Supported Reading Comprehension for People with Aphasia: Photographic and Linguistic Supports

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The more that you read, the more things you will know. The more that you learn, the more places you'll go
– Dr. Seuss
Introduction

• People with aphasia often experience residual reading comprehension deficits long into the chronic phase of recovery
  (Brennan, Worrall, & McKenna, 2005; Dietz, Ball, & Griffith, 2011; Parr, 1995, 2007; Rose, Worrall, Hickson, & Hoffman, 2011)

• Initial rehabilitation focuses on verbal expression to meet the demands of everyday life
  (Conklyn, Novak, Boissy, Bethoux & Chemali, 2012)

• Insurance companies limit number of visits leaving little time to address reading comprehension
  (Cameron & Wright, 2009)
Alleviating Reading Comprehension Challenges

- Developing and implementing strategies to optimize comprehension may help minimize the adverse effect of aphasia on activities of daily living

(Parr, 2007; Worrall et al., 2010)

- Reports outlining aphasia friendly techniques that facilitate the reading comprehension of people with aphasia have emerged in the literature

(e.g., Brennan et al., 2005; Dietz, Hux, McKelvey, Beukelman, & Weissling, 2009; Egan, Worrall, & Oxenham, 2004; Rose, Worrall, McKenna, 2003; Worrall, Rose, Howe, Brennan, Egan, & McKenna, 2005; Rose, Worrall, Hickson, & Hoffman, 2011)
Aphasia Friendly Techniques

Techniques

1. Abundant white space
2. Large and standard fonts
3. Simplified syntax and vocabulary
4. Relevant pictures
   (Rose et al., 2003)

Effectiveness

• Combination of 4 techniques yield increased reading comprehension
  (Rose et al., 2003)

• Techniques in isolation yield increased reading comprehension accuracy
  – Abundant white space
  – Large and standard fonts
  – Simplified syntax and vocabulary
    (Brennan et al., 2005)
Visual Supports

• Debate over helpfulness of pictures
  (Dietz et al., 2009; Rose et al., 2003; Rose et al., 2011)

• Possible reasons include differences in the types of:
  – images
  – passages
  – response modes
  – severity of reading deficits

• People with aphasia report that visual supports improve their reading comprehension, speed, and ease
  (Dietz et al., 2009; Rose et al., 2011)
Linguistic Supports

- Adult reading materials often incorporate linguistic supports to facilitate comprehension of material
  
  - Topic Setters
  - Newspapers, Internet sites
Linguistic Supports (2)

- **Keywords**
  - Internet sites, textbooks
Linguistic Supports (3)

- People with aphasia also benefit from the incorporation of these supports during communication and auditory comprehension tasks
  
  (Garrett & Huth, 2002; Garrett & Lasker, 2013)

- The impact of topic setters and keywords on the reading comprehension of people with aphasia is unknown
Pre-task Stimulation

• Hearing predictive sentences or viewing predictive drawings prior to the passage may improve auditory comprehension
  (Hough et al., 1989; Jones, Pierce, Mahoney, Smeach, 2007; Pierce, 1991; Pierce & Beekman, 1985; Waller & Darley, 1978)

• Pre-task stimulation may help contextualize the information by activating prior knowledge for the upcoming reading comprehension task
Problem

- Aphasia friendly formatting is helpful in supporting the reading comprehension of people with aphasia
- However, the following problems remain:
  - Aphasia friendly formatting requires simplifying the syntax
  - There is no consensus on the helpfulness of using photographs
  - The helpfulness of linguistic supports, such as keywords and topic setters, remains unexplored
  - No data on the benefits of pre-task stimulation
  - However, people with aphasia encounter all of these reading supports on a daily basis
Purpose of the Study

• To compare the effect of reading comprehension accuracy by people with aphasia who read “un simplified” narratives paired either with no reading supports, photographic supports, keywords, or topic setters

• Specifically, the supports were provided as pre-task stimulation and were also present during the reading task
- **N = 17**
  - **Mean Age = 64 (SD = 11.7)**
  - **At least 12 MPO**
    - \( M = 87.71, \ SD = 78.55 \)

- **Average Years of Education**
  - 14.76 (SD = 2.49)

- **Western Aphasia Battery-R**
  - **Mean AQ = 55.08 (SD = 21.37)**
  - 12 nonfluent
  - 5 fluent

- **Reading Comprehension Battery for Aphasia-2**
  - **Mean Total = 72.90 (SD = 17.4)**
Methods: Materials

• **Topic Setters:** provided information about the primary setting or situation of the story without revealing the solution to the problem

  (Garrett & Huth, 2002)

• **Keywords:** 15 nouns or verbs conveying critical information

• **Photographs:** single image that captured the meaning conveyed at the beginning of each story
• **4 Narratives:** described the scenario for a problem, a conflict, or dilemma faced by one or more characters and a problem resolution

• Each narrative was balanced for the following:
  
  – **Sentence length**
    • 10 sentences long mean length of 12.93 words \((SD = 0.46)\)
  
  – **Number of words**
    • contained between 124 and 136 words \((M = 129.33, SD = 4.62)\)
  
  – **Flesch-Kincaid grade**
    • 5.80 and 6.00 \((M = 5.93, SD = 0.06)\)
  
