

Reading comprehension by people with chronic aphasia: A comparison of three levels of visuographic contextual support

The need to minimize the high-linguistic demands of current augmentative and alternative communication (AAC) technology prompted the development of the Visual Scene Displays (VSDs). VSDs (i.e., contextually-rich visuographic images) are integrated into high- and low-technology AAC devices to represent meaning, facilitate co-construction of messages between people with chronic aphasia and their communication partners, and support system navigation. In an attempt to *bypass* the *broken* language system of people with aphasia, VSDs utilize their relatively intact cognitive and visuospatial abilities. VSDs include high-context pictures combined with *text boxes* and *speak* (see Figure 1.). The text boxes relay the *content* revealed through the high-context pictures in written text. The speak buttons, when activated (touched), produce a spoken message via synthesized or digitized speech. These spoken messages are identical or similar to the written text in the corresponding text box. Anecdotal data during fieldwork revealed that people with aphasia were reluctant to activate speak buttons if the corresponding text boxes were absent. It seemed that they were unsure of the message that the VSD speak button would produce, unless the corresponding text box was present (Dietz, McKelvey, & Beukelman, 2006; Dietz, McKelvey, Beukelman, McKelvey et al., 2007). Thus, the purpose of this investigation was to evaluate the impact of three levels of visuographic context—(a) photos of high-context scenes, (b) photos of low-context scenes, and (c) no-context—on the reading comprehension of narratives by people with chronic aphasia.

Methods

A repeated measures design was employed to compute the participants': (a) response accuracy measured in percent of correct responses, (b) response time measured in seconds, and (c) responses to the *Self-Assessment of Performance* scale. Participants included 10 medically-stable adults with chronic aphasia and concomitant reading comprehension deficits. The participants read three different narratives, each presented with high, low, or no-context. The researcher defined high-context scenes as photographs in which people interact with each other, the natural environment, and the central action of the scene (see Figure 2.) and low-context scenes as photographs with no central action and limited-to-no interaction between the people and the natural environment (see Figure 3.). To ensure equivalency, the three passages were balanced for: (a) total number of words, (b) words per sentence, (c) characters per word, (d) Flesch Reading Ease, (e) Flesch-Kincaid Grade Level, and (e) passage dependency (see Table 1. and Table 2.).

The participants read a passage in each of the three conditions. Next, the researcher presented the corresponding question set, one question at a time, and employed written choice principles to elicit responses (Garrett, 1993). Once the participants provided an answer, the researcher presented the subsequent question. The participants completed the *Self-Assessment of Performance* questionnaire, using a 5-point Likert scale, following completion of each question set.

Results and Discussion

Response Accuracy

The researcher tallied the total number of *overall* correct responses, as well as the number of correct *concrete* and *abstract* responses. Analysis of the group data revealed no significant difference in the response accuracy between the experimental conditions. However, inspection of *individual* data revealed variability between participants, thus, highlighting a *subset of participants* who did benefit from the use of visuographic context during the narrative reading tasks. An explanation for this relates to the heterogeneity that existed within the participant pool regarding reading ability. Specifically, some participants demonstrated a ceiling effect in that they performed with high levels of accuracy on the comprehension questions regardless of experimental condition. Other participants demonstrated the opposite effect—that is, they performed near or below chance levels when responding to comprehension questions across all three conditions. A third subgroup of the participants demonstrated a pattern of higher accuracy levels in the high- and/or low-context conditions. An important factor to consider when evaluating the participants' response accuracy includes cognitive factors associated with processing visuographic information. According to Wilkinson and Jagaroo (2004), non-brain-injured people process high-context scenes in a holistic manner because of natural integration of the portrayed objects, people, and actions. As a result, non-brain-injured people tend to process these photos automatically, thus facilitating the efficiency of the associated cognitive processes (Fabre-Thorpe, Delorme, Marlot, & Thorpe, 2001; Wilkinson & Jagaroo, 2004). However, this theory does not elucidate why some participants exhibited comparable or superior benefit from low-context scenes when compared to high-context scenes.

