

# AAC navigation by ABI survivors: Prompt and contextualization effects

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## Rationale

AAC systems can support survivors of acquired brain injuries (ABIs) who have unmet communication needs. However, dynamic screen systems with multiple levels may present navigation challenges for some ABI survivors. In particular, impairments in cognitive flexibility and executive functions limit the manner in which ABI survivors may interpret various types of images and prompting questions.

Image type potentially affects navigation accuracy and speed.



High-context  
image

Low-context  
image

No-context  
image

Prompts guiding survivors to intended messages potentially affecting navigation speed and accuracy:

- Matching context prompts - provide clues about message location
- No-context prompts - do not provide clues about message location

## Purpose

The study purpose was to investigate AAC system navigation by ABI survivors.

## Questions

- What effect does cognitive flexibility competence have on ABI survivors' navigation accuracy and speed?
- What effect do images varying in their amount of contextual information have on ABI survivors' navigation accuracy and speed?
- What effect does the type of verbal prompt given to ABI survivors have on navigation accuracy and speed?
- What are the characteristics of navigation attempts by ABI survivors who have impaired cognitive flexibility?

## Participants

- 18 survivors of severe ABI
- 24.75 to 64.42 years of age ( $M = 39.86$  years;  $SD = 11.15$ )
- Education level -  $M = 13$  years;  $SD = 2.22$
- Time post onset -  $M = 16.53$  years;  $SD = 10.22$
- Functioning at Level VI or above on *Rancho Los Amigos Levels of Cognitive Functioning - Revised*

Divided into 2 groups determined by performance on the Symbol Trails subtest of the *Cognitive Linguistic Quick Test*.

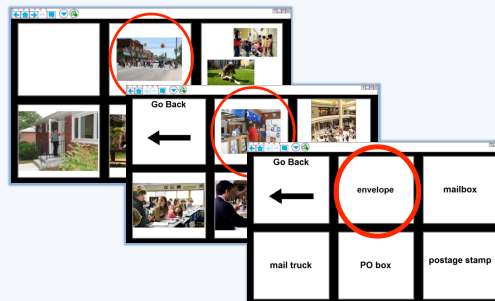
- Group 1 passed ( $n = 10$ )
- Group 2 failed ( $n = 8$ )

## Materials

- Three versions of AAC system
- One version for each image condition (high, low, no context)
- 3 level, dynamic screen system
- Hierarchical organization with superordinate, ordinate, and subordinate exemplars on Levels 1, 2, and 3, respectively

## Stimuli

- Digital photographs for Levels 1 and 2 images
- Target words located on Level 3
- Prompts (matching context, no-context)



## Procedures

- Participants were trained and screened on AAC system organization
- Three experimental tasks – one for each image condition
  - Locate 20 target words – 10 with matching context prompts and 10 with no-context prompts
  - System re-set to Level 1 after each target word location or when participant indicated desire to proceed to next trial
- Analysis
  - 2 mixed ANOVAs examining accuracy and speed of accurate responses across groups, image types, and prompt types
  - Examination of AAC system levels at which Group 2 participants made navigation errors

## Results

- Group 1 participants had significantly better accuracy overall than Group 2 participants (Figure 1); no group difference in speed of accurate responses (Figure 2)
- A trend appeared for greater accuracy with high-context and low-context images than no-context images; participants were significantly more accurate with matching context prompts than no-context prompts (Figure 1)
- Participants were significantly faster using low-context and no-context images than high-context images; participants were significantly faster with matching context prompts than no-context prompts (Figure 2)

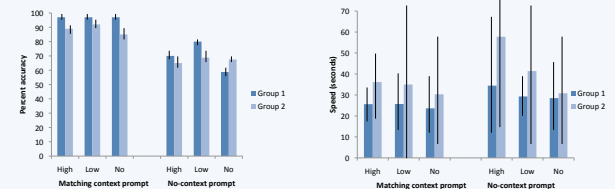
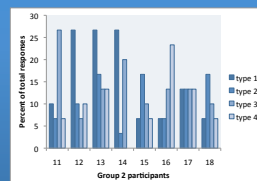


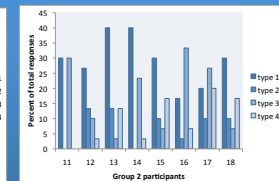
Figure 1. Percent accuracy across groups

Figure 2. Speed of accurate responses across groups

- No consistent pattern of navigation errors across Group 2 participants, although consistency appeared within individuals
- Four types of navigation errors made by Group 2 participants
  - Participant made one or more navigation errors but eventually found correct response and made no errors after first selection of correct Level 1 photograph
  - Participant made one or more navigation errors but eventually found correct responses and made errors after selecting correct Level 1 photograph
  - Participant never made correct Level 1 selection
  - Participant selected correct Level 1 photograph at least once but still was unsuccessful in locating target word
- Type 1 and 3 errors suggest difficulty with superordinate level of organization; Type 2 and 4 errors suggest difficulty with ordinate and subordinate levels of organization



Group 2's type of navigation errors with matching-context prompts



Group 2's type of navigation errors with no-context prompts

## Discussion

- Performance on a cognitive flexibility measure may help clinicians distinguish ABI survivors likely and not likely to struggle with AAC navigation without prior instruction
- Variability among survivors highlights the importance of performing individualized evaluations when making decisions about image contextualization for AAC purposes
- Based on trends and differences in accuracy and speed, clinicians should consider the trade off of navigation accuracy and speed when designing AAC systems
- Survivors may make various types of navigation errors due to difficulties with different levels of hierarchical organization