Teaching discriminated requests to an individual with autism spectrum disorder using grid, scene, and hybrid displays on an iPad AAC application

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ABSTRACT

AAC applications can include different displays including grids, visual scenes, and hybrid models (elements of grids and scenes). Using a multielement design, the aim of this pilot study was to compare how a 3 year-old male with ASD acquired discriminated requesting using four different display formats available on the AAC application AutisMate by SpecialNeedsWare. During discriminated request training (with four similarly preferred items) the participant showed the most rapid acquisition with the grid and the least rapid acquisition in one of the hybrid formats. The participant's performance with a second hybrid format (visual scene with a pop-up grid) was, however, more consistent than with the grid during generalization probes. When a highly preferred item was introduced, the participant had high rates of correct responding across displays, but showed higher performance with the grid and pop-up hybrid when the highly preferred item was removed. The results suggest that a variety of AAC displays may be appropriate for individuals with ASD, but individualized assessment may distinguish which formats lead to more accuracy and efficiency under a variety of conditions.

INTRODUCTION

As the use of augmentative and alternative communication (AAC) applications on the Apple iPad® continues to grow among individuals with autism spectrum disorder (ASD) and related disabilities (Farrall, 2012; Kagohara et al., 2013), research is needed to evaluate what elements of such applications may facilitate or impede the acquisition of functional communication skills (Gevarter et al., 2013; McNaughton & Light, 2013). AAC applications may include different display formats such as traditional grids, visual scenes with embedded hotspots, (Drager et al., 2004; Drager, Light, Speltz, Fallon, & Jeffries, 2003; Light et al., 2004) and hybrid models that combine elements of grids and scenes (Light & Drager, 2007).

Direct comparisons involving VSDs and grid-systems may show mixed results, but evidence may indicate that age may be a mitigating factor supporting advantages of VSDs for younger children when advanced operations including navigation is required (Drager et al., 2003; Drager et al., 2004; Light et al., 2004). For instance, 2-and 3-year-old typically developing children were reported to be more accurate in locating vocabulary with schematically-based scene systems than with either schematically or taxonomically organized grid displays (Drager et al., 2003; Drager et al., 2004). Despite showing significantly stronger increased performance with VSDs as compared to grid-systems, 2 year-olds, did, however, demonstrate limited accuracy using all systems (Drager et al., 2003). Differences between performance with the taxonomic grid, schematic grid, and schematic scenes were not, however, supported in a replication with 4 and 5 year old typically developing children (Light et al., 2004). Another study, which did not assess navigational skills, but examined language communication skills with static VSDs and grid-displays, reported mixed results regarding communication outcomes for typically developing young children and those with communication disorders (including one participant with ASD; Wood Jackson et al., 2011).

Prior to examining how children with ASD perform with different systems using higher order skills (e.g., page navigation) it is important to assess differences seen at earlier stages of acquisition. Gevarter et al. (2014) demonstrated for example, that some individuals may show acquisition differences (in terms of efficiency or effectiveness) between displays that may serve as precursors to VSDs, grids, and hybrids. The study by Gevarter et al. (2014) examined requesting for items in a field of one. This pilot study will extend this research by examining differences in performance based on display format when discriminated requesting in a field of 4 is required.

METHODS

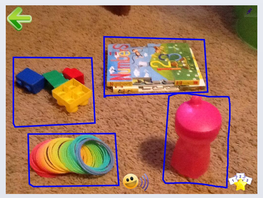
Participant

Addie was a 3 year-old African-American male diagnosed with ASD. He did not use vocal words, but had prior experience with PECS and manual sign. He had previously participated in the Gevarter et al. (2014) study teaching field of one requests. In that study he mastered field of one requests using Scene-precursor and Grid-precursor displays. He was most efficient and consistent with the scene-precursor format. He did not master the hybrid-precursor format.

