Effect of Verb Network Strengthening Treatment (VNeST) on Lexical Retrieval in Sentences in Moderate-Severe Aphasia

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Abstract

- Verb Network Strengthening Treatment (VNeST) is a semantic treatment that aims to improve lexical retrieval of content words in sentence context by promoting systematic retrieval of verbs (e.g., measure) and their thematic roles (i.e., agent (doer of the action, e.g., carpenter, chief) and patient (receiver of the action, e.g., lumber, sugar)).
- VNeST is influenced by Llorens and colleagues (e.g., Llorens, Sellinger, and Prescott, 1979), who used "verb as cont" treatment to improve sentence production, and McRae and colleagues, who showed that verbs prime typical agents and patients (Ferretti, McRae, & Hatherell, 2001) and vice-versa (McRae, Hare, Elman, & Ferretti, 2005).

In a phase I study with 4 moderately impaired participants, Edmonds, Nadeau, & Kiran (in press) reported improvement on sentence production for trained verb networks and semantically related untrained networks (see below). There were additional improvements in single word noun and verb naming, sentences, and connected speech.

The current study is a phase II study examining the effect of VNeST on two participants with severe lexical retrieval impairments.

Both participants improved on lexical retrieval of words in sentence contexts (picture description) with words containing trained networks and untrained semantically related networks with additional pre-to-post-treatment improvements on other lexical retrieval tests.

Verb Networks

- Treatment of agent-patient pairs in VNeST (carpenter/chef and butcher/bake) is the context in which the trained verb measure will strengthen the connections for the verb itself and its thematic role (e.g., agent and patient), which will then be strengthened, as will their connections to the neural substrates for their thematic pairs (e.g., butcher/bake), since they are thought to be engaged by the closely related verbs. Consequently, retrieval of both trained and untrained verbs and related theamatics should be facilitated.

Experimental Design

- Single subject multiple baseline across subjects design with 2 participants.
- Each participant trained on 10 verb networks.
- Treatment provided 2 times/week for 2 hours each.
- Probes included pictures containing trained verb networks, semantically related untrained verb networks and adjectival control task.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Verb Networks Set 1</th>
<th>Verb Networks Set 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set 1</td>
<td>Set 2</td>
<td></td>
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<tr>
<td>Set 1</td>
<td></td>
<td></td>
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<tr>
<td>Set 2</td>
<td></td>
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</tbody>
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Scoring for probes (errors bolded)

Because participants were so severely impaired and because improvement in lexical retrieval was the goal, a scoring hierarchy was implemented to capture improvement in lexical retrieval over time.

A maximum of 3 points per picture was possible, resulting in 30 possible points for each verb network set.

Abbreviated Previous Findings

- Probe Results – P1
- General pre-post tx results – P2

- Probe Results – P2
- General pre-post tx results – O&A

- Probe Results – O&A
- General pre-post tx results – BNT

Current Study: Participant Demographics

<table>
<thead>
<tr>
<th>Gender</th>
<th>P1</th>
<th>P2</th>
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<tbody>
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<td>Sex</td>
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<td>Age</td>
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<td>Education</td>
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<td>12</td>
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<tr>
<td>Previous occupation</td>
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<td>Choreographer</td>
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<tr>
<td>Glottal</td>
<td>Left &amp; Right</td>
<td>Left</td>
</tr>
<tr>
<td>Months post-onset</td>
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<td>9</td>
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References


Discussion

- Both participants with severe lexical retrieval impairments showed improvement in a variety of lexical retrieval contexts, including weekly sentence probes. Weekly probe improvements were significant from baseline to treatment phases, and pre-treatment to post-treatment effect sizes were large (ranging from 5 to 11), which is particularly encouraging for participants with severe lexical impairments.
- The addition of a writing step in the VNeST protocol (for pt 2) allows participants with more preserved writing to express their own ideas while still encouraging spoken responses.
- A hierarchical scoring system giving partial credit for errors close to the target allows evaluation of lexical retrieval improvement in severely impaired participants.
- More participants representing a range of language severities with carefully characterized cognitive abilities, social support, motivation, and other factors need to be tested in order to define better the characteristics that promote and/or impede acquisition and generalization of lexical retrieval improvements in sentences and beyond.
- More functional outcome measures are currently being explored.

Other Notes

- We would like to thank the participants who participated in this study for their contributions. We acknowledge the work of the San Diego Aphasia Research Group, and are grateful to Dr. John Kavanagh, Dr. Maria De la Santa, Armanda Oester, Alex Johnson, Megan Ferguson, and Karina Nasdogloft.