

Visual Representation in Children with Autism Spectrum Disorders

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this is where everything connects

INTRODUCTION

- AAC systems frequently based in adult models of the world (Light & Drager, 2007).
- Unique perspectives of children with disabilities underrepresented.
- Children need to make their own decisions when it comes to technology (Druin, et al., 1999).
- The extent to which previous research on language representation and categorization extends to children with ASD is unknown.
- Consequently, two studies were undertaken to systematically replicate and extend previous research on representation and categorization with children with ASD with an aim toward determining how clinicians can best construct and utilize symbols.

BACKGROUND AND SIGNIFICANCE

- Drawings produced by children are often very different from those that are commercially available (e.g., Boardmaker).
- Light and Drager (2007) studied 50 typically developing children of various cultural backgrounds and asked them to draw 10 early emerging abstract concepts.
 - Their drawings contained **entire scenes**, included the child in the drawing, and rarely used pieces or parts of objects to depict a concept.
 - These results varied greatly from commercially available symbol sets.
- However, due to the noted differences between typically developing children and children with ASD, it cannot be assumed that findings from typically developing children translate well for children with ASD.

RESEARCH QUESTIONS

- How do children with ASD relative to their age-matched peers without disabilities:
 - (a) pictorially represent and describe early emerging concepts such as "on" and "who";
 - (b) identify Picture Communication Symbols (PCS) typically used in many AAC systems; and
 - (c) recall what target concepts they drew after a short delay?

METHOD: PARTICIPANTS

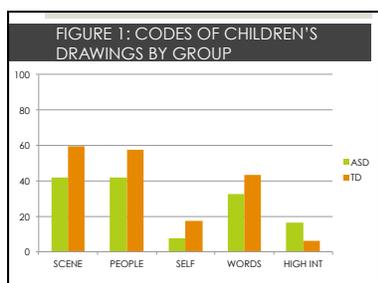
- 15 Children with ASD (6 F, 9 M); Age: $M = 8;4$; (range = 4;10-12;9)
 - Composite score on CCC-2: $M = 79.87$ ($SD = 9.81$)
- 18 Children without disabilities (5 F, 13 M); Age: $M = 7;8$ (range = 4;3-11;10)
 - Composite score on CCC-2: $M = 105.33$ ($SD = 11.91$)
- Chronological age was not significantly different.
- CCC-2 scores were significantly different, $t(31) = 6.61, p < .001$.

METHOD: PROCEDURE

One videotaped session lasting approximately 1 hour

- Concepts targeted: **big, eat, who, want, what, come, up, all gone, open, more**

- 1) Drawing Task:** Children drew pictures of 10 concepts and were asked to describe their pictures.
 - Coded for use of the following: an entire scene, symbols, self, isolated parts, high-interest subjects: people, animals, objects, words
- 2) Identification of PCS Task:** Name 20 Picture Communication Symbols (PCS; Mayer-Johnson)
- 3) Identification of Own Drawings Task:** Recall what word he/she was attempting to represent in his/her own drawing.



IDENTIFICATION OF OWN DRAWINGS

- Children with ASD: 72.14%
- Children, no disability: 78.89%
 - No significant difference
- Correlated with age for both groups
 - Children with ASD: $r = .784, p < .001$
 - Children without a disability: $r = .702, p < .001$

IDENTIFICATION OF PCS TASK

- Children with ASD: 20.50%
- Children with no disability: 24.58%
 - No significant group difference
- Performance was correlated with age for both groups.
 - Children with ASD: $r = .716, p = .001$
 - Children without disability: $r = .762, p < .001$

ADDITIONAL CORRELATIONAL FINDINGS

- There were no relations between task performance and general language skills (CCC-2).
- For children with ASD, age was significantly related to:
 - Use of symbols ($r = .55, p < .05$)
 - Use people ($r = .49, p < .05$)
 - Use of animals ($r = .47, p < .05$)
 - Use of high interest subjects ($r = -.514, p < .05$)
- For TD children, age was significantly related to:
 - Use of symbols ($r = .46, p < .05$)
 - Use of words ($r = .44, p < .05$)

Study 2: Categorization of Language Concepts

INTRODUCTION

- Organization of symbols for page sets based on adult models (Drager, Light, Speltz, Fallon & Jefferies, 2003)
- Assumption is that older children move toward taxonomic organizations, but lack of research on the strategies older children may use (Fallon, Light, & Achenbach, 2003)
- Adults more likely to categorize taxonomically (Lucariello, Kyratzis & Nelson, 1992) and children more likely to classify schematically (Light & Drager, 2007).
- There is minimal research on how children with ASD categorize language concepts.

RESEARCH QUESTIONS

1. How do children with autism spectrum disorders arrange symbol representations of words taken from the following categories:
 - (a) describing themselves;
 - (b) making an art project;
 - (c) birthday party?
2. How will children with ASD change their organizational schemes when given a specific communication task?
3. How do the children organize concrete (e.g. cake) vs. abstract (e.g. wish) representations of concepts?

PARTICIPANTS

- 10 Children with ASD (5f, 5m); Age: $M = 9.6$; (range = 6.6-12.7)
- 9 typically-developing children (3 f; 5 m); Age: $M = 8.41$; range = 4.5 - 12.7
- Parent reported ASD diagnosis by a professional
- CCC-2: $M = 74.6$; $SD = 14.56$
- CCC-2: $M = 99.55$, $SD = 20.66$.

PROCEDURE

- One videotaped scripted session lasting approximately 20-30 minutes
- **Organization Task:** Children sorted 57 laminated picture cards made from Boardmaker onto 6 felt boards and then named the categories of each board.
- **Communication Task:** Children participated in a pretend silent birthday party. They had an opportunity to rearrange any pictures they wanted before the start of the birthday party. Participants were instructed to use symbols to communicate and given the opportunity to respond to 9 prompts from AMDI 8-level, low-tech aid.



RESULTS: CHILDREN WITH AUTISM

- **Themes of Children's Symbolic Organization**
 - Participants appeared to pay attention to the picture and not the word the symbol represented.
 - No evidence of complete duplication of actual categories taken from SonoFlex®.
 - Concrete items were quickly categorized while abstract items appeared more difficult.
- **Individual Differences**
 - One participant created a narrative based construction.
 - One participant used all six boards to make one large board and organized based on things he likes a lot, things he likes a little, and things he does not like.
 - One participant named some boards based on items that were in the room, ex. bananas.

RESULTS: CHILDREN WITH AUTISM

- **Themes of Children's Symbolic Organization**
 - 70% (7/10) of participants put all family cards together. This included family, mom, dad, brother, and sister.
 - 40% (4/10) of participants put all animal cards together. This included dog, cat, and bird.
 - 70% (7/10) of participants put dog and cat together.
 - 70% (7/10) of participants put all color cards together. This included orange, red, blue, green, yellow, and pink.



RESULTS: CHILDREN WITH AUTISM

- **Birthday Party Task**
 - Only two participants used their cards to communicate during this task.
 - Four participants held up fingers when asked "How many pieces (of cake) do you want?"
 - One participant wrote the number when asked "How many pieces (of cake) do you want?"
 - Participants made minor changes if any when told they would use the categories for a task.

RESULTS: TD CHILDREN

- Majority of participants (6 out of 9) arranged at least 50% of symbols using inherent categories
- Youngest participants verbally related symbols to their lives
- Taxonomic and schematic organizational schemes both present
- Consistent with previous research, all participants, regardless of age, had more difficulty organizing abstract concepts than concrete ones
- Evident by the inconsistent and wide range of organizations of abstract concepts by the participants

RESULTS: TD CHILDREN

Unique Categorizations



SUMMARY OF MAJOR FINDINGS

- Children, including older children, still do not replicate adult conceived models.
 - One of the oldest participants created a story line, which does not support the belief that all older children move towards more taxonomic strategies.
- It might be easier for younger children to make sense of stimuli when personal connections are apparent.
- Participants utilized spontaneous and unaided communication strategies.

GENERAL DISCUSSION

GENERAL DISCUSSION

- Understanding of children's personal representations critical
- Creating transparent symbol sets
- Heterogeneous population of children with ASD
- Current technology makes the transposition of different symbols sets within a given AAC system easier.

GENERAL DISCUSSION

- Potential age related changes, but children with ASD may need to build even more personalized associations.
- Sorting task is useful in understanding how a child organizes concepts.
- Personalization might enhance memory.
 - Reflection of themselves rather than a tool
- Older children struggle with visual representations of abstract concepts.

FUTURE DIRECTIONS

- Importance of communication context for children with ASD
- Future of research needs to focus on how clinicians should handle abstract concepts
 - Instruction and placement on an AAC device
 - Instruction of the link between a linguistic stimuli and its symbolic representation
- Are symbols always necessary?

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