American Speech-Language-Hearing Association

SPECIAL INTEREST DIVISION 12
Augmentative and Alternative Communication

The following article appeared in the April 2006 issue (Vol. 15, No. 1, pp. 7-13) of Perspectives on Augmentative and Alternative Communication, *the peer-reviewed publication of ASHA Special Interest Division 12. This article may not be reprinted, copied, or distributed without advance written permission from the publisher, the American Speech-Language-Hearing Association.*

Using Visual Scene Displays to Improve Communication and Communication Instruction in Persons With Autism Spectrum Disorders

Howard C. Shane
Children's Hospital Boston
Boston, MA

AAC, and particularly the application of Visual Scene Displays (VSD), lend themselves well to supporting communication and communication growth for persons with autism spectrum disorders (ASD). VSD were described comprehensively for the first time in Augmentative Communication News (Blackstone, 2004). According to that issue "….VSDs portray events, people, actions, objects and activities against the backgrounds in which they occur or exist" (p. 4). The clinical application of VSDs is a departure from the more traditional application of the grid screen approach, which tends to divide a screen or page into various numbers of target areas. VSDs have an intuitive appeal because they create a meaningful context. They provide a number of possible applications across a wide range of populations who have difficulty with communicating and learning. This paper focuses on applications with people with autism spectrum disorders.

The focus of most AAC research, clinical writing, clinical applications, and commercial device development has been on expressive communication using a grid or keyboard content. It is also my observation that practitioners and parents within the autism community largely ignored augmented approaches until the decade of the 90s. Implementation of AAC with individuals with ASD was almost a full 10 years behind the earlier AAC zeitgeist, one that initially affected persons with severe communication problems mainly associated with motor impairment. This early lack of AAC usage among the ASD population is especially enigmatic given the well established recognition that persons with ASD tended to evidence a relative strength in visual processing skills, are often nonspeaking (Wetherby & Prizant, 2000) and do not generally have motor access concerns.

In the early 90s, a shift in thinking reversed the earlier trend in practice with individuals with ASD, which relied and focused almost exclusively on spoken language as an intervention. This change led to a greater use and acceptance of other symbolic approaches to communication. Two seemingly unrelated events emerged, sparking an intense interest and a reversal of attitude toward the credibility of AAC. The first involved a systematic use of symbols for requesting, known as the Picture Exchange Communication System (PECS). PECS gained some traction with behavioral practitioners and toward the end of the decade became synonymous with augmented communication in ASD. Surely, the fact that early PECS proponents insisted on data collection to support their methodology was significant because it reflected parallel growth in the behavioral movement of data driven intervention. It should be noted that, although PECS embraces the idea that the pragmatic function of requesting can be accomplished through the association between a symbol and desired object (i.e., manding behavior), the tactic of specifying a desired object through a symbol choice was introduced at least a decade before PECS was developed (e.g., Shane, 1980).

The second factor that helped persuade families, teachers and therapists to use AAC was facilitated

communication (FC), a highly controversial methodology that ultimately proved to be unfounded. FC worked only when a communication partner (known as the facilitator) directed the pointing to or selection of letters (that enabled competent spelling) by the individual with ASD. FC has been disproved, but it had the unanticipated effect of persuading parents and practitioners alike that augmentative communication might be a worthwhile approach to consider for individuals with ASD who had severe communication problems.

Use of Visual Supports

As noted previously, AAC, as a young discipline, has often paid greater attention to the expressive side of communication. While expression is generally an unquestionable problem in ASD, the communication difficulties experienced by this population are considerably more pervasive, suggesting that effective communication intervention must also be wide-ranging. Shane and Simmons (2001) proposed a framework that considers three forms of visual supports for persons within the ASD population including:

- **Visual Expressive Mode (VEM):** Visual supports used for the purpose of expressive communication.
- **Visual Organizational Mode (VOM):** Visual supports used to represent the organization of an activity, routine, script, or schedule.
- **Visual Instructional Mode (VIM):** Visual supports used as an alternative to or in conjunction with spoken or written language. The intent is to enhance instruction by incorporating a visual element that complements or substitutes for spoken language.

