The relationships between anomia and short-term memory deficits

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Introduction

- Anomia is the most common symptom of language dysfunction occurring in aphasia. Moreover, verbal short-term memory (STM) impairments are a frequent characteristic of aphasic syndromes. However, the nature of these deficits and their relationships to language production impairments in these patients are still debated.
- Recent STM models have been proposed incorporating relationships between language representations and STM, including distinct capacities for temporary storage of phonological and lexical-semantic information (N. Martin & Saffran, 1992; R. Martin, Lesch, & Bartha, 1999).

Aims & Hypotheses

- This study explores the relationships between anomia and STM deficits.
- Based on recent STM models, we assume that a naming impairment may be related to either a phonological STM impairment with preserved lexical-semantic STM or to an impaired lexical-semantic STM with preserved phonological STM.

Methods

Participants

- BN (age 61) suffered from a left hemisphere CVA which resulted in tempo-parietal lesions.
- TM (age 59) suffered from a left hemisphere CVA which resulted in frontal lesions.
- Control participants: 15 healthy adults matched for age and for socio-economic background.

Tasks

- Picture naming task
  - 150 black and white drawings (adapted from Bonin et al., 2003) presented on a computer screen.
  - Analyses: number of correct responses, naming latencies, naming errors and effects of psycholinguistic variables.

Short-term memory tasks

- Phonological STM
  - Rhyme probe task
    - Auditory presentation of bisyllabic words of medium lexical frequency.
    - Sequences of 2 to 7 items.

- Lexical-semantic STM
  - Category probe task
    - Does “ categoria” share the feature “start” with one of the words of the sequence?

Lexical decision tasks

- with phonologically related primes
  - Primes and targets matched for lexical frequency and length.
  - Primes = words and nonwords phonologically/semantically related vs. not related.

- with semantically related primes
  - A set of 299 pictures for psycholinguistic studies: French norms for name agreement, image agreement, conceptual familiarity, visual complexity, image variability, age of acquisition, and naming latencies. Behavior Research Methods, Instruments, & Computers, 25(1), 158-167.

Results

<table>
<thead>
<tr>
<th>SHORT-TERM MEMORY</th>
<th>BN</th>
<th>TM</th>
<th>Control Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhyme probe task</td>
<td>72.73 % *</td>
<td>86.36 %</td>
<td>81.81 - 93.18 %</td>
</tr>
<tr>
<td>Semantic probe task</td>
<td>75 %</td>
<td>65.91 % *</td>
<td>72.73 - 96.46 %</td>
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<tr>
<td>Lexical decision task</td>
<td>Size of phonological priming effect</td>
<td>170.87 ms *</td>
<td>173.64 ms.</td>
</tr>
<tr>
<td></td>
<td>Size of semantic priming effect</td>
<td>184.44 ms. *</td>
<td>4 ms. *</td>
</tr>
<tr>
<td>Picture naming task</td>
<td>Accuracy</td>
<td>56.72 % *</td>
<td>55.22 % *</td>
</tr>
<tr>
<td></td>
<td>Naming latencies</td>
<td>4464 ms. *</td>
<td>3328 ms. *</td>
</tr>
<tr>
<td></td>
<td>Naming errors</td>
<td>Phonoassociative paraphasias</td>
<td>Repetitive self-corrections</td>
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<tr>
<td></td>
<td></td>
<td>Semantic paraphasias</td>
<td>Omissions</td>
</tr>
<tr>
<td></td>
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<td>Circumlocutions</td>
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<tr>
<td></td>
<td>Effects</td>
<td>Increased length effect</td>
<td>No frequency effect</td>
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<tr>
<td></td>
<td></td>
<td>Increased frequency effect</td>
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</table>

Discussion

- Results show a double dissociation between phonological and lexical-semantic STM deficits, as N. Martin and Safran (1992); R. Martin et al. (1999) suggested. Indeed, BN presents a phonological STM impairment with preserved lexical-semantic STM while TM shows an impaired lexical-semantic STM with preserved phonological STM.
- Furthermore, both patients’ word naming capacity, as assessed with the picture naming task, was impaired. BN produced phonological lexical paraphasias, repetitive self-corrections and presented an increased length effect. We assume that BN’s errors and effect may be related to her phonological STM deficit. TM instead produced semantic paraphasias, omissions and circumlocations and presented an increased frequency effect. These errors and effect may be related to his lexical-semantic STM deficit.

References


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