Response Time

The participants tended to demonstrate faster response times in the no-context condition when compared to the low- and high-context conditions. Additionally, analysis of the data revealed a trend for faster response times in the low-context condition compared to the high-context condition. Response times across the three experimental conditions were significantly different ($p = .045$); however, pairwise comparisons between the high- and no-context conditions, as well as the low-context and no-context conditions only approached significance (i.e., $p = .058$ for both comparisons). Response times between the high- and low-context conditions were not statistically different ($p = .206$). These outcomes suggest that, overall, people with chronic aphasia respond more slowly to questions following narrative reading passages presented with any level of visuographic context than to narrative passages presented with no visuographic support. It appears that presenting narrative passages with some level of visuographic context may have provided increased access to the participants' world knowledge and facilitated engagement of deeper-level information processing, thus resulting in longer response times. This supports the resource allocation theory, which advocates that people with aphasia have a reduced *central pool* of cognitive resources available or have difficulty allocating attention for language purposes, including reading tasks (McNeil, 1983; McNeil et al., 1991; Mayer & Murray, 2002; Murray, 1999).

Self-Assessment

Participants generally perceived pictures as helpful during the high- and low-context conditions; further, the majority of the participants reported that pictures would have assisted them during the no-context condition. Likewise, they also reported that the narrative reading tasks were easier in the high- and low-context conditions than in the no-context condition. These data seem to correlate with the documented positive impact of a *picture walk*, a common prereading instruction method utilized with children (Edmondson, 2000; Zeece, 2003). The basic principle of a story walk is to activate the reader's world knowledge by means of pictures, thus providing the child with a strategy to decipher the text meaning. Perhaps the participants who demonstrated significant reading comprehension deficits relied upon the pictures in the high- and low-context conditions to activate their world knowledge when attempting to decode the narrative passages. In turn, activation of world knowledge in the high- and the low-context conditions may have facilitated a participant's perception of greater task ease when compared to the no-context condition. These findings suggest that modification of the visuographic components of reading materials facilitates an increase in the confidence, or the ease, with which people with chronic aphasia perform reading tasks.

Impressions

In essence, this investigation provided preliminary data to support the notion that VSDs have the potential to assist people with chronic aphasia to regain increased independence using supported reading comprehension strategies.

References

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Table 1.

Passage Characteristics Summary

	Narrative 1	Narrative 2	Narrative 3
Number of words	107	100	101
Words per sentence	10.7	10.0	10.1
Characters per word	3.9	4.2	3.8
Flesch Reading Ease	95.5	95.1	96.9
Flesch-Kincaid Grade Level	2.5	2.4	2.2

Table 2.

Passage Dependency Index Summary

Passage Dependence Index	
Narrative 1	0.78
Narrative 2	0.78
Narrative 3	0.73

Figure Captions

Figure 1. Example of a Visual Scene Display (VSD).

Figure 2. Example of a high-context scene.

Figure 3. Example of a low-context scene.

Figure 1.

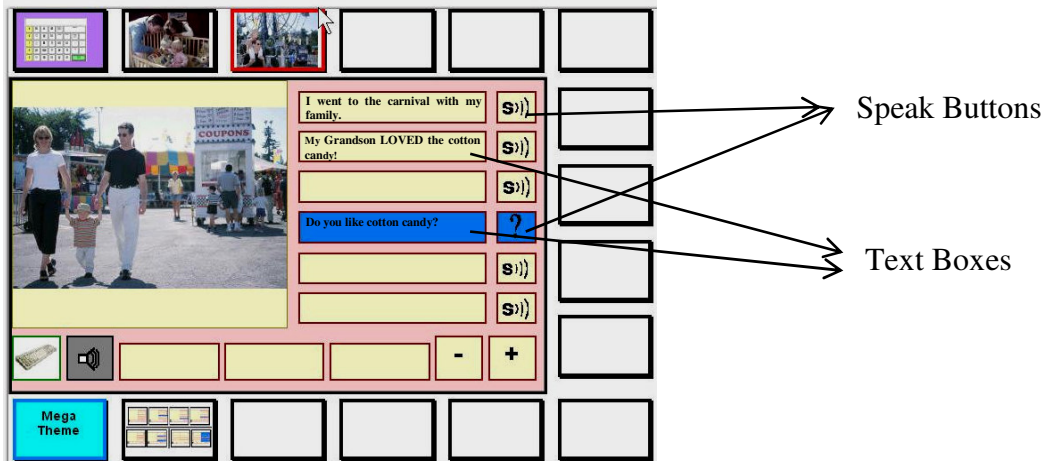


Figure 2.



Figure 3.

