. People who have benefitted from using tangible symbols include individuals of all ages who have the following disabilities: severe mental retardation; developmental disabilities; autism or pervasive developmental disorders; severe vision impairment; severe orthopedic impairment; multiple disabilities; and deafblindness. We have also demonstrated that tangible symbols may serve as a bridge to other symbol systems, including abstract symbol systems (such as speech or manual sign language) and that learning to use tangible symbols does not interfere with the acquisition of speech (Rowland & Schweigert, 2000).

3

What Are Tangible Symbols?

Terminology That We Use

SYMBOLS represent, or stand for, people, objects, places, activities or concepts. Unlike gestures, symbols allow a person to refer to entities that are spatially distant (e.g. in another room) or temporally distant (e.g. occurring in the past or future).

Gestures limit us to the "here and now."

REFERENTS are what the symbols stand for or represent.

ABSTRACT SYMBOLS are the symbols that make up languages, such as speech, manual sign language and printed language. Abstract symbols have an arbitrary relationship to referents. That is, there is no obvious relationship between the symbol and the physical properties (auditory, visual, tactile) of the referent. They generally do not look like, sound like or feel like the referent for which they stand. Other types of abstract symbols include printed words, braille and Blissymbols (McNaughton & Kates, 1980).

Abstract symbols (such as manual signs) require good representational ability and motor skills.

CONCRETE SYMBOLS are symbols that have an obvious physical relationship to their referents. The symbolic gestures that young children sometimes use, or that adults use when playing charades, may be considered concrete symbols. These gestures are iconic; that is they mimic the shape, movement or sound of the referent. For instance, a child might pat the seat of a chair to tell Mom to sit down (mimicking the desired action), or he might make a kissing sound to ask for a kiss, (mimicking the sound of the referent). Sometimes auditory and gestural symbols are combined; for instance, one child we know would indicate the smoke rising from her father's pipe by making an upward spiraling motion with her hand and accompanying this symbolic gesture with a "whooshing" sound.

TANGIBLE SYMBOLS are a subset of Concrete Symbols. They may be either three-dimensional (objects) or two-dimensional (pictures) and they have the following properties:

- ☆ They bear a clear perceptual relationship to a referent (that is, they are iconic), making lower demands on cognitive abilities than do abstract symbols. The relationship between the symbol and the referent is obvious to the individual user, since it is based on the user's own experience.

- ☆ They are permanent, making lower demands on the user's memory than do speech and signs, which must be pulled out of "thin air," utilizing recall memory. Tangible symbols need only be recognized out of a permanent display of symbols, thus utilizing recognition memory, a more basic cognitive skill.

- ☆ They are manipulable. They may be picked up and handed to someone or placed next to a referent. Thus, a literal exchange of information is possible through the communication act.

- ☆ They may be indicated through a simple motor response such as eye pointing, touching or pointing, placing low demands on the user's fine motor abilities.

- ☆ Finally, three-dimensional symbols may be useful for people without sight, since they are tactually discriminable.

In summary, as we use the word "tangible", it embraces two major characteristics. First, the symbols are tangible because there is a history of correspondence between the symbol and its referent that has a perceptual basis for the individual user. Second, the symbols are tangible because they are permanent and can be touched or manipulated. All of the properties listed above make tangible symbols seem an alternative to consider for many individuals who do not appear able or ready to acquire abstract symbols at their current stage of development.

The following table shows where tangible symbols fit into a progression of communication from presymbolic or gestural communication to the use of abstract symbols or language. For some individuals, the use of tangible symbols may help to bridge the gap between gestural communication and the use of formal language systems. For others, tangible symbols may represent an ultimate level of communicative competence.

LEVEL of COMMUNICATION	MEANS of COMMUNICATION
Presymbolic	Body and limb movements Gestures Vocalizations
Concrete Symbolic	Symbolic gestures and vocalizations Tangible symbols: Objects (three-dimensional) Pictures (two-dimensional)
Abstract Symbolic (Language)	Speech Sign language Printed language Braille Abstract shapes Abstract graphics

4 Who Needs Tangible Symbols?

Readiness

Although we don't believe that there are any prerequisites for communication intervention, we do believe that there is a logical sequence of intervention that builds steadily on current levels of communication. Building on current abilities with clear intervention targets and objectives will bring success more rapidly.

Expressive communication

There are three major indicators that would suggest that a learner might be ready to learn to use tangible symbols for **expressive** communication:

1. The individual has intentional fine or gross motor behavior that may be used to indicate a symbol. Examples include picking up a symbol and giving it, pointing, hand guiding, eye pointing, and touching.
2. The individual understands that he can control the behavior of another person through some presymbolic means, such as pointing, extending objects, tugging, hand guiding, facial expressions or vocalizing. Our research (Rowland & Schweigert, 2000) has shown that individuals who already know how to communicate pre-symbolically will more readily learn how to use tangible symbols. An individual who lacks this understanding is not ready for symbolic communication. For instance, if an individual will not extend an actual cup to you to request more to drink, you would not expect him to extend a symbol for a cup to make the request. If an individual does not use pre-symbolic behaviors intentionally and reliably to convey basic needs and preferences, then you should begin by teaching him to do so.

3. The individual does not already use abstract symbols to communicate. An individual who can use a higher level of communication with reasonable efficiency should not be asked to use a lower level of communication. The exception to this rule is the case where the environment does not support the individual's use of a higher level of communication. For instance, an individual may be able to use sign language, but other individuals in the community may not understand it. In this case it might be beneficial to teach the individual to use picture symbols, for instance, if you thought that others in the community would respond more readily to pictures. The use of the picture symbols would not replace the individual's use of sign language, but would enable her to communicate with a wider audience.

Assessing Communication Skills

A useful instrument for assessing the current communication skills of potential tangible symbols users is the **Communication Matrix** (Rowland, 1990, 1996). This instrument is structured around seven levels of communicative competence covering pre-intentional behavior through the development of language. It accommodates all forms of communication including gestures, augmentative and alternative communication systems and speech.

Receptive communication

For receptive communication purposes (as a means to provide information to an individual), you may start using tangible symbols prior to the emergence of intentional pre-symbolic communication skills. Using these symbols receptively increases the likelihood that your communication to the individual will be understood. It also helps to reinforce the association between symbols and referents so that when the individual is ready to use them expressively, the correspondence has already been established.

The teacher announces that it's time to go outside while showing the student the symbol for that activity.

5

What's In It For Me?

Motivation

Once you have determined that an individual is ready to learn to use tangible symbols, the next step is to find a highly motivating context in which the learner will want to communicate. If a person has nothing positive to say about an activity and the materials associated with it, it's unlikely that she will want to communicate about it. Since the number of opportunities for use is also of paramount importance when we first introduce symbols, we should look for highly motivating activities that occur frequently and regularly. Such contexts will provide adequate practice in using new symbols. It is unlikely that an individual at this stage will learn to use a symbol for an activity that only occurs once a week. Motivation is also influenced by the communication partner: are you worth talking to? As we get to know an individual we need to present ourselves as valuable communication partners. Our value is in our ability to read signals and to respond to signals and in our willingness to serve as an agent to accomplish something the individual desires.

The Medium of Enjoyment

During a parent workshop we showed many videotaped scenes of children using tangible symbols in the midst of various highly engaging activities. One parent used the phrase "the medium of enjoyment" to describe the use of intrinsically motivating contexts for teaching communication skills.

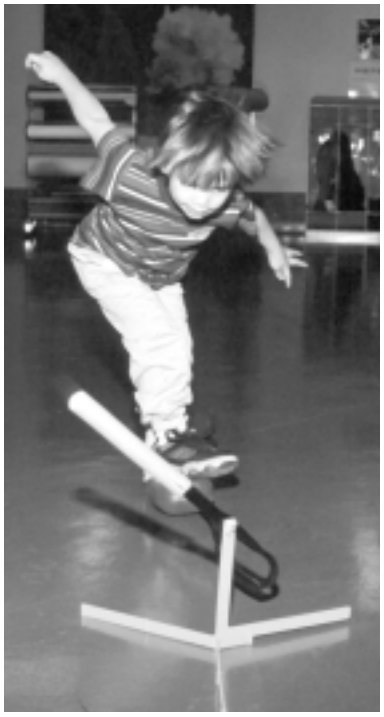
Conducting preference probes

Unless the learner's preferences are obvious, it is advisable to put a great deal of effort into conducting a preference probe to determine the most motivating activities and materials to use. Present many different choices of materials and activities and gather objective data on the learner's responses to determine which are the favorites. What items does she choose most often? What items does she interact with for the longest periods? If an individual cares more about people than things, introduce different objects with the various interactions she enjoys. The focus continues to be the social interaction, but the object mediates the game and can come to be asso-

ciated with it. For instance, you could use a hand puppet in a tickling game or a blanket in a game of peek-a-boo. These items may then become symbols for the different social interactions.

