DELAYED LEXICAL ACCESS IN ANOMIC AND BROCA’S APHASIA

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DISCLOSURE INFORMATION

- I have no relevant financial or nonfinancial relationship(s) within the products or services described, reviewed, evaluated or compared in this presentation.
LEXICAL ACCESS IN APHASIA

• Difficulty accessing words is the most prevalent aphasic language deficit, being associated with all the different aphasic syndromes (Dell, Schwartz, Martin, Saffran & Gagnon, 1997).

• Word production is noticeably affected, with aphasic speech manifesting paraphasias, disfluencies and circumlocutions, etc.

• Difficulty with aphasic word comprehension is less obvious because a smaller proportion of aphasic individuals exhibit failed comprehension of words. In addition, many individuals with aphasia are able to comprehend words that they cannot name.
WORD COMPREHENSION IN BROCA’S APHASIA

- Individuals with Broca’s aphasia have been claimed to have intact single-word comprehension (Goodglass, 1968; Goodglass & Kaplan, 1983; Schwartz, Saffran, & Marin, 1980).
- Recent studies, however, have suggested that individuals with aphasia, especially Broca’s aphasia, exhibit delayed lexical access (Choy & Thompson, 2010).
- Furthermore, some researchers have suggested that this delay in lexical access may contribute to impaired sentence comprehension, especially for those who demonstrate agrammatic aphasia (Love et al. 2008).
COMPREHENSION: ANOMIC VS BROCA’S APHASIA

• Comprehension deficits in Broca’s aphasia, especially with non-canonical sentences (Caramazza & Zurif, 1976; Schwartz, Saffran, & Marin, 1980; Thompson, Tait, Ballard, & Fix, 1999).

• Unlike agrammatic participants, anomic participants perform relatively well on both canonical and non-canonical sentences in comprehension (Cho-Reyes, Thompson, 2012).
CURRENT STUDY

• Examines whether lexical access is delayed during word comprehension in Broca’s and anomic aphasia
  • Comparison of lexical access during comprehension in two aphasic syndromes (which have lexical access deficits but differ in terms of comprehension) may shed light on whether lexical access problems lead to comprehension deficits.
• Tests whether lexical access is affected in the same way in the two aphasia types.
  • Semantic and phonological influences on lexical access.
EXPERIMENT 1

- Testing lexical access in Broca’s and anomic aphasia
  - Is aphasic individuals’ lexical access delayed?
  - Are aphasic individuals’ eye movements delayed?

- 2 conditions:
  1) Non-linguistic (n=30)
  2) Word in isolation (n=30)
PARTICIPANTS

• 4 individuals with Broca’s aphasia (ages: 36-72; WAB AQs: 56.4-73.4)
• 4 individuals with anomic aphasia (ages 46-63; WAB AQ: 83.6-94)
  • Diagnoses of anomic aphasia or Broca’s aphasia were based on the Western Aphasia Battery (WAB; Kertesz, 1982).
• 8 age-matched controls (ages: 36-70)

• All participants were native speakers of English and demonstrated good visual and hearing acuity.
• There was no reported (premorbid) history of neurological or psychological disorders.
<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Gender</th>
<th>Education</th>
<th>WAB AQ</th>
<th>Fluency</th>
<th>Comp</th>
<th>Naming</th>
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<td>M</td>
<td>12</td>
<td>94</td>
<td>9</td>
<td>9.65</td>
<td>9.1</td>
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<tr>
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<td>M</td>
<td>16</td>
<td>93.2</td>
<td>9</td>
<td>9.8</td>
<td>9</td>
</tr>
<tr>
<td>AA 3</td>
<td>63.1</td>
<td>M</td>
<td>18</td>
<td>94</td>
<td>9</td>
<td>9.7</td>
<td>9</td>
</tr>
<tr>
<td>AA 4</td>
<td>46.7</td>
<td>F</td>
<td>20</td>
<td>83.6</td>
<td>5</td>
<td>10</td>
<td>9.3</td>
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<tr>
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<td>36.5</td>
<td>F</td>
<td>16</td>
<td>71.8</td>
<td>4</td>
<td>8</td>
<td>8.1</td>
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<td>BA 2</td>
<td>69</td>
<td>M</td>
<td>12</td>
<td>56.4</td>
<td>4</td>
<td>6.55</td>
<td>5.2</td>
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<td>BA 3</td>
<td>72</td>
<td>F</td>
<td>16</td>
<td>73.4</td>
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<td>71.4</td>
<td>4</td>
<td>8.1</td>
<td>8.8</td>
</tr>
</tbody>
</table>
EXPERIMENTAL PARADIGM