Materials

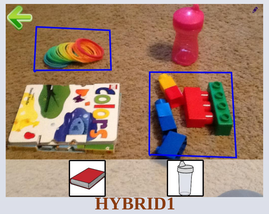
Preferred Stimuli. A multiple stimulus without replacement preference assessment was utilized to determine 4 similarly preferred items (slinky, Legos, book and sippy cup) to be used during the initial discrimination phase. One highly preferred item (phone) was also selected to be used in the case that the participant did not master requests for 4 similarly preferred items.

AAC displays.

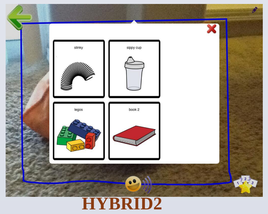


SCENE

GRID



HYBRID1



HYBRID2

Experimental Design

A multielement design randomly alternating each condition was implemented. An ABA reversal component was added to determine interaction of item preference with conditions. A session in each condition consisted of 10 trials to request any of the 4 preferred items using the SGD.

Dependent Measures and Mastery Criterion

The dependent measure was the number of correct SGD requests. A correct SGD request consisted of pressing a hotspot or symbol area with enough force to produce output AND then selecting the preferred item that matched the item requested. In addition, responses needed to include no more than 2 fingers, or 2 taps of same hotspot and could not consist of motions such as swiping. Grabbing, touching alternative spots of the iPad (e.g., navigation button), or touching more than one hotspot or symbol area were incorrect responses. Mastery criterion: was 3 days at 80%

METHODS CONTINUED

Instruction

Step 1: The interventionist placed the iPad with condition display in front of items (items in same order as on display) and gave a 5s time delay.

- If no response or an incorrect response occurred the interventionist used the following prompt hierarchy: partial physical (place finger above correct hotspot, wait 3 s); full (guide to touch correct hotspot)

Step 2: Once hotspot pressed correctly (prompted or independent) interventionist slid away iPad and said "take it"

- If item did not match request: blocked access and gave full physical prompt to corresponding item on screen and then reinforced with that item
- If correct item, gave access for 20-30 s or time to consume

Generalization (after 3 x at 80%)

- Change order of actual items so they do not match order on screen or change bag in hybrid2
- Continue to maintain generalization probes in all mastered conditions until 16 total sessions.

Preferred Item Modifications

Due to inconsistent performance in hybrid 1 and Scene conditions, a second phase in which the child's highest preferred item (phone) replaced one of his original 4 items was introduced. Instructional methods remained the same.

RESULTS

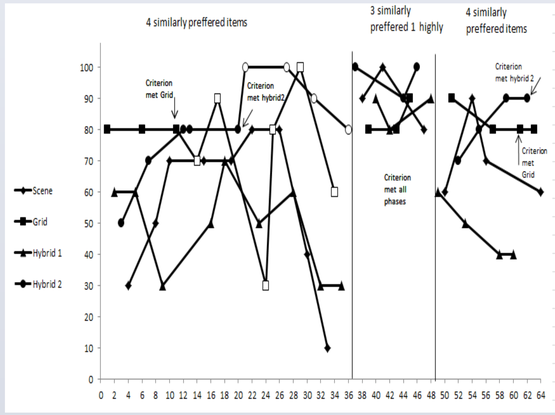


Table 1. Percentage of discriminated AAC requests in each condition (open points are generalizations).

During discriminated request training (with four similarly preferred items) the participant showed the most rapid acquisition with the grid and the least rapid acquisition in one of the hybrid formats. The participant's performance with the hybrid 2 format (visual scene with a pop-up grid) was, however, more consistent than with the grid during generalization probes. Initially, the participant more often used multiple-tapping (incorrect response) with scene embedded hotspots in the scene and hybrid1 conditions than with symbol buttons. He also had difficulty discriminating between when to use embedded hotspots versus buttons in the hybrid1 condition. In scene and hybrid 1 phases, some errors included pressing the navigational button and trying to select the hybrid2 display.