Keeping Things Interesting

Remember that even the most motivating activities or materials may lose appeal after repeated exposure. Be prepared for this. Continue to probe for preferences throughout instruction. Then, as enthusiasm for the current materials wanes, you will be prepared to reignite the interaction with new materials.



6

Getting Your Point Across

Indicating Response

The indicating response is the behavior that the learner uses to select a symbol. The indicating response used by an individual depends on the learner's fine motor skills, tactual and visual abilities as well as on the ability to elicit another's attention (if an individual merely selects a symbol without first evoking attention, then the attempt to communicate might be unsuccessful). The most common indicating responses are:

Pointing

Eye pointing

Touching

Picking up and giving

Hand guiding

The indicating response should be one that the learner can make easily and that is clear to communication partners. Responses that are more subtle, like eye pointing, may require that you assess the accuracy and reliability of the behavior. Having defined the behavior precisely (e.g., gazes at symbol for desired item for two seconds, after scanning all symbols in array), you are able to tell other potential communication partners what to look for and what to accept as an indicating response from this communicator. The more people who can "read" the indicating response, the larger the individual's potential audience (see Katie's case study).

Gaining attention

Communicating effectively requires not only indicating a symbol but also gaining the attention of another person. If you can't gain someone's attention, then you can't initiate a communicative exchange. Our own experience has shown that individuals with AAC systems can be easily overlooked or ignored in certain environments. It is critical that we encourage them to learn a variety of appropriate strategies for gaining attention. Without persistance and a repertoire of acceptable strategies, we might reasonably expect a communicator who is being ignored to resort to less appropriate (perhaps self-injurious) behavior. For those who lack appropriate strategies for gaining attention, or who need some tangible means for doing so, picking up and giving the symbol to the communication partner is worth considering. This behavior combines symbol indicating with attention gaining. Such a strategy would dictate that the symbols be removable from the array. If this is the targeted response, we will often require that the student learn to use tapping, vocalizing or hand guiding to gain attention as well.

"No Thanks, Try Again"

Sometimes individuals who have previously demonstrated their ability to make choices will not choose any of the symbols or objects that you present to them. You may wonder whether the learner has suddenly forgotten what to do. At this point, consider the possibility that the learner is trying to communicate that he would like to make a different choice, one that has more appeal to him. In other words, this lack of a response may be his way of communicating "No thanks, try again". When you think this may be the case, offer other choices if they are available.

7

Lots to Talk About

Referents

A referent is what a symbol stands for or represents. When we determine the vocabulary that we will teach a learner to use, we are determining the referents for which we will create tangible symbols. In the initial stages of symbol use, the major consideration is to teach symbols for referents that are highly motivating. Many individuals show slower acquisition of symbols for less preferred items or activities as compared to symbols for more highly preferred items. The more reinforcing the referent, the greater is the likelihood that the learner will initiate using the symbol, which is the ultimate goal of communication instruction.

Materials used in activities

Any activity, regardless of how boring or mandatory, is likely to contain some materials that the individual can communicate about. Initial instruction is most effective when it revolves around vocabulary for highly preferred materials that are used repeatedly so that sufficient practice is possible. For instance, in snack or meal contexts, potential referents are preferred foods that may be offered in small portions so that the learner has numerous opportunities to request them. Similarly, in a vocational context, logical referents would be the materials that are used repeatedly and that may be presented one at a time or in small quantities. You will find that certain materials or equipment inherently foster communicative exchanges, since they are associated with more social rather than solitary actions: these materials make especially good vocabulary. For object-mediated activities that require the help of another person, the learner may use a symbol to request the specific object, and then use a gesture to ask for "help" or "more" of the object. For instance, the individual may use a "swing" symbol to request to use the swing, and then use a gesture to request more pushing when necessary.

Who's In Charge?

Offering someone a choice does not mean that you are relinquishing control to that person. You are teaching interdependence. For example, while grooming is a necessary activity, there's no need to brush your teeth before you wash your face. Even within this obligatory routine one could choose the order of the components. In the end the teeth get brushed, the hair combed and the face washed, but the individual is allowed to practice communication by requesting the items needed to accomplish each task in the order he desires.

Activities

Tangible symbols may also be used to represent the activities that make up the learner's daily schedule. Such symbols are often used receptively (to tell someone what the upcoming activity is), but they may also be used expressively. The user may request the next activity, or may at least use activity symbols to respond to questions about what activity comes next. It is helpful if activities are conducted in separate areas so that the physical location of each activity may serve as an additional cue to aid in the distinction between activities.

"Finished"

It's useful for an individual to be able to indicate that she is finished with an activity or with certain materials used within the activity. A natural opportunity for using a "finished" symbol is when the learner pushes the materials away or tries to stand up to leave the area during the course of an interaction. If departure is permissible at that moment, a symbol for "finished" (a rather abstract concept) may be made available. Eventually a "finished" symbol should be a part of every symbol display. As with any symbol, its use doesn't always require that the request be granted, but it should at least be acknowledged. Similarly, the teacher may use the "finished" symbol to indicate receptively that the activity is over or that it is time to move on to new materials.

The "Wild Card"

With some individuals who use calendar systems for time management purposes and who are disturbed by changes in the regular schedule, we have used a "wild card" to stand for something new for which there is no symbol. For instance, if school pictures are to be taken today, we would insert the "wild card" into the calendar system. Though it doesn't specify exactly what is about to occur, at least the learner knows that something unusual is about to happen.

People

It's useful for individuals to be able to refer to the important people in their environment. We often use items of personal identification such as jewelry or a watch band to identify a particular person. One learner used a tube of distinctively scented lip balm as a symbol for a teacher who wore it regularly.

8

Putting It Another Way

Levels of Representation

There are many options in terms of the type of tangible symbol we decide to use. Different types of symbols reflect different relationships between symbol and referent or "levels of representation." Tangible symbols should be constructed for each user, capitalizing on the features of the referents that are most meaningful to that individual. If the symbol does not have a connection to the referent that is clear to the user, then it is not tangible to him. Below, we describe the major types of tangible symbols.

Three-dimensional symbols

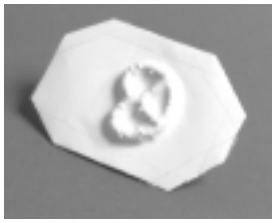
Three-dimensional symbols may be identical objects, parts of objects or associated objects. Suppose you're deciding how to make a three-dimensional symbol for a particular toy that a child really likes. Pay attention to how the child plays with it. What does he focus on? Does he hold the toy by the handle? Does he pull the string or push down on the lever to activate it? Or is he focused on the red arrow that spins? By making a symbol that is similar to the features of the toy that the child focuses on, you create a symbol that is immediately meaningful to him. For instance, a piece of a pull string with a plastic ring on the end might be a good symbol for that toy if that's the part the child acts on. David, who was deafblind, loved to take walks, but didn't have a symbol for "walk." His walking partner first used a cane tip for a "walk" symbol, but it didn't register with David because he never touched that part of the cane. A cane handle, however, made a good symbol, since it was a familiar part of the cane for David.

Custom Made

Tangible symbols are generally not premade and marketed, but are custom-made. If you used ready-made symbols, you'd have to assume that the symbols represented something motivating to any user, and also that the relationship between symbol and referent was obvious to any user. Both of these conditions are unlikely.

Identical objects. Sometimes we use an object identical to the referent as a symbol. For instance, a few raisins glued to a square of cardboard might be the symbol for raisins.