The remainder of this paper will focus on communication approaches that would mainly be considered visual scene displays. The displays in turn will be featured in the context of their application to two of the modes noted above—namely the organizational mode and the instructional (or receptive) mode.

Visual Organizational Mode (VOM)

Quill (1995) suggested that AAC should be used to support understanding of an item, person, and/or event taking place. No doubt the most popular application of a VOM is the personalized visual schedule that displays the foremost events of a day. The graphical representations contained on such displays can include photographs (Krantz & McClannahan, 1997) or combinations of pictures, symbols, or text. Visual supports such as VOMs can take many forms besides the typical embodiment of graphic images laid out in sequence. These additional forms can include visual timer, count down display, first—then display, subtractive finger countdown, and so on.

It is not uncommon for a person on the autism spectrum to react negatively and even violently to changes in routine. Proper introduction and use of a VOM, however, can lessen the individual's anxiety and therefore improve such negative behavior. A clear-cut visual support can serve as an alert about an impending transition or reveal the nature of the transition itself (i.e., what is about to happen). No doubt, an effective VOM reduces uncertainty about a situation or more specifically what may happen within that situation. In other words, a well-placed VOM may prevent a person from being surprised when life's normal transitions unfold.

One popular form of VOM, often referred to as a *visual schedule*, displays images (photographs, symbols, etc.) arranged vertically or horizontally. Typically, such visual schedules serve as a child's "to do list" laying out the schedule of activities (e.g., of a school day) or the series of weekend events (in the home). The visual schedule is effective because it removes confusion about the day's transitions, allowing the person to comprehend what is about to take place.

Traditional Layout

It is remarkable that despite the regularity and the extent to which VOMs in general and visual schedules in particular are used, there is a paucity of empirical evidence as to their overall effectiveness. More striking, there is little critical thinking and research on candidacy, best practices, or a standard way to configure and display symbolic content. The literature about visual schedules is mainly descriptive and includes countless samples of displays. The most consistent theme across these samples is the lack of consistency. An analysis of the content and form of visual schedules based on a review of the descriptive literature and clinical observations has led to the following conclusions regarding form (display characteristics):

1. There is no uniformity of layout; items or images on displays tend to be arranged vertically, horizontally, or as a single item to a page;
2. The number of images on a page is variable;
3. The size of images on the display is variable;
4. Marking "place" in a daily schedule is generally omitted;
5. Marking the beginning of or end to a scheduled event is generally omitted;

6. Some displays are in the form of wall charts and some are hand held; and
7. Some displays are meant for an entire class; some are individualized.

The analysis led to the following conclusions regarding the content of visual schedules:

1. The content typically consists of images of isolated nouns that depict a person (*who*), place (*where*), or object (*what*);
2. The symbol content may include photographs, different forms of symbols, and/or text;
3. Little consideration is given to implementing a level of representation that matches an individual's ability to interpret the meaning of the symbolic content; and
4. Photographs or drawings of entire scenes (Visual Scene Displays) are largely ignored.

Furthermore, there appear to be no guiding clinical principles identifying who would benefit from the use of a visual schedule. Implementation of visual schedules seems to be most associated with simply having a diagnosis on the autism spectrum. More recently there has been a clinical drift from earliest use of visual schedules with persons with ASD to use with those with other developmental disabilities as well. With respect to implementation of visual schedules, there appear to be few evidence-based practices for teaching the abstract concept that a point in time is represented by an entry on a visual schedule. Furthermore, there are a lack of strategies for moving to independent interpretation and use of a visual schedule.

Despite this considerable inconsistency in form, content, and instruction, visual schedules continue to enjoy widespread use as a communication tool to help impose order and assist an individual to comprehend the organization of a day. This pervasive use of visuals suggests face validity for their overall effectiveness. However, the above conclusions raise a number of important questions, the most important of which is whether this communication tool could be more effective and more successfully used by a greater number of individuals. Based on observation and resulting modification of numerous examples of traditional visual schedules seen in my own clinical practice, the most likely reasons for failure or limited effectiveness include:

1. The selected level of representation is too abstract;
2. The individual does not understand the intent (executive function) of the visual schedule—namely, that a chosen image is meant to stand for an activity or event;
3. The selected representation does not clearly correspond to the intended event or activity; and/or
4. The individual demonstrates behaviors (activity level, ability to focus) that interfere with learning the rules of a visual schedule.