• ASL D6 optics eye tracker
• Eye tracking while listening:
  • Eye movements were recorded while participants looked at a computer screen with four objects.
  • Participants were asked to point to the item that corresponded to the auditory word presented.
EXP 1, CONDITION 1
TESTING EYE MOVEMENTS (NONLINGUISTIC CUE)

Eye movement latency:
Measured from onset of beep to fixation.
EXP 1, CONDITION 2
TESTING WORDS IN ISOLATION

Eye movement latency: Measured from onset of word to fixation.
### RESULTS: EXPERIMENT 1

Mean Latency of eye movements (in ms)

<table>
<thead>
<tr>
<th></th>
<th>Condition 1</th>
<th></th>
<th>Condition 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-linguistic</td>
<td></td>
<td>Lexical</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>533</td>
<td></td>
<td>859</td>
<td></td>
</tr>
<tr>
<td>Broca’s Aphasia</td>
<td>560 (+27)</td>
<td></td>
<td><strong>1109</strong> (+250)</td>
<td></td>
</tr>
<tr>
<td>Anomic Aphasia</td>
<td>537 (+4)</td>
<td></td>
<td><strong>1003</strong> (+144)</td>
<td></td>
</tr>
</tbody>
</table>

- **Lexical access is delayed in Broca’s and Anomic aphasia**
- **This is not due to a delay in eye movements (as eye movements are not delayed)**
EXPERIMENT 2

- Do semantic or phonological distractors affect lexical access in aphasia. Are they the same for Anomic and Broca’s aphasia.
- 4 conditions
  - Semantic distractors (SEM)
  - Phonological distractors (PHON)
  - Combined semantic and phonological distractors (COM)
  - Unrelated (UNR)
## BROCA’S APHASIA VS ANOMIC APHASIA

<table>
<thead>
<tr>
<th>TARGET</th>
<th>Competitor/Filler</th>
<th>Filler</th>
<th>Filler</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHON</td>
<td>teacup</td>
<td>tepee</td>
<td>memaid</td>
</tr>
<tr>
<td>SEM</td>
<td>throne</td>
<td>crown</td>
<td>worm</td>
</tr>
<tr>
<td>COM</td>
<td>toothbrush</td>
<td>toothpaste</td>
<td>fireworks</td>
</tr>
<tr>
<td>UNR</td>
<td>check</td>
<td>tie</td>
<td>cow</td>
</tr>
</tbody>
</table>
EXP 2 RESULTS
FIXATION LATENCY

- BA >> Control for all conditions
- AA >> Control for all conditions
- BA >> AA (except SEM)
EXP2 RESULTS
ACCURACY

• Control >> AA for COM, SEM
• Control >> BA for SEM
CONCLUSIONS

• Aphasic individuals exhibit delayed lexical access during comprehension.
• Both individuals with anomic aphasia and Broca’s aphasia show slower lexical access compared to controls.
• Lexical access is more delayed for individuals with Broca’s aphasia compared to individuals with anomic aphasia.
FURTHER CONCLUSIONS

• Semantic distractors had a larger effect on lexical access latencies for anomic aphasia, while phonological distractors had a larger effect for Broca’s aphasia.
• Despite the difference in lexical access times, the amount of delay does not seem to impact success of word comprehension, as there was no significant difference in word comprehension accuracy between the two aphasic groups.
• While we cannot completely rule out effects of delayed lexical access on sentence comprehension, the fact that there were no differences in word comprehension accuracy between the two groups suggests that it is not the difference in word comprehension accuracy that results in differences in sentence comprehension disparities between anomic and Broca’s aphasia.
REFERENCES