

The Effect of Modified Verb Network Strengthening Treatment in a Cooperative Therapy Setting



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Background

- Aphasia & Anomia:
- Among the variety of expressive and receptive language impairments associated with aphasia, anomia (i.e., word finding difficulties) stands as a core symptom across all types of aphasia (Helm-Estabrooks & Albert, 2004).
 - As anomia may reflect impaired lexical retrieval, treatment approaches must seek to improve the process of retrieval itself, so that individuals with aphasia can generalize the skills practiced in therapy to a wider lexicon and communicative contexts that occur outside of therapy (Chapey, 1994).
- Verb Network Strengthening Treatment (VNeST):
- VNeST is designed to improve lexical retrieval by focusing on verbs as the central nodes of sentences and strengthening networks of words around them (Edmonds, 2016).
 - Systematically activating these verb-based networks is believed to promote neural reorganization of semantic networks and thereby improve retrieval. Such improved semantic networks and retrieval processes are hypothesized to support generalization to untrained words (Edmonds, 2014).
- Cooperative Group Therapy:
- According to Avent (2004), cooperative therapy is a well-established educational pedagogy that utilizes small group learning to encourage individuals to work together to maximize their own and each other's learning.

Research Questions

- Will VNeST, modified to accommodate a cooperative dyad model, demonstrate treatment effectiveness?
- Will the modified VNeST result in improved production of subjects, verbs, and objects in describing illustrations featuring untrained verbs, as well as increased Correct Information Units (CIUs), mean length of utterance (MLU), and scores on subtests of the Test of Adolescent/Adult Word Finding-2nd Edition (TAWF-2)?

Design, Participants, & Setting

- Research design:
- Single-case quasi-experimental design
- Main participant:
- 72-year-old monolingual English-speaking male
 - Left hemisphere CVA, 10 years prior to the study
 - Diagnosed with moderate-severe Broca's aphasia and moderate apraxia of speech (AOS) by a graduate clinician and confirmed by an experienced clinical supervisor (third author)
 - Most recent performance on the Western Aphasia Battery-Revised (WAB-R), 10 months prior to study, revealed an AQ of 56.6
 - Seven-year member of university-based Aphasia Treatment Program (ATP), which provides six hours per week of conversation- and activity-based group treatment (reading and writing, choir) three quarters per year (approximately 9 weeks per quarter)
 - This was the client's twenty-third quarter as a participant of ATP and his ninth quarter of cooperative therapy
- Cooperative therapy partner:
- 69-year-old monolingual English-speaking male with diagnoses of severe Broca's aphasia and moderate AOS following a left-hemisphere CVA three years earlier.
- Clinician:
- Graduate student pursuing a master's degree in communicative sciences and disorders
- Setting:
- University-based speech, language, and hearing clinic