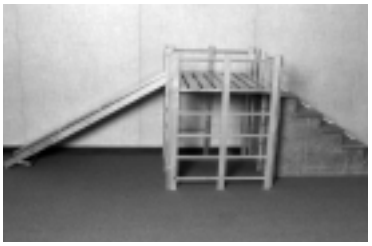
Partial or associated objects. Sometimes we use parts of objects or objects associated with activities as symbols. For instance, a short length of chain (a partial object) might be used to represent the tire swing. A plastic hook (an associated object) might be used to represent hanging up your coat.

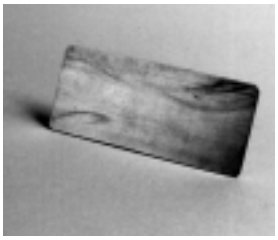


Thermoform Symbols

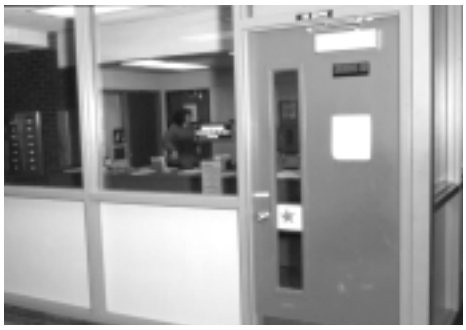
The process used to reproduce brailled text (thermoforming) can also be used to make three-dimensional symbols. Through a combination of heat and vacuum, a thin plastic sheet is molded over part of an object. This captures some of the size and shape of the referent but not color or texture. Entire pages of these symbols can be bound in a book which is lightweight and portable, increasing its accessibility.

One or two shared features. The symbols discussed to this point bear a very obvious physical relationship to their referents. In other words, the symbols and referents share a number of perceptual features, such as shape, size, color and texture. The fewer perceptual features that a symbol shares with its referent, the more abstract it is. A more abstract level of representation involves symbols that share only one or two features with their referents, depending upon the sensory abilities of the learner. Brandon's symbol for the slide, for instance, was made of smooth metal similar only in texture to the real slide. (See Brandon's case study).





Creating associations. Some referents do not lend themselves easily to representation through tangible symbols — locations, for instance, or activities that don't involve particular objects, or equipment that doesn't have removable pieces. In other instances, the logical symbol for a referent may be so similar to one already in use that it would be difficult for the learner to distinguish one from the other. In any of these cases, we may artificially create a symbol, teaching the symbol-to-referent association by permanently displaying the symbol at the activity site or on the equipment. In this case, a perceptual association is developed by repeatedly pairing the symbol with the referent (through receptive exposure) prior to its introduction as a symbol for expressive communication. At one school a plastic star shape was attached permanently to the office door next to the handle. As they entered the office, the students were encouraged to scan the star shape tactually or visually. Several students than began to use an identical star shape for a symbol for that room. Other school locations were represented with unique shapes that came to be associated with each room by attaching the shape to the door.



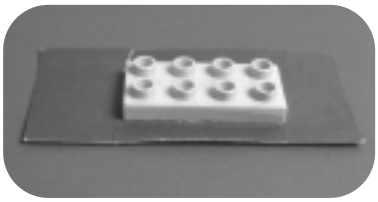
Scavenging Materials for Three-dimensional Symbols

Never throw away a broken toy. The part you can salvage may become your next symbol. To find materials for symbols, try shopping at second hand stores and garage sales. Buy two of the same toy and reserve one of them for symbols. A hacksaw, utility knife, and hot glue gun are invaluable tools.

Miniature Items Make Poor Symbols

It's sometimes possible to use ready-made miniatures such as doll house furniture or charms made for necklaces and bracelets as 3-dimensional symbols. These are very convenient symbols if the learner has the visual and cognitive abilities necessary to understand their meaning. The drawbacks to using miniatures are:

- ☆ Individuals without sight will probably not be able to perceive the relationship between a miniature and the object that it looks like. Think about the sensation that you derive from sitting in a chair (a sensation that impacts chiefly on the posterior of your anatomy). It has no similarity to the sensation derived from feeling a miniature doll's chair with your fingers. How would a person without sight connect the feel of a tiny doll's chair with the sensation of sitting down in a real chair?
- ☆ Even individuals with good vision require relatively advanced cognitive skills to perceive the relationship between a miniature and a full-sized version of an object, particularly if the discrepancy in size is very great.
- ☆ Ready-made miniatures are available for only a restricted number of potential referents.



Borders for Three-dimensional Symbols

When we use symbols that bear a very strong resemblance to their referents, such as identical, partial or associated objects, we run the risk that the learner will not be able to distinguish the symbol from the referent. To avoid this problem you may attach the symbols to some sort of border, such as a cardboard backing or a piece of plexiglass. This distinguishes the symbol from the actual object.

Two-dimensional symbols

Two-dimensional symbols are pictures of referents. They may be photographs or line drawings, colored or black-and-white, and specific or generic.

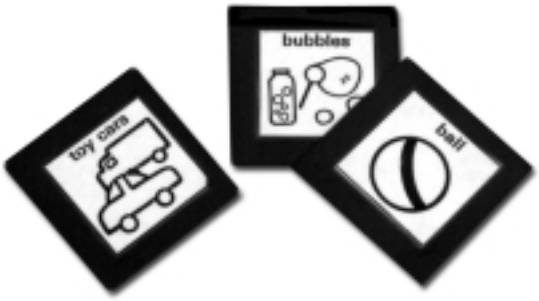
Photographs. When taking photos for symbol use, it's worthwhile to attend to the amount of background "information" that you include. For some people, a picture of the referent in the context it's associated with is a meaningful symbol. For another person, the background should be a solid color, contrasting in color to the referent pictured. In this case, the backgrounds used across different photos should be similar, so that when the learner chooses from an array of photo symbols you know that he is responding to the image and not to the colored background.

One Symbol, One Referent

Don't use the same symbol to represent both an activity and an object used within the activity (for instance, a milk carton to represent both "lunchtime" and "milk"). The double meaning can be very confusing for the learner.

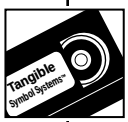
Specific line drawings. These two-dimensional representations are line drawings of referents. They are specific, meaning that they look like the actual referent used, rather than a generic version of it. Photographs may be traced and then photocopied onto regular paper and sized to accommodate the user. They may be colored like the referent.

Generic line drawings. These are the two-dimensional images available through commercial sources. For those who can use this level of representation meaningfully, it's easy to keep up with their growing vocabulary. Pictures may be photocopied or printed off the computer using specially designed software. These images are generic in that they do not, in most instances, look identical to the actual referent. With the exception of color that you may add, the car picture may not look much like the user's actual car.



Combining Two-and Three-dimensional Symbols

Alberto had some usable vision but was quite reliant on tactile information and tended not to use his vision. For him, we combined a photographic image with a three-dimensional representation of the referent on the same card. The photo was placed at the top of the card so that when he tactually scanned the three-dimensional portion at the bottom, the photo was not obscured. This system increased his exposure to two-dimensional representations, but at the same time maintained his access to a symbol type that he readily understood. Over time, we were able to reduce the tactile information provided by the three-dimensional portion of the symbols, making that portion smaller and smaller (see Alberto's case study).



9

Where to Start?

Tangible Symbols Pretest

The goal of Tangible Symbol Systems™ is to provide a means for the pre-symbolic communicator to move into the world of symbolic communication as smoothly and successfully as possible. It is often difficult to determine which type of symbol to start with for a particular learner. Even individuals with functional vision may at times require the concreteness of three-dimensional symbols to make the cognitive connection between symbols and referents. For some two-dimensional symbol users, the specificity of a photographic image of a referent in context may be more meaningful than a line drawing of that item: for others, a photograph may be distracting because it's more cluttered than a line drawing. There was a time when an individual who did not speak would immediately receive instruction in sign language. Now there seems to be a tendency to presume that line drawings are the appropriate modality for the non-verbal child. It is not always that simple. To avoid wasted time and frustration it is important to assess what is **currently** the most meaningful type of symbol for **each individual**. We will reassess periodically throughout intervention to see when and if an individual is ready to advance to a more abstract type of symbol.

The Tangible Symbols Pretest will help you to determine what type of symbol to start with. It is used to record the learner's ability to **match** objects to various levels of representation. The pretest is also designed to help flag any possible bias in responses related to the **position** of the symbol in the array. Finally, the pretest should give you an idea of how many symbols the learner is capable of scanning and discriminating between in an initial **array**.