When a highly preferred item was introduced, the participant had high rates of correct responding across displays. He always request the highest preferred item in the hybrid1 and VSD conditions, but occasionally requested other items using the grid and pop-up hybrid 2. When the highly preferred item was removed, he again only showed mastery level performance using the grid and hybrid 2 conditions.

DISCUSSION

The results suggest that a variety of different AAC display formats may be appropriate for individuals with ASD, but individualized assessment may help to distinguish which display types or application elements may lead to better efficiency and accuracy during acquisition. This supports previous findings of Gevarter et al. (2014). Additionally, proficiency and preference for different display formats may interact with preference for items available for request. (a finding also supported by Gevarter et al., 2014). More specifically ,when motivation for one particular item is high, individuals may show increased success across display types. When individuals have a choice of similarly preferred items, display format may play more of an important role.

Practitioners may consider using different AAC applications and display types (e.g. not just traditional grid-based systems) to teach discriminated requesting for different needs (e.g. possibly using a hybrid model to teach mands for items out of sight), but be sure to monitor individual success with the different formats. AAC application developers may contemplate providing multiple different display options within AAC programs. Future research should also seek to explore potential advantages or disadvantages of different display formats for more complex AAC skills such as sentence construction, non-item based requests, commenting, and multi-page navigation.

REFERENCES

- Drager, K.D.R., Light, J.C., Carlson, R., D'Silva, K., Larsson, B., Pitkin, L., & Stopper, G. (2004). Learning of dynamic display AAC technologies by typically developing 3-year-olds: effect of different layouts and menu approaches. *Journal of Speech, Language and Hearing Research, 47*, 1133-1148.
- Drager, K.D.R., Light, J.C., Speltz, J.H.C., Fallon, K.A., & Jeffries, L.Z. (2003). The performance of typically developing 2 1/2-year-olds on dynamic display AAC technologies with different system layouts and language organizations. *Journal of Speech, Language and Hearing Research, 46*, 298-312.
- Farrall, J. (2012). *What's APPropriate: AAC Apps for iPhones, iPads and other devices*. Paper presented at the 15th Biennial Conference of the International Society for augmentative and Alternative Communication (ISAAC), Pittsburgh, PA.
- Gevarter, C., O'Reilly, M.F., Rojeski, L., Sammarco, N., Lang, R., Lancioni, G.E., & Sigafoos, J. (2013). Comparisons of intervention components within augmentative and alternative communication systems for individuals with developmental disabilities: A review of the literature. *Research in Developmental Disabilites, 34*, 4404-4414.
- Gevarter, C., O'Reilly, M. F., Rojeski, L., Sammarco, N., Sigafoos, J., Lancioni, G. E., & Lang, R. (2014). Comparing Acquisition of AAC-Based Mands in Three Young Children with Autism Spectrum Disorder Using iPad® Applications with Different Display and Design Elements. *Journal of autism and developmental disorders*, 1-11
- Kagohara, D. M., van der Meer, L., Ramdoss, S., O'Reilly, M. F., Lancioni, G.E., Davis T.N., . . .Sigafoos, J. (2013). Using iPods® and iPads® in teaching programs for individuals with developmental disabilities: A systematic review. *Research in Developmental Disabilities, 34*, 147-156.
- Light, J., Drager, K., McCarthy, J., Mellott, S., Millar, D., Parrish, C., . . . 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.
- Light, J., & Drager, K. (2007). AAC technologies for young children with complex Communication needs: State of the science and future research directions. *Augmentative and alternative communication, 23*, 204-216.
- McNaughton, D., & Light, J. (2013). The iPad and mobile technology revolution: benefits and challenges for individuals who require augmentative and alternative communication. *Augmentative and Alternative Communication, 29*, 107-116.
- Wood Jackson, C., Wahlquist, J., & Marquis, C. (2011). Visual supports for shared reading with young children: The effect of static overlay design. *Augmentative and Alternative Communication, 27*, 91-102.