  – **Flesch-Kincaid reading ease**
    • 73.60 and 76.00 \((M = 75.33, SD = 0.29)\)
Example Narrative Topic Setter, Key words and Photographic Supports

Narrative
Betty walked to the kitchen early one morning to make her first cup of coffee. Heading to the living room, she noticed a young man sprawled on the couch. Disoriented, the man stood, took a few shaky steps, and then fell back onto the couch. Betty debated whether she should confront the man or telephone the police. She decided to call for assistance. An officer arrived and approached the stranger. The man said he was visiting a friend nearby and had attended a party the previous night. Leaving at 3:00am, he lost his way and thought Betty’s house was his friend’s. In an attempt to not wake anyone, he climbed in an open window and curled up on the couch to sleep. The officer escorted him out to the police car and charged him with trespassing.

Topic Setter
Home Break-In

<table>
<thead>
<tr>
<th>Keywords</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Betty</td>
<td>Morning</td>
<td>coffee</td>
<td>living room</td>
<td>man</td>
<td></td>
</tr>
<tr>
<td>couch</td>
<td>Police</td>
<td>Call</td>
<td>Officer</td>
<td>party</td>
<td></td>
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<tr>
<td>3:00am</td>
<td>Lost</td>
<td>window</td>
<td>Charged</td>
<td>trespassing</td>
<td></td>
</tr>
</tbody>
</table>

Photograph
Example Reading Materials

Pre-Task Stimulation (Front Cover)

Reading Task (Inside Folder)

- 18-point Arial font
- Photographs: 5X7”
- Supports on cover of folder and left interior
- Story on 8.5X11” paper; right interior
Comprehension Questions

• 16 cloze statements in the format of a sentence stem with omission of the final word or phrase

• One correct response and three foils accompanied each sentence stem

• Passage Dependency Index was .93 (SD = 0.03)
Example Cloze Statement-Question

Concrete Question (12)

1. The events happened in the
   a) morning
   b) afternoon
   c) evening
   d) night

Abstract Question (3)

10. The man was trying to be
    a) thoughtful
    b) noisy
    c) sarcastic
    d) sneaky
Procedures

• As part of a larger study, the participants were advised that they would read 4 passages either with no support, a photograph, a topic setter, and keywords
  – Advised that the supports would help them understand the story

• (Pre-task stimulation) When present, supports left in view for ~30 seconds prior to seeing passage and while engaged in reading

• Answered 16 cloze statements with passage and supports present
Data Analyses

• Repeated Measures ANOVA \( (p \leq .05) \)

• Computation of Fisher’s Protected LSD procedure (Rosner, 2005) \( (p \leq .05) \)
  – Evaluation of the post hoc differences among the support conditions.
Results (1)

% Correct Comprehension Questions

- No support: 55%
- Topic Setter: 60%
- Keywords: 65%
- Photographs: 70%

The bar chart shows the percentage of correct comprehension questions for different conditions, with Photographs resulting in the highest percentage and No support resulting in the lowest.
<table>
<thead>
<tr>
<th>Aphasia Type</th>
<th>No support</th>
<th>Topic Setter</th>
<th>Keywords</th>
<th>Photograph</th>
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<td>4</td>
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<td>75.00</td>
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<td>Grand Mean</td>
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<td>Standard Dev.</td>
<td>21.86</td>
<td>24.45</td>
<td>24.88</td>
<td>24.61</td>
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</tbody>
</table>
Results (2)

• Repeated measures ANOVA
  – \( (F_{(3, 16)} = 2.788, p = .0506, MSE = 75.124) \)

• LSD value = 6.008
  – No support vs. Photograph = 5.5
  – No support vs. Topic Setter = 1.118
  – No support vs. Keywords = 2.515
  – Photographs vs. Topic Setter = 1.397
  – Photograph vs. Keywords = 8.015*
Anecdotal Observations

• Some patients referred back to the supports and passage; others did not during comprehension testing.
• Had inefficient search patterns when referring back to supports and passage.
• Seemed unaware of errors; others were aware of errors but had 'out.'
• Labored over the passage; others breezed through.

% Participants Preferred Support

- No support: 6%
- Topic Setter: 0.00%
- Keywords: 6%
- Photographs: 88%
Discussion

• This is not the end of the ‘story’

• Anecdotal and research data document the perceived helpfulness of using pictures to support comprehension

  (Dietz et al., 2009; Rose et al., 2003; Rose et al., 2011)

• People with aphasia will not always have access to text with simplified syntax
Discussion (2)

• Similar to provision of augmentative and alternative communication, people with aphasia may require **instruction** to be successful in using supports paired with unsimplified text
  
  (McKelvey, Dietz, Hux, Weissling, & Beukelman, 2007; Purdy & Van Dyke, 2011; Wallace, Dietz, Hux, & Weissling, 2012)

• Pre-stroke reading interest levels & reading topic
  
  – Pleasure
  
  – Work
  
  – Preferred/personally relevant topics vs. relatively uninteresting stories presented here

  (McKelvey, Hux, Dietz, & Weissling, 2010; Jones, Pierce, Mahoney, & Smeach, 2007)
The more that you read, the more things you will know. The more that you learn, the more places you'll go

– Dr. Seuss
Selected References


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