Use the following forms to structure the information that will help you develop tangible symbol systems for specific learners.

Part 1

The first form contains space to record performance on matching tasks involving zero to two distractors, in arrays of one to three items. It allows for the relevant number of unique arrangements of items (one arrangement for zero distractors, two arrangements for one distractor, and three arrangements for two distractors). The (+) indicates the position of the corresponding symbol or referent in the array. Under each level of representation, three lines allow for testing across three different items (referents). Use the fourth line to calculate the percentage of correct responses. Examples 1 and 2 on page 25 illustrate how to use Part 1.

Part 2

The second form may be used to record data if you need to perform more detailed probes. For instance you might want to probe performance on a single type of symbol across multiple trials and multiple referents. Example 3 on page 26 illustrates how to use Part 2.

Not a Pretty Picture

At a recent conference we were approached by a child psychiatrist who wanted to vent his frustration with the picture communication systems that he had seen imposed upon some of his clients recently. Why, he asked, is the assumption made that any child can understand what pictures mean, regardless of his cognitive or sensory abilities? Pretesting for the ability to understand various levels of representation is a good way to avoid the indiscriminate use of any particular type of symbol.

Order of testing

The Tangible Symbols Pretest is arranged in order from the more conventional and abstract types of symbolic representations to the less conventional and more concrete types. Test in this order based on your knowledge of the learner. There is no need to probe to three-dimensional symbols if an individual succeeds in tasks involving two-dimensional symbols. Don't presume a certain level of representation based solely on the sensory and cognitive labels of the learner. Remember, Tangible Symbol Systems™ is all about individualization.

Testing materials

Refer to your preference probe results to determine what materials you will present to the learner in this pretest. We find it useful to have at least three different items from that list to present.

Procedure

The typical format is to present a different preferred item to the learner at each trial. The item remains tactually or visually present to the learner but he does not yet get it. Now an array of symbols is presented (randomly vary the position of the correct symbol in the array) and the individual should indicate the symbol that corresponds to the presented item. If he does so, then allow the learner to briefly interact with that item. If he responds incorrectly (that is, he does not select the corresponding symbol/item or does not respond at all) then show the correct response and proceed to the next trial. Other format possibilities include:

- ✰ Reverse the order of presentation (i.e. first present the symbol and have the learner indicate the item that corresponds to it from an array of 2-3 items).
- ✰ At times we will begin a pretest by presenting only a single symbol after an item has been presented. Encourage the learner to somehow indicate that symbol and when he does so, then reinforce him with that item. Once he understands what you expect him to do, then try arrays of 2-3 symbols.
- ✰ It's important to remember that at the point of pretesting we are not insisting on the specific response that we may later require during instruction. Our major purpose here is to determine what level of symbolic representation is most meaningful/tangible to the learner right now. If need be we can modify the indicating response in the context of daily instruction later on.
- ✰ Be sensitive to exactly how items are positioned. For instance you may need to adjust the spacing of items in the array or the position of the array in relation to the learner.

When a learner stumbles, you need to determine whether it's the level of representation or if it's something else that impedes him. For example, present a different preferred item from your list (perhaps he did not like what you were offering). Try a smaller array (i.e. fewer distractors). Finally, if necessary, move to a less abstract level of representation.

Examples

Three examples of pretest data are provided on the following forms. A description of the data depicted accompanies each example. Blank forms are provided in the Appendix.

Tangible Symbols Pretest
Part 1

Student _____

Date _____ Tester _____

Type of Symbol (Level of Representation)	Referent Items	Array of Symbols (+ = referent; – = distractor)						Distractors Used / Comments
		+ – –	– + –	– – +	+ –	– +	+	
Generic Line Drawing	1 Puzzle	① –/		② –/				
	2 Juice				③ +/	④ –/		
	3 Car				⑤ –/			
	% correct	0/2 = 0%			1/3=33%			
Specific Line Drawing	1 Puzzle		⑨ +/	⑩ –/	⑪ +/			
	2 Juice	⑥ +/	⑦ –/	⑧ –/	⑫ –/			
	3 Car			⑭ –/	⑬ +/	⑮ +/		
	% correct	2/6=33%			3/4=75%			
	% correct							
Partial or associated object (e.g., a *wheel* for a *toy car*)	1 cd player			⑫ +/		⑯ +/		
	2 Cup		⑪ –/	⑭ +/	⑮ +/	⑲ +/		
	3 cologne	⑬ –/	⑩ –/		⑱ –/	⑰ –/		
	% correct	2/5=40%			3/5=60%			
Identical object	1 cd player	⑤ +/	④ +/	⑥ –/			③ +/	
	2 Cup	⑧ +/		⑦ +/			② +/	
	3 cologne		⑨ +/				① +/	①–③ = warm-up trials
	% correct	5/6=83%					100%	

Example #1. Testing began with generic line drawings. (The trials are numbered so that the order of trials can be tracked for specific patterns both in our presentation and the learner's responses.) At this level of representation the learner seemed to struggle to identify the match [0% correct @ 3-symbol array and 33% @ a 2-symbol array] so the teacher moved to specific line drawings of the referents. Trials 9-15 used the same preferred referents of puzzle, juice, and car, but now the symbols for these were specific line drawings of the learners' car, juice, and puzzle. The results showed that at this level of representation in a 2-symbol array, the learner was able to more accurately match symbol to referent (75%). At a 3-symbol array performance is poor (33%). This level of representation would be reassessed a second time to make sure that similar results could be obtained before instruction using this level of representation would begin.

Example #2. You see that testing began with 3 warm-up trials of identical object matching, presenting only a single symbol array. This was done to help the learner understand what to do with the symbols. The following six trials (4-9) all involved a 3-symbol array. The learner had no problem at this level of representation (83%) so we advanced our testing to partial or associated object symbols, using the same highly preferred objects (trials 10-19). The data summary here shows that at this level of representation, 3-symbol arrays were difficult (only 40% performance), but the same symbol type at a 2-symbol array yielded 60% and was worth another look the next day (see Tangible Symbols Pretest Part 2, example #3).

Tangible Symbols Pretest
Part 2

Student _____

Date _____ Tester _____

Trial	Type of Symbol	Referent Items	Array of Symbols (+ = referent; – = distractor) + – –	– + –	– – +	+ –	– +	+	Distractors Used / Comments
1	3D-partial	CD player				NR			just sat there
2		Cup					NR		Just sat there
3		Cologne				+			
4							+		
5		CD				+			
6		cup					+		
7		cd				+			
8		cologne					–		
9							+		
10			6/7 = 86% at 2-symbol array						
11		CD		–					
12		cup	–						
13			0/2 = 0% at 3-symbol array						
14	1-2 features	Cup				+			
15							–		
16						–			
17		cd					–		
18		cologne					+		
19			2/5 = 40% at 2-symbol array						
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Example #3. Resuming our pretest at the 3-dimensional partial/associated level presented in a 2-symbol array, the learner made no response (NR) to two presentations of either the CD player or the cup. When the cologne was presented he readily and correctly responded. Likely he was telling us that he wanted to begin his day with cologne and not music or a drink! 86% of all responses across all referents at this symbol level and in a 2-symbol array were correct. However, 3-symbol arrays continued to cause difficulty at this time (0%). A probe ahead of 3-dimensional symbols with 1-2 shared features similarly showed poor performance (40% at a 2-symbol array), suggesting that for now this was not an appropriate level around which to build his communication system.

10

Say What You Mean

The Comprehension Check

Comprehending the meaning of each tangible symbol is crucial to success. When someone is learning how to speak, it's easy to figure out whether he understands what a new word means. You can say "What is this?" or "Tell me what you want" and see whether he uses the correct words to answer your questions. For the tangible symbol user, we need to systematically embed comprehension checks into the acquisition of each tangible symbol. If we don't attend to comprehension from the very beginning of instruction, then we may find out that the user has only learned that tangible symbols are things that you give to people (or point to or look at) that result in something positive happening eventually. What he has not learned is that each symbol means one thing and one thing only. In other words, the user does not understand the 1:1 correspondence between a particular symbol and a particular referent. This situation will be difficult to remedy if it is allowed to persist. That's why we incorporate a comprehension check into the learning of every symbol as soon as the symbol array exceeds one.