Successful employment of a visual schedule seems to depend on the level of abstraction, executive function, representation, and interferences to behavior.

Maps

In the Center for Communication Disorder's autism program at Children's Hospital Boston, we are exploring ways to design more useful and effective visual schedules, which we refer to as maps. In our expanded conceptualization, the content of a map often includes visual scenes and is not limited to single graphic items. We include whole scenes for two primary reasons:

1. Whereas traditional schedules use images of isolated nouns to depict a person (*who*), place (*where*), or object (*what*) in isolation, an entire visual scene can convey all of these themes simultaneously; and
2. Whole scenes are likely to provide greater meaning of schematic or experiential content to persons with ASD including some who may not comprehend the semantic meaning behind images of isolated nouns.

Besides intuitive appeal for using whole scenes to convey meaning, the work of Drager, Light, Curran Speltz, Fallon, & Jeffries (2003) lends some research credibility to this approach. These investigators explored the ability of typical children to derive meaning from layout formats usually used on augmentative communication displays. In a comparison of a grid screen versus visual scene format younger children (aged $2\,1/2$) were better able to interpret the content of a visual scene display than a grid like display. The finding of improved interpretation did not hold up for older children (aged 4-5), who were equally capable of interpreting meaning from either level of representation (Light et al., 2004). The findings suggest that younger children or those with less cognitive ability may derive greater meaning from—or in this case be better able to see the relationship between a symbol and an event—using a visual scene than they can from an isolated symbol. Others with greater cognitive aptitude may do equally well. These results may have particular relevance for persons with autism spectrum disorders in light of the cognitive difficulties that may co-exist with the condition.

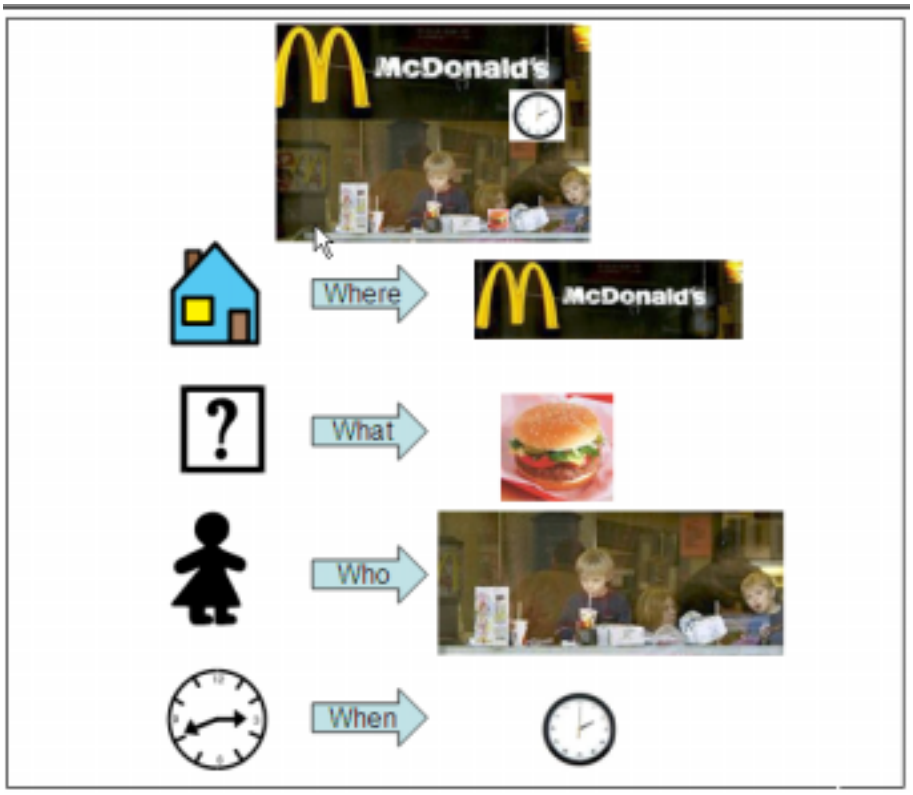
We also recognize that the employment of a vi-

sual scene as content on a map gives rise to certain other advantages and disadvantages over single-element images. With regard to the advantages mentioned above, a visual scene can potentially convey greater information and trigger more associations. Further, a visual scene can serve as a kind of springboard or launch pad to other information associated with the main theme of the scene (see below). On the other hand, a single element entry on a map can help maintain focus on a single concept or idea. A narrower focus may be particularly useful if stimulus over-selectivity, a recognized behavioral trait in ASD, is present. Over-selectivity is defined here as the tendency to narrowly attend to some minor and possibly insignificant aspect of a photograph or picture.