Methods

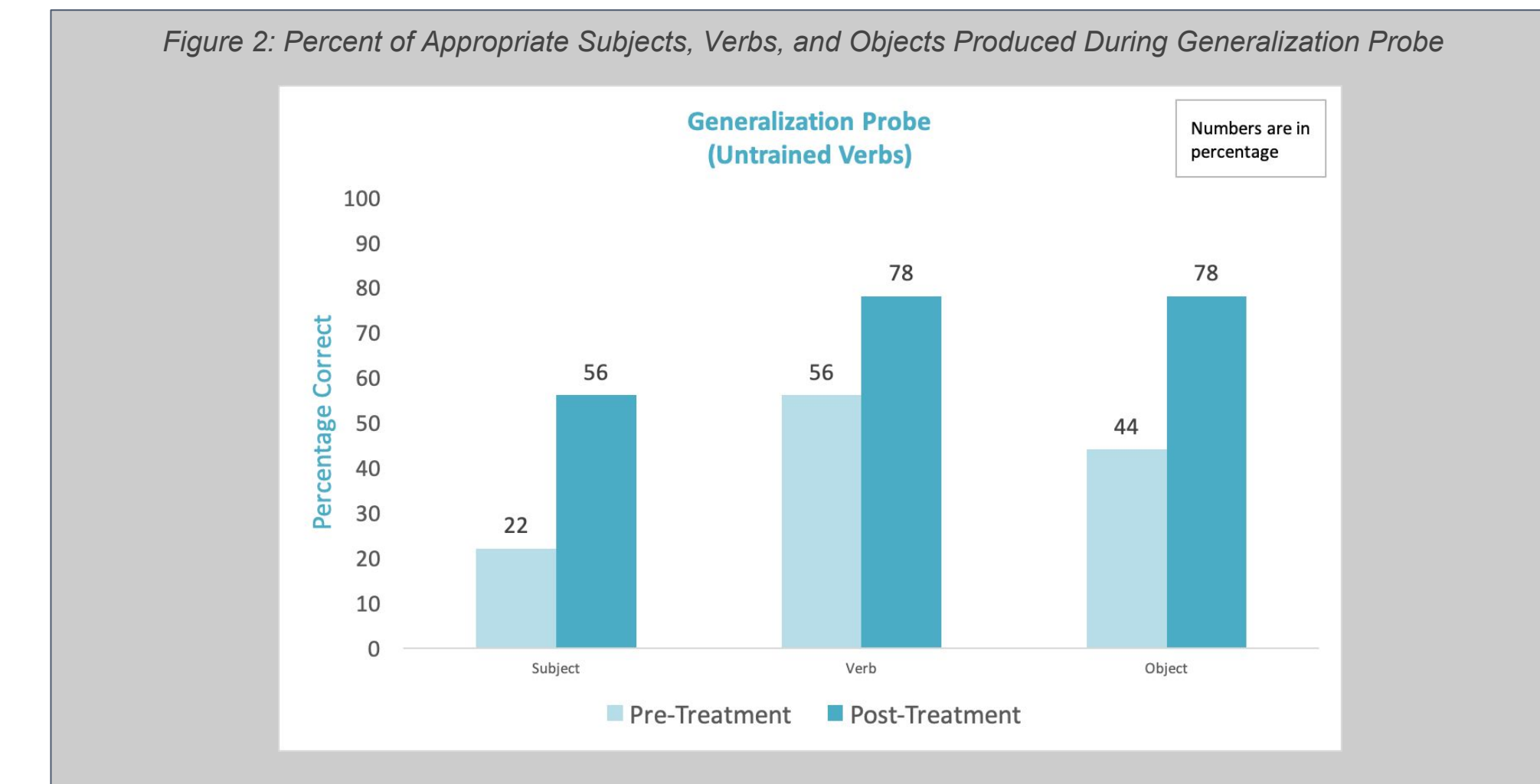
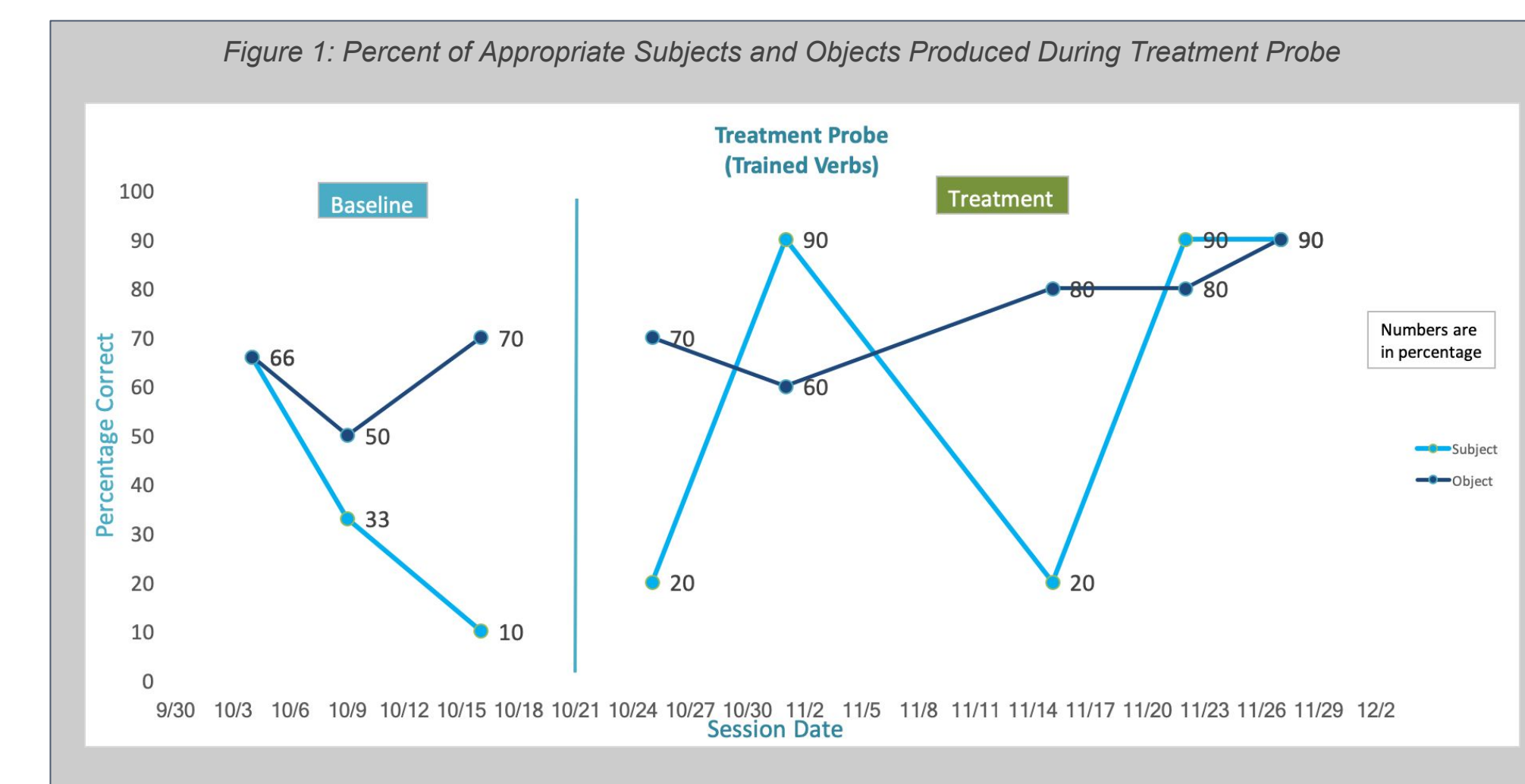
- Pre- and Post- Assessment:
- Before and after the quarter of therapy, the participant was assessed with the first three subtests (Noun Naming, Sentence Completion, and Verb Naming) of the TAWF-2 and Nicholas and Brookshire's (1993) CIUs. MLU was also calculated via CIU administration.
- Treatment:
- The participant and his partner took turns acting as "coach" (carrying out cueing) and "player" (receiving treatment). Each client carried out each role for 55 minutes per week (half of each session, twice weekly).
 - The participant was asked to complete two 30-minute VNeST practice sessions per week at home to make up for reduced dosage (shortened VNeST step 4 and less total therapy time). He completed this home practice using a modified 6-step VNeST protocol at least twice a week for five weeks and recorded his completion status in a provided practice log with 100% compliance, which was confirmed by his wife.
- Weekly treatment probe:
- The participant was provided the 10 verbs used in therapy and asked to produce an appropriate subject and object pair for each verb.
- Pre- and post-treatment generalization probe:
- The participant was asked to describe an illustration depicting an action with a *subject + verb + object* sentence. Generalization probes were carried out before and after the term of therapy. These probes utilized nine illustrations of actions (featuring verbs not used in therapy but semantically related to the target verbs).