One-symbol arrays

If instruction begins with an array of only one symbol, there is no opportunity to check the student's understanding of the symbol, because no discrimination is being required. At this step you present an array of two objects that the child is interested in. He indicates his choice pre-symbolically, but does not yet get that object. With the desired object remaining visually or tactually apparent, you present him with the symbol that corresponds to the chosen item. If he acts on that symbol correctly (e.g. picks up and gives, touches, looks at), he gets the object. What the user learns at this stage is simply what to do with a symbol. He does not necessarily learn to associate the symbols with any specific referent or to discriminate between symbols. As quickly as possible, we move on to an array containing more than one symbol.

Wise Choices

When new choices are presented to the learner it may be that a casual visual inspection of them doesn't afford enough information for an informed decision— especially if she has a significant visual impairment or doesn't attend closely. In this case it's important to allow the learner to scan the array of items tactually prior to making her choice. In some cases, you may need to offer a brief "sample" of what each choice is about (for instance, by turning on the massager or activating a noise-making toy briefly).

As the learner comes to associate how the object looks or feels with what it does, this "sample" may be eliminated.

Multi-symbol arrays

Comprehension checks begin when the array of symbols includes two or more. Now the learner must discriminate the correct symbol from an array of possibilities. There are two major requesting procedures used to check comprehension as a learner

first attempts to use tangible symbols presented in multi-symbol arrays. They differ in the order of presentation of the object and symbol arrays.

Objects first, then symbols. First, offer the learner a choice of objects. Once the learner has indicated which object he wants, offer a choice of symbols for the same objects. If the learner chooses the symbol that corresponds to the chosen object, this shows comprehension, as opposed to random choice. If the learner chooses the wrong symbol, do not give him the chosen object. Show him the correct symbol and set up a new choice of items.

Symbols first, then objects. The second procedure is just the opposite—the learner first chooses from an array of symbols, and then chooses the corresponding object. This is closer

to the natural sequence of communication—first we ask for something, then we get it. Again, if the learner chooses the wrong object, don't give it to him. Show him the correct object and set up a new choice of symbols.

One of these comprehension checks is built into instruction for every new tangible symbol, and is continued until the data show that the learner clearly understands the meaning of that symbol. We generally require the learner to demonstrate comprehension for each symbol with at least 80% accuracy across two consecutive sessions, using an array of a least three symbols. The comprehension check should be eliminated on a symbol by symbol basis. Thus, a learner using a multi-symbol array may be using some symbols without comprehension checks, while other newer

Change Gauge

A change in instructional variables such as size of array or level of representation, may cause some confusion for the learner. The comprehension check can be reinserted into the instructional procedure whenever questions arise. It is your gauge to judge whether or not the learner can handle that change at this time.

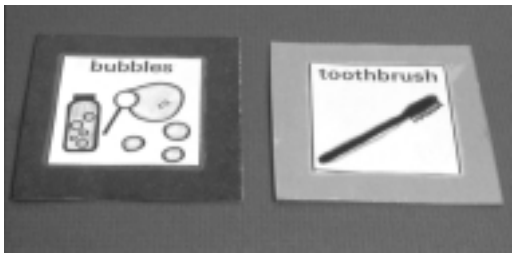
symbols still require comprehension checks every time they are used. Once the comprehension check is eliminated, the learner is allowed to use tangible symbols just like one uses words – without an elaborate routine.

Avoiding a position bias

As we implement either of the requesting procedures, we randomly alter the position of symbols and referents as we present choices. This is done to avoid the development of a position bias, where the user simply indicates symbols or referents in one particular position, regardless of what they represent. If you suspect a position bias, you should take data on the position in which symbols are presented, and the position from which the learner chooses. If the data show that a position bias is present, then you need to be more systematic about how you present symbols and materials. It may also be useful to consider temporarily changing the type of distractor symbols in the array.

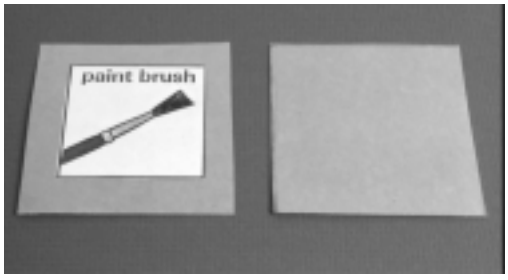
Distractor symbols

In the requesting paradigm, there is always one correct choice of symbol. In a multi-symbol array, all symbols except for the correct one are called distractor symbols. Generally, as we implement requesting procedures, we give learners choices of two or more things that they enjoy, so the distractor symbols are all for preferred items. Be sure that the learner scans the symbols and referents carefully either visually or tactually. If the learner doesn't seem to attend closely to the choices presented, you may need to introduce the tasks of attending and discriminating between symbols more gradually. As a temporary measure you may use distractor symbols for something other than preferred items until the learner's performance improves.



Non-preferred distractors. Try offering choices of one highly preferred item paired with one item which the learner does not like. Now the importance of the choice is heightened, since choosing the non-preferred symbol is not nearly as pleasant as choosing the preferred one.

"Nothing" symbols. For some individuals, we use what we call a "nothing" symbol as a distractor. The "nothing" symbol is an abstract shape or a blank card that is never associated with any referent. When the learner chooses this symbol, he gets "nothing", and the trial starts over again after a minute or so. In this way, the individual learns that it makes a difference which symbol he chooses, but the task is made easier, because he only has to learn to avoid the "nothing" symbol.



11

Talk to Me

Examples of Expressive Tangible Symbol Use

Receptive and expressive communication learning should be embedded into functional routines throughout the learner's day. Below are two sample routines to give you an idea of the flow of instruction.

1. **In the playroom,** the communication partner waits for Sammie to gain his attention by taking his hand. In response to Sammie's bid for attention, the partner says "What do you want?" indicating an array of the oval roller, the therapy ball and the barrel bolster by assisting her to tactually scan this array of play equipment.

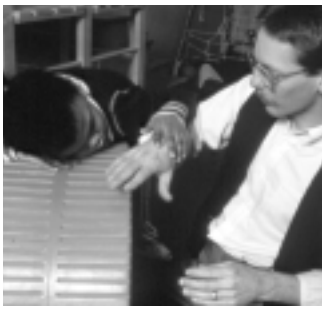
Sammie wastes no time in reaching for the object she wants, in this instance, the oval roller.

Now that the partner knows what Sammie wants, he indicates the display of tangible symbols for oval, therapy ball, and bolster, assisting her to tactually scan the array of 3-dimensional symbols, and asking her to "show me what you want".

All this is done in the presence of the desired object. Sammie must now respond by picking up the symbol for the oval and giving it to her partner.

If correct, then Sammie is given a healthy dose of interaction on the oval with her partner's help.

If Sammie had picked up the "ball" symbol, then the partner would say "No", indicate the correct symbol (giving Sammie receptive exposure to the symbol), and then begin another trial: Sammie would not be allowed to play on the oval.



Pauses in the play are interspersed throughout, providing frequent opportunities for Sammie to request more play by taking her partner's hand to the oval. She may indicate that she is finished with that toy by not reinstating, or by pushing the object away. By the end of the play time, many such opportunities to use tangible symbols to make a request have occurred.

2. **At lunch,** Bryan gets to choose from a menu of options from the cafeteria. These are represented through line drawn symbols spread out on the table in front of him. Anxious to eat, Bryan taps his teacher for attention.

Next he extends his cup, clearly asking for a drink.

Before his request is responded to, he must present the corresponding symbol to his communication partner.

At that point she pours him a cup of milk.

Encouraging Spontaneous Communication

As Sammie and Bryan become proficient symbol users in these fairly structured routines, their teachers will begin to arrange the environment to encourage them to communicate more spontaneously. There are many factors that encourage or discourage spontaneous communication in an activity. The ACE (Rowland & Schweigert, 1993) is an environmental inventory that may be used to suggest ways to encourage spontaneous communication in an activity regardless of the communication mode used by the learner.

12

Listen to Me

Examples of Receptive Tangible Symbol Use

Using tangible symbols for receptive communication gives the learner experience in associating symbols with referents, provides specific information in a manner that the learner can understand, and also demonstrates how to use symbols. These are all good reasons to use tangible symbols to communicate with the learner receptively.

Symbols for activities

Most often, symbols are used receptively to represent the activities that make up an individual's daily routine, frequently in "calendar systems." Such symbols provide enough concrete information to allow the user to develop some expectation about the forthcoming event. Often symbols for completed activities are returned to and stored in a "finished box" that is placed next to the calendar system. The presence of the "finished box" gives the learner the option to retrieve a symbol from the box and communicate about an activity that is not in the schedule. It's a good idea to require that the learner show the activity symbols to you so that the opportunity to use them expressively is built into the use of the calendar from the very beginning.

Planning the Daily Calendar

There are many chances to communicate as you set up the activity calendar at the beginning of the day. You might sort through the activity symbols together with the learner and converse about the planned activities as you place the symbols. For some time slots, you may be able to offer the learner a choice of activities. Once a symbol has been placed in the calendar sequence, you may have a discussion about the materials and people involved in the activity, using any existing tangible symbols to discuss those topics.

Receptive use of tangible symbols for activities is not simply something you do to the learner. You must expect a specific response (such as going to the coat rack when you give the symbol for going home) and you must allow time for the learner to make a response. The following strategies will help you to monitor the receptive use of activity symbols and the learner's understanding of them.

- ✰ Post a list of the specific symbol/activity pairings and how they are to be used.
- ✰ Model and monitor their use for all potential communication partners.
- ✰ Identify and monitor the responses from the learner.
- ✰ Collect data on these responses. This will allow you to track the emergence of anticipatory responses and the development of the learner's understanding of the 1:1 correspondence between symbol and referent.

Symbols for items and people

Symbols for individual items and people may also be used receptively. You might show the learner a symbol for an item you want him to give to you. Or you might simply label items by pointing first to the item, and then to the corresponding symbol. Use the symbols like you would use speech, to indicate specific items and people to the learner.

13

Keeping an Eye on Things

Monitoring Daily Instruction

It is important to design steps that encourage the learner to be successful independently. Moving too quickly and expecting too much from the learner increases the chances that she will fail. Repeated failure weakens motivation and impairs understanding of the value of communication. The goal is to move at a pace that challenges the learner without overwhelming her. This increases the chances that she will succeed.

Monitoring the learner's performance regularly using objective data will allow you to track the adequacy of your instructional design. When the acquisition criterion is met (the criterion we generally use is "Chooses correct symbol with 80% accuracy over two consecutive days"), then a change in the procedure should be made to guarantee a steady learning progression.

Data collection is also individualized. Each practitioner must develop a system designed to ask and answer specific questions about a learners' acquisition and the efficacy of the current instructional step.

The Story's in the Data

George couldn't seem to break out of the 60-70% range of performance day after day. Looking at the data, it was clear that his mistakes were occurring near the end of each instructional session. The mistakes were not specific to certain items. Perhaps George was getting bored and this was his way of demonstrating that. We introduced a way for George to indicate "finished" so that he could tell his teacher when he was tired of the activity. Another preference probe was also conducted.

On the next page is a sample of a data form that we have used to collect data on tangible symbol acquisition on a daily basis.

In this particular example we are tracking the following information for each opportunity:

- ☆ The items or symbols in the array (/) to make sure choices are spread out across all items
- ☆ The item selected, and whether or not it was correctly paired with the symbol or referent (+ or –)
- ☆ Gaining attention is also being monitored, noting in this example only opportunities in which the learner independently gained attention (✓)

Look at the third opportunity (column 3) on the sample data sheet. After independently gaining his teacher's attention (✓), Donatello was offered a choice of clay (/), a book (/) or a toy bear (/). He picked the book and the teacher removed the clay and the bear. When she offered him the array of the three corresponding symbols, however, Donatello failed to select the "book" symbol (–). The teacher would therefore show him the correct symbol, and then start a new opportunity.

From this data sheet it is possible to compute data on the entire session, as well as on each individual item. In Donatello's case, his symbol use was accurate 63% of the time over all ("Session Total"), and he gained his teacher's attention 75% of the time. If we look at the "book" choice, we can see that although he chose the book three times out of the five times that it was offered, he only chose the correct symbol once, for a total of 33% correct (or chance performance) on this particular symbol.

The data sheet is more efficient if it provides current protocol information such as array size and order of presentation as shown at the bottom of this example. Data collection strategies should be flexible enough to allow you to adjust the type of information you are seeking. For one child the data sheet called for noting the position in the array of the selected item, as there was some question about position bias. In that case we added an L, M, or R (for left, middle, right) to the boxes (for example; +/ M would tell you that the item-symbol correspondence was correct and the symbol was in the middle position of the array). Other variables that we have tracked include level of assistance, latency of response and use of spoken words by the learner. A blank copy of a data sheet set up to track four day's worth of data appears in the Appendix.

Daily Data Collection

Student Donatello Instructor MacKenzie

Function targeted Requesting (making choices) Activity Leisure

Date 10/9/00 Items	1	2	3	4	5	6	7	8	9	10	%
Bubbles	/	/			/		/	/			
Clay		–/	/	/		+/	+/				2/3=67%
Tape		/		+/	+/						2/2=100%
Book	–/		–/			/	/	+/			1/3=33%
Car	/			/	/	/		/			
Bear			/								
Gain attention		✓	✓	✓	✓		✓	✓			6/8=75%

Protocol
3 items (choices) in array
3 symbols in array
item first, then symbol

Scoring System
/ = choices presented in array
+ = corresponding symbol was selected
– = corresponding symbol was NOT selected
✓ = Gains attention independently

Session Total 63 % correct

14 Where Do We Go From Here?

Promoting Progress

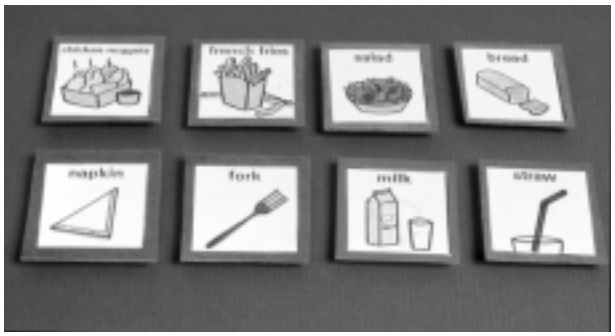
When the daily data show that the individual has achieved the current learning goal, decide what to do next to promote continued progress. There are seven major changes that you can make that will promote progress in tangible symbol acquisition. These are described below in the approximate order of importance.

Expand vocabulary

It is essential to increase the learner's vocabulary so that she can communicate about the many aspects of her environment. Therefore, the first and most important change is to expand the learner's vocabulary. As soon as the individual has acquired one set of symbols, introduce more. There are an infinite number of referents or topics about which an individual can communicate using tangible symbols. Ongoing preference probes will enable you to keep up with the need to add new vocabulary.

Increase size of array

Gradually increase the number of symbols available to the learner in the symbol array. The more vocabulary presented to the learner at one time the more efficiently he will be able to communicate. Also, the learner will be less dependent on the communication partner for deciding what symbols should be in an array. For some learners, the size of the array may be restricted by limited motor abilities. For example you may remember Katie's case study from the videotape. She is a child with restricted trunk control who uses eye pointing as an indicating response. She is able to turn and look at the symbols in a way that is readable, to the left, midline and right with the symbols spaced 10" apart. The limit of her array size is three for now.



Generalization

Generalization of behavior does not occur spontaneously for many tangible symbol users, but must be systematically targeted through instruction. Once a learner understands how to use a set of symbols under carefully controlled conditions, show her that the symbols can also be used in other settings, such as at home, in the community, with other people, and at other times of the day. Generalization is also necessary for the sake of consistency. Take the situation where certain materials are used in a variety of contexts throughout the day. It might be confusing to the learner to require that he use tangible symbols to request those materials if he can get them at other times without having to use the symbols. Therefore, the expectation should be the same in all contexts, namely that access to those items is accomplished through the use of the tangible symbols.