Figure 1 contains three single element-based ways to convey a visit to McDonald's as a module on a larger daily map. These graphic options include the golden arches logo (suggestive of *where*), the drawing of a hamburger (suggestive of *what*), and the marquee in a McDonald's restaurant (suggestive of *where* and *what*). Figure 2 contains a visual scene also relating to a McDonald's visit. In this case, the scene conveys the concept of *where* or location. The lower section of Figure 2 displays additional information about the map entry. This added information could be displayed as a single target area on a non-electronic daily map or as a sort of isolated springboard, with live hot spots on a computer-based visual schedule (i.e., designated locations within the scene on the computer-based schedule that speak the label or hyperlink to another location or image when selected). In this case, selecting areas within the main visual scene on a computer screen summons the related sub-information: selecting the logo of the golden arches leads to designation of location (*where*); selecting hamburger leads to designation of eating hamburger as the activity (*what*); selecting children leads to designation of people or personnel (*who*); and, selecting clock leads to designation of the time that the activity will stop, start,

Figure 1. Three single-element ways to convey McDonald's.

Figure 2. Example of an expanded visual map depicting the idea of who, what, when, and where.



and/or duration (*when*).

The value of such simultaneous information may be greatest when a new event or activity is being introduced. The visual scene may increase readiness to tolerate a new situation by increasing the knowledge base about the event or activity. In this instance, the individual with ASD can be directed not only to the singular *who* or the isolated *what* or the solo *where,* but can be directed to all of these important elements (plus others) in a unified, intuitive, and concise manner. For persons who are inflexible about their daily agenda, intolerant or resistant to change, and/or confused by the stream of events in the day, a strategy that can systematically provide a multitude of key information seems desirable.

Personal experience suggests that an individual will feel less confused about an impending event when provided with more information. In the above example, it is possible to not only convey the visit to McDonald's but also to supplement the mere location or *where* data with facts about *when* the event will occur, *who* will attend, and *what* will happen. The more closely a visual scene cue reflects an impending event, the more information it conveys.

Besides providing useful information for the individual who evidences a high level of intolerance for change, this approach may have utility simply because it serves as a platform for learning and instruction. The scene serves to help organize information. If it is a playground scene location, for example, the activities within that setting are clearly identified, as are the people who will or might be present. This information then sets the stage for branching to other vocabulary that can be used to talk about the whole experience.

Over time the use of a single item for some persons may be sufficient to make the necessary association to an entire event or activity. In fact, being able to use a single image and make the important associations to the occurrences of the day is a desirable outcome and one that undoubtedly comes from recurrence of and familiarity with the experience.

Visual Instructional Mode (VIM)

The Visual Instruction Mode refers to the use of visual supports as an alternative to or in conjunction with spoken or written language. The intent is to enhance instruction by incorporating a visual element that complements or substitutes for spoken language. In my clinical work, I regularly utilize several forms of visual supports including electronic and non-electronic versions of aided language (Goossens', Crain, & Elder, 1992; Cafiero, 2001). This section of the paper discusses the use of scene cues as a visual instructional mode (VIM). A scene cue is defined here as a complete visual scene that portrays, in pictorial form, a concept or command that is being presented simultaneously through spoken language.

Scene cues are viewed as a form of visual scene display. As such, they have the potential to represent a whole idea or complete thought through a single image. Scene cues can aid comprehension during real time speech production when the content of a spoken message is not understood. This occurs typically because the linguistic structure is too advanced for the listener (considered a comprehension deficit) or the message cannot be processed quickly enough (considered an auditory processing deficit).

