Effects of Emotional Stimuli on Word Retrieval in People with Aphasia

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Effects of Emotional Stimuli on Word Retrieval in People with Aphasia

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Introduction
Characteristics of stimuli (e.g., word frequency) influence the ease of word retrieval and, thus, influence language assessment and treatment design. Stimulus emotionality may also impact word retrieval in neurotypical adults (Schwen Blackett et al., 2017), having important clinical implications for people with aphasia (PWA). Some data support a performance-enhancing effect of emotional vs. nonemotional stimuli in PWA for comprehension (Reuterskiöld, 1991), pragmatics (Borod et al., 2000), repetition (Ramsberger, 1996), reading and writing (Landis et al., 1982), and word recognition (Newton et al., 2020). However, this performance-enhancing effect of emotion is not universally reported (Wallace & Canter, 1985), and it is unknown how emotional stimuli may affect word retrieval in PWA.

Methods
Thirteen people with chronic anoma, based on the Boston Naming Test Short-Form (del Toro et al., 2011) and 13 age-matched, neurotypical controls participated in tasks presenting positive, negative, and neutral stimuli, taken from the International Affective Picture System (Lang et al., 2008) and Affective Norms for Emotional Words database (Bradley & Lang, 1999). Tasks included object picture-naming (60 items), action picture-naming (60 items), category-member generation (39 items), and verb generation (60 items). The three valence sets within each task had an equal number of items and were balanced for word frequency, concreteness, imageability, age of acquisition, visual complexity (picture-naming tasks), and number of phonemes, syllables, and living vs. nonliving items. Task, valence block, and item order were randomized across participants. Accuracy and reaction time (RT) were measured for each trial. Generalized logistic and linear mixed-effects models were used to evaluate differences in accuracy and RT between participant groups and among tasks and valence.

Results
All planned fixed effects were included in the final model (group, task, valence, task*valence, and task*valence*group). Participants were included as a random effect. Table 1 shows statistical significance for accuracy and RT models. As expected, across task and valence conditions, PWA were significantly less accurate (59.86%) than controls (95.61%) and were 2.54 seconds slower than controls, on average. PWA showed the
lowest accuracy for negative trials, followed by positive and then neutral trials across tasks (Figure 1). Controls showed this same pattern for all tasks except object picture-naming. RT data showed that PWA and controls were slower for emotional than neutral trials, with negative trials tending to be slower than positive trials.

**Conclusions**

Emotional stimuli, especially negative items, produced worse naming performance than nonemotional stimuli, as measured by accuracy and RT in PWA and controls. This replicates findings of a performance-interference effect of emotion on word retrieval in neurotypical controls (Burbidge et al., 2005; Schwen Blacket et al., 2017). This effect appears to be robust across naming tasks that differed by word class (nouns vs. verbs) and stimulus type (pictures vs. words). Negative stimuli resulted in worse naming performance than positive stimuli, and, in few cases, participants performed better for positive compared to neutral stimuli. Results suggest that emotionality of stimuli is an important variable in word retrieval research and could, perhaps, impact clinical assessment and intervention of word retrieval deficits in PWA.

**References**


Acknowledgments
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Figure 1. Least square means of percent accuracy by task

Table 1. Type III fixed effects for accuracy and reaction time mixed-effects models

<table>
<thead>
<tr>
<th>Effect</th>
<th>Accuracy</th>
<th>Reaction Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F$ statistic</td>
<td>$p$ value</td>
</tr>
<tr>
<td>Group</td>
<td>$F(1, 21.83) = 70.20$ &lt; .0001</td>
<td>$F(1, 14.5) = 116.99$ &lt; .0001</td>
</tr>
<tr>
<td>Task</td>
<td>$F(3, 5631) = 13.49$ &lt; .0001</td>
<td>$F(3, 4359) = 136.98$ &lt; .0001</td>
</tr>
<tr>
<td>Valence</td>
<td>$F(2, 5631) = 35.80$ &lt; .0001</td>
<td>$F(2, 4356) = 48.14$ &lt; .0001</td>
</tr>
<tr>
<td>Task*Valence</td>
<td>$F(6, 5631) = 3.39$ .002</td>
<td>$F(6, 4356) = 3.88$ .0007</td>
</tr>
<tr>
<td>Group<em>Task</em>Valence</td>
<td>$F(11, 5631) = 2.47$ .005</td>
<td>$F(11, 4357) = 27.29$ &lt; .0001</td>
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</tbody>
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