New functions

Once learners have become adept at making requests, show them how to use symbols for other communicative purposes, such as labeling or making comments. Although being able to obtain things that are desired is likely the single most important communicative function, there are other reasons for communicating which broaden the user's options for interaction. Sometimes it helps to teach the learner to use a different indicating response to express new functions. For example, some learners will touch the symbol for the referent they want to comment about, while they pick up and give symbols for things they are requesting. For learners who are able to combine symbols into a single utterance, requests may be naturally distinguished from other functions because they are preceded by a symbol for "want" or "I" + "want"

Multi-symbol utterances

It is possible to chain tangible symbols together into simple phrases, just as it is possible to chain words together. "Want" is usually one of the first symbols to be incorporated into multi-symbol utterances. In cases where the user points to or touches symbols that are fixed on the array, symbols for "want" or "I" + "want", can be added to the permanent display. Often the learner at this stage has her communication system in a book, with a page or more for each context of the daily routine. Generic vocabulary such as "want", "more", "finished" will be placed on the facing page for each context's vocabulary.

If symbols are removable (as in the case where the learner uses a pick up and give response) a "want card" may be used. In this instance, the learner selects the symbol for the desired item, removes it from the array, places it on the "want card" and hands the card to his partner.

Portability

Tangible symbols must be available whenever they might be needed. If a learner doesn't have constant access to her symbols, she will not be able to communicate at will. Unfortunately some symbols may be large or difficult to carry from site to site. Once a learner understands how to use one type of symbol, think about how to make the symbols more portable by mak-

With this clipboard the learner has access to all the vocabulary needed in the playroom.

ing them smaller, lighter, or placing them in a permanent array such as a book that can be easily carried. Portability should also encourage use of the symbols in more settings, including the general community. If the meaning of a symbol is not immediately obvious to strangers in a new setting, then a printed label should be added for each symbol so that anyone can understand them.

This book contains all of this child's symbols.

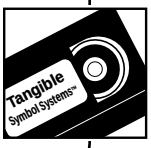
Change the type of symbol

Another area for change is the type of symbol—or the level of representation. Although you may probe this variable to discover what is the most appropriate level of representation to start with (see Tangible Symbols Pretest), this is usually the last variable to change after the initial pretest. Initially it's more important to teach a learner to communicate competently and spontaneously with meaningful symbols, than to spend valuable time and energy trying to teach the use of more abstract symbols.

Once an individual is ready to learn a new type of symbol (periodic probes will help gauge this readiness), you want to move to a level of representation that is more abstract, more conventional, and/or more portable. Our research has shown repeatedly that the acquisition of one type of tangible symbol is likely to serve as a bridge to more abstract types of tangible symbols and sometimes even to abstract symbols such as speech, manual signs or printed words (Rowland & Schweigert, 2000).

Tangible Symbols and Speech

For individuals who have a few speech approximations, the introduction of tangible symbols does not cause them to abandon the little speech they are using, nor does it prevent them from acquiring new spoken vocabulary. It does, however, provide a means of communicating symbolically that is immediately meaningful to the user, allowing access to more interaction and greater participation than would be the case if we responded only to the limited speech. (Remember Kenyari and Catherine from the videotape? See also Alberto's and Damien's case studies)



15 Plotting A Course

The Intervention Record

The daily data you are collecting will show you when you need to adjust instruction to promote learning. The Tangible Symbol Systems™ Intervention Record spells out the options for making changes in the instructional program and provides a form for tracking the systematic changes that you will make. Instructional changes are divided into four categories. Under each category are a number of variables that might be addressed. In the first column, the status of all relevant variables is described to document the nature of instruction at the outset. In the following days/weeks, the additional columns are used to describe just those variables that are adjusted when a significant change in the instructional procedure is made. A sample form appears on the following page. It shows the major changes that occurred in Alberto's case study on the accompanying videotape. A blank form appears in the Appendix. Each variable on the Intervention Record is explained below.

Assessment (You may need to assess for readiness, preferences or type of symbol)

- ☆ Assess for symbolic readiness. Indicate if you are conducting a communication assessment designed to determine if the learner has the needed pre-symbolic communication behaviors.
- ☆ Preference probes. Indicate if you are investigating what is motivating to the learner at this time. Often this is an ongoing part of instruction.
- ☆ Tangible Symbols Pretest: Indicate if you are assessing for the most meaningful level of tangible symbol representation for the learner at this time.

This is Not a Cook Book

Tangible Symbol Systems™ is not a cook book approach to instruction. A cook book approach does not allow individualization, which is key to our instructional process. However, our approach is systematic and logical and its success is based upon a clear rationale and decision making that is based upon objective data.

Symbolic features for promoting progress (These are the seven major areas of change described in the previous chapter on Promoting Progress)

- ☆ Vocabulary/Materials. List the specific referents or topics that are being represented using tangible symbols.
- ☆ Array size. Describe the number of tangible symbols presented to the learner at one time.
- ☆ Generalization. Describe any new contexts in which instruction is occurring and identify new communication partners.
- ☆ Communicative function. Describe the functions for which tangible symbols are being used in this situation.
- ☆ Length of symbol utterance. Describe how many tangible symbols the learner is stringing together into one expression.
- ☆ Symbol display/portability. Describe how the symbol array is presented to the learner, and strategies (such as a book) for increasing accessibility to the symbols.

- ☆ **Symbol type.** Describe the level of symbolic representation that is being targeted at this time.

Comprehension check (Factors related to the comprehension checks embedded in instruction)

- ☆ **Order of presentation.** Describe whether the learner will choose from an array of objects first then symbols or from an array of symbols first then objects to demonstrate comprehension.
- ☆ **Distractor symbols.** Describe whether the other symbols in the array are preferred, non-preferred, or "nothing" symbols.
- ☆ **Position check.** Describe tracking of object/symbol position in the array to monitor for possible position bias.

Teaching routine: cues, responses, consequences (These cover the major steps included in the teaching routine from start to finish)

- ☆ **Instructional cues.** Describe what the teacher does to prompt the response.
- ☆ **Array scanning.** Describe what the teacher does, if anything, to insure that the learner is aware of what is in the object and symbol arrays.
- ☆ **Attention gaining.** Describe how the learner will gain the attention of the partner.
- ☆ **Indicating response.** Describe how that learner will gain the attention of the partner and how the learner will indicate the symbol to the communication partner.
- ☆ **Level of assistance.** Describe any physical assistance, model/demonstration, or other assistance that is being provided to assist the learner to make his response.
- ☆ **Consequences.** Describe any procedure used in the event of an incorrect response by the learner. Also describe any specific procedures to be followed to reinforce a correct response by the learner.

Tangible Symbols Intervention Record

Student Alberto - case study	Scene 1	Scene 2	Scene 3	Scene 4	Scene 5
Assessment					
Assess for Symbolic Readiness					
Preference Probes					
Tangible Symbols Pretest					
Symbolic Features for Promoting Progress					
Vocabulary / Materials	hip-hop/game	spinner	pen/paper	space tops	playground
Array Size	2 item/1 symbol	2 symbols	3 symbols	7-8 symbols	
Generalization Setting	Table top: free play				
Partner	Darlene				
Communicative Function	Request				
Length of Symbol Utterance	1				
Portability / Symbol Display	cardboard strip			book	
Symbol Type	photo-partial	track speech		2-d color picture	+ speech
Comprehension Check					
Order of Presentation	object, then symbol				symbol, then object
Distractor Symbols	none	preferred			
Position Check					
Teaching Routine (cues, responses, consequences)					
Instructional Cues	what do you want?				
Array Scanning (tactile / visual)	tactile & visual		as needed		
Attention Gaining	vocalize/speech				
Indicating Response	pickup & give				
Level of Assistance	verbal/gesture	delay gesture	drop gesture	"Look"	
Consequences for correct response	give item				
for incorrect response	correct & cue next trial				

16

Moving On

Successful Transitions to New Environments

You and the learner have invested a tremendous effort into establishing a new and meaningful communication system. Now it's time for the learner to move on to a new setting. We have found that transitions are full of peril for the user of augmentative and alternative communication systems. Sometimes systems are completely abandoned. Sometimes a new type of symbol is introduced that the learner doesn't understand. It is the learner who suffers most from these lapses in continuity.

To safeguard against difficulties it's important to provide the new environment with the symbol system itself as well as information about the way the individual uses the system. Often it's the parents who are left with the responsibility of transmitting such information to a new setting, without any systematic means of relaying such information.

In the Appendix is a Symbol Acquisition Record that may be used to describe a learner's symbolic vocabulary as it grows. A copy of this record could be passed on to new settings. Although some of the vocabulary may not be relevant in the new setting, this record shows the learner's capacity to communicate symbolically. Another resource is the "Let's Talk" materials (Rowland, Schweigert & Dorinson, 1995) which address the transfer of information about communication systems to new environments.