Scene cues can provide two interrelated services. First, they can serve a compensatory role and help improve comprehension of a spoken message. Second, scene cues can serve as a therapeutic tool to help improve auditory comprehension. As a therapeutic tool, the aim is to gradually reduce dependence on the visual scene cue until a spoken message is understood on its own.

Figure 3 contains a collection of photographic images showing the Gumby character engaged in three different activities: pushing a car, standing in a truck, and standing on a block. Scenes cues, such as these images, are introduced initially during tabletop activities. In the therapeutic setting, materials contained in the scene are made available. The scenes are then introduced as a way to begin to build the association between the visual scene and the activity that it represents. Individuals with ASD may benefit from the full blown use of scene cues such as these if they are able to sort and match pictures and objects, and can recognize nouns (characters), but have difficulty

interpreting relational language (e.g., prepositions, action verbs). This disparate ability to comprehend different grammatical categories is a common finding with persons with ASD.

The expected outcome is that the individual will carry out commands using the materials that mirror what is portrayed in the scene cues. The executive skill is to understand the intention of the task, view the scene cue (with the accompanying spoken command), and carry out the command. In numerous clinical trials where such materials and scenes were introduced, there was a significant improvement in performance between the condition where spoken language is presented alone versus the speech plus scene cue condition.

Finally, scene cues can provide input in several domains in real life circumstances. Examples of such application are

1. Scene cues can inform (e.g., daddy is home, we are going to grandma's house); and
2. Scene cues can clarify a verbal message (e.g., Put this paper in the trash. Get the item that is in the drawer, where there is more than one location).

Summary and Conclusion

Visual scene displays have tremendous potential as a way to improve communication and communication instruction for persons with autism spectrum disorders. Given the considerable communication deficits experienced by this population, intervention needs to focus not only on expressive communication, which is the more typical instructive mode, but also on the receptive channel, discussed herein as the visual instruction mode. Persons with ASD also encounter great difficulty with the understanding of time and sequence and may become disoriented as the result of even a small change in routine. Using visual scenes to provide elaboration about the surroundings, people, and structure of activities gives those on the autism spectrum the greatest amount of support to safely and effectively interact in their environment.

References

Blackstone, S. (2004). *Augmentative Communication News, 16*, 2.

Cafiero, J. M. (2001). The effect of augmentative communication intervention on the communication, behavior, and academic program of an adolescent with autism. *Focus on Autism and other Developmental Disabilities*, *16*(3), 179 –189.

Drager, K. D. R., Light, J. C., Curran Speltz, J., Fallon, K. A., & Jeffries, L. Z. (2003). The performance of typically developing 2 ½-year-olds on dynamic display AAC technologies with different system layouts and language organizations. *Journal of Speech Language Hearing Research, 46,* 298-312.

Goossens', C., Crain, S. S., & Elder, P. (1992). *Engineering the preschool environment for interactive symbolic communication 18 months to 5 years developmentally*. Birmingham, AL: Southeast Augmentative Communication Publications.

Krantz, P.J. & McClannahan, L.E. (1997). *Teaching independence and choice: How to use photographic and written activity schedules in autism intervention* [Videotape]. Princeton, NJ: Princeton Child Development Institute.

Light, J., Drager, K. McCarthy, J. Mellott, S., Parrish, C., Parsons, A., Rhoads, S., Ward, M., & Welliver, M. (2004). Performance of typically developing four and five year old children with AAC systems using different language organization techniques. *Augmentative and Alternative Communication, 20,* 63-88.

Quill, K.A. (1995). *Teaching children with autism: Strategies to enhance communication and socialization*. New York: Delmar Publishers.

Shane, H.C., & Simmons, M. (2001, November). *The use of visual supports to enhance communication and improve problem behaviors*. Paper presented to the annual ASHA Convention, New Orleans, LA.

Shane, H. C. (1980). Approaches to assessing the communication of persons who are non-oral. In R. Schiefelbush (Ed.), *Non-speech language and hearing* (pp. 197-224) Baltimore: University Park Press.

Wetherby, A. M., & Prizant, B. M. (2000). *Autism spectrum disorders: a transactional developmental perspective*. Baltimore: Paul H. Brookes.