Procedures are adapted from the VNeST protocol (Edmonds, 2014)

Description	Examples	Cueing Strategy
1. Partner presents visual stimuli (i.e., WHO card, WHAT card, and a verb card) to participant and asks a question with both interrogatives and the verb. Participant generates three subject + verb + object sentences using the provided verb.	Partner: "Who usually bakes? And what do people bake?" Participant: 1) "My wife bakes pies." 2) "My mother bakes cakes." 3) "My sister bakes cookies."	If participant has trouble generating an answer: Minimal Cue: Provide a contextual question (e.g., "Who might bake for their job?"). Maximal Cue: Provide four choices for subject or object with only one correct answer (e.g., "janitor", "baker", "doctor" and "architect" for subject).
2. Participant reads each sentence he/she generated in Step 1 aloud. Partner: 1. Gestures to participant to pause and says, "Look at me," before modeling the 1st time. 2. Gestures to pause, and says, "Listen to me," before modeling the 2nd time. 3. Invites participant to say it together when modeling the 3rd time.	Partner: "When does your wife usually bake pies?" Participant: "My wife bakes pies after dinner."	If participant has trouble reading any of these sentences, partner provides three verbal models of the sentence.
3. Participant chooses one subject + verb + object sentence to leave on the table, and partner removes the rest