References

Beukelman, D.R. & Mirenda, P. (1998). *Augmentative and alternative communication: management of severe communication disorders in children and adults* (2nd edition). Baltimore: Paul Brookes

Bloom, Y. (1990). *Object symbols: a communication option*. Sydney: North Rocks Press.

Bondy, A., & Frost, L. (1994). The picture exchange communication system. *Focus on Autistic Behavior*, *9*(3), 1-19.

Engleman, M.D., Griffin, H.C., & Wheeler, L. (1998). Deaf-blindness and communication: practical knowledge and strategies. *Journal of Visual Impairment & Blindness*, *92*, 783- 798.

Heller, K.W., Alberto, P.A., & Bowdin, J. (1995). Interactions of communication partners and students who are deaf-blind: a model. *Journal of Visual Impairment & Blindness*, *89*, 391-401.

Heller, K.W., Allgood, M.H., Ware, S.P. & Castelle, M.D. (1996). Use of dual communication boards at vocational sites by students who are deaf-blind. *RE:view*, *27*(4), 180-190.

Joffee, E., & Rikhye, C.H. (1991). Orientation and mobility for students with severe visual and multiple impairments: a new perspective. *Journal of Visual Impairment and Blindness*, *85*(5), 211-216.

Johnson, R. (1994). *The picture communication symbols combination*. Solana Beach, CA: Meyer-Johnson Co.

McLean, L.K., Brady, N.C., & McLean, J.E. (1996). Reported communication abilities of individuals with severe mental retardation. *American Journal on Mental Retardation*, *100*(6).

McNaughton, S., & Kates, B. (1980). The application of Blissymbolics. In R. L. Schiefelbusch (Ed.) *Nonspeech language and communication* (pp. 303-322). Baltimore: University Park Press.

Ockelford, A. (1992). *Objects of Reference*. London: Royal National Institute for the Blind.

Park, K. (1995). Using objects of reference: a review of the literature. *European Journal of Special Needs Education*, *10*(1), 40-46.

Park, K. (1997). How do objects become objects of reference? A review of the literature on objects of reference and a proposed model for the use of objects in communication. *British Journal of Special Education*, *24*(3), 108-114.

Rowland, C. (1990, 1996). *Communication Matrix*. Portland, OR: Oregon Health Sciences University.

Rowland, C., & Schweigert, P. (1989). Tangible symbols: Symbolic communication for individuals with multisensory impairments. *Augmentative and Alternative Communication*, *5*(4), 226-234.

Rowland, C. & Schweigert, P. (1990, 1996). *Tangible symbol systems*. Tucson: Communication Skill Builders. Currently available through the authors.

Rowland, C. & Schweigert, P. (1993). *Analyzing the communication environment: An inventory of ways to encourage communication in functional activities* (manual and videotape). Tucson: Communication Skill Builders. Currently available through the authors.

Rowland, C. & Schweigert, P. (1998). Enhancing acquisition of functional language and communication. In R. Silberman & S. Sachs (Eds.) *Educating Students with Visual Impairments and Other Disabilities* (pp. 413-438). Baltimore: Paul Brookes.

Rowland, C. & Schweigert, P. (2000). Tangible symbols, tangible outcomes. *Augmentative and Alternative Communication, 16*(2), 61-78.

Rowland, C., Schweigert, P. & Dorinson, A. (1995). *Let's talk*. Portland, OR: Oregon Health Sciences University.

Rowland, C. & Stremel-Campbell, K. (1987). Share and share alike; Conventional gestures to emergent language for learners with sensory impairments. In L. Goetz, D. Guess & K. Stremel-Campbell (Eds.) *Innovative program design for individuals with dual sensory impairments* (pp. 49-75). Baltimore: Paul Brookes.

Schwartz, I.S., Garfinkle, A.N., & Bauer, J. (1998). The Picture Exchange Communication System: Communicative outcomes for young children with disabilities. *Topics in Early Childhood Special Education, 18*(3), 144-159.

Stephenson, J., & Linfoot, K. (1996a). Intentional communication and graphic symbol use by students with severe intellectual disability. *International Journal of Disability, Development and Education, 43*(2), 147-165.

Stephenson, J., & Linfoot, K. (1996b). Pictures as communication symbols for students with severe intellectual disability. *Augmentative and Alternative Communication, 12*(4), 244-256.

Stillman, R. & Battle, C. W. (1984). Developing prelanguage communication in the severely handicapped: an interpretation of the van Dijk method. *Seminars in Speech and Language, 5*(3), 159-170.

Umholz, R., & Rudin, D. (1981). *Teaching time concepts through the use of concrete calendars*. Unpublished manuscript. Texas School for the Blind, Deaf-Blind Annex. Austin, TX.

van Dijk, J. (1966). The first steps of the deaf-blind child toward language. *International Journal for the Education of the Blind, 15*(4), 112-114.

van Dijk, J. (1967). The non-verbal deaf-blind child and his world: His outgrowth towards the world of symbols. *Jaarverslag, Institut voor Doven.*

Werner, H. & Kaplan, B. (1963). *Symbol Formation*. New York: John Wiley.

Wilcox, M.J. & Shannon, M.S. (1998). Facilitating the transition from prelinguistic to linguistic communication. In Wetherby, A.M., Warren, S.F. & Reichle, J. (Eds.), *Transitions in prelinguistic communication* (pp. 385-416). Baltimore: Paul H. Brookes.

A Appendix

Tangible Symbols Pretest, Part 1

Tangible Symbols Pretest, Part 2

Daily Data Collection

Tangible Symbols Intervention Record

Symbol Acquisition Record

Additional Materials by the Authors

Tangible Symbols Videotape Table of Contents

Tangible Symbols Pretest
Part 1

Student _____

Date _____ Tester _____

Type of Symbol (Level of Representation)	Referent Items	Array of Symbols (+ = referent; – = distractor) + – –	– + –	– – +	+ –	– +	+	Distractors Used / Comments
Generic Line Drawing	1							
	2							
	3							
	% correct							
Specific Line Drawing	1							
	2							
	3							
	% correct							
Photograph	1							
	2							
	3							
	% correct							
Symbol sharing only one or two features with referent (e.g., size, shape, color, texture)	1							
	2							
	3							
	% correct							
Partial or associated object (e.g., a *wheel* for a *toy car*)	1							
	2							
	3							
	% correct							
Identical object	1							
	2							
	3							
	% correct							

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Tangible Symbols Pretest
Part 2

Student _____

Date _____ Tester _____

Trial	Type of Symbol	Referent Items	Array of Symbols (+ = referent; – = distractor)						Distractors Used / Comments
			+ – –	– + –	– – +	+ –	– +	+	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
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22									
23									
24									
25									
26									
27									
28									
29									
30									

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Daily Data Collection

Student _____ Instructor _____

Function targeted _____ Activity _____

Date _____ Items	1	2	3	4	5	6	7	8	9	10	%
Protocol	Scoring System										Session Total _____% correct

Date _____ Items	1	2	3	4	5	6	7	8	9	10	%
Protocol	Scoring System										Session Total _____% correct

Date _____ Items	1	2	3	4	5	6	7	8	9	10	%
Protocol	Scoring System										Session Total _____% correct

Date _____ Items	1	2	3	4	5	6	7	8	9	10	%
Protocol	Scoring System										Session Total _____% correct

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Tangible Symbols Intervention Record

Student _____	Date	Date	Date	Date	Date

Assessment					
Assess for Symbolic Readiness					
Preference Probes					
Tangible Symbols Pretest					

Symbolic Features for Promoting Progress					
Vocabulary / Materials					
Array Size					
Generalization Setting					
Partner					
Communicative Function					
Length of Symbol Utterance					
Portability / Symbol Display					
Symbol Type					

Comprehension Check					
Order of Presentation					
Distractor Symbols					
Position Check					

Teaching Routine (cues, responses, consequences)					
Instructional Cues					
Array Scanning (tactile / visual)					
Attention Gaining					
Indicating Response					
Level of Assistance					
Consequences if correct response					
if incorrect response					

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Symbol Acquistion Record

Student _____ Recorded by _____

Symbol	Description	Date Acquired

Symbol	Description	Date Acquired

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