Working Memory and Attention in Utilizing Aided AAC Displays

Jennifer J. Thistle, M.S., CCC-SLP, Doctoral student, The Pennsylvania State University;
Krista M. Wilkinson, Ph.D., Professor, The Pennsylvania State University & Adjunct Associate Scientist, Shriver Center;
Renee Carelli, Undergraduate student, The Pennsylvania State University

Abstract

Aided AAC users with intellectual disabilities must be able to convey messages, store input for a limited period of time, and process this information in order to hold information in mind. It is important to understand the strengths and weaknesses of children who may benefit from AAC to design displays to meet their needs. This study examined the working memory and attention demands of aided AAC used by individuals with developmental disorders.

Attention & Working Memory:

What abilities do individuals with developmental disorders have?

Research with children with autism, Down syndrome, and fragile X reveals strengths and weaknesses on various tasks of attention and working memory.

Knowing the strengths and weaknesses of children who may benefit from AAC can help guide our decisions related to designing AAC displays.

<table>
<thead>
<tr>
<th>Ability</th>
<th>Autism</th>
<th>Down Syndrome</th>
<th>Fragile X</th>
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<tbody>
<tr>
<td>Sustained</td>
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<td>Selective</td>
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<td>Divided</td>
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<td>Visual WM</td>
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<td>Verbal WM</td>
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Attention & Working Memory: AAC Demands

To use an AAC display effectively for communication a child must:

Sustain attention (in order to hold the intended message and individual words in mind).

Selectively attend to relevant symbols, while ignoring irrelevant or distracting symbols.

Divide attention between the display and intended message.

Working memory storage overlaps with sustained attention as the child keeps the target word in mind.

Working memory processing is utilized as the child coordinates the various demands of attention, visual processing, motor movements, social aspects.

For example: To complete the request by saying “book,” this child must:
1. Remember his place in the sentence (sustain & processing)
2. Remember his intended target (sustain, storage)
3. Inhibit other targets (selective, divided, processing)
4. Recognize the correct target (processing)
5. Point to the target (processing)

References


Current Research: Background Color

- Background color can influence visual search in children under a 5 year old developmental level.
- The color affects strategies and processing correct items.
- Color choice may be influenced by the complexity of the task and is likely to be further complicated by any working memory impairments the child may have.

Current Research: Layout

- It would appear that although it seems to sacrifice useful space on a display, the clock pattern results in the most accurate and fastest responding, most clearly positive to non-spacial arrangement and also relatively to organization based on quadrants.
- The clock arrangement can be increased in greater demand as the child sustains attention to the desired target and selectively inhibits attention to the distracting targets.

Conclusion

Designing an effective display requires consideration of the child’s abilities, including those related to attention and working memory. There is now compelling evidence that distinct profiles of attention/memory skills and deficits are associated with disabilities of different etiological origins. It is therefore critical to ensure that the features of AAC displays are well-suited to the processing skills of each individual child. In this poster, we have identified several ways in which the features of an AAC display might tax attention or memory. Alternatively, reduce attention/memory demands. Preliminary analysis of initial data sets supports the value of this approach and provides avenues for further experimental research.

Funding and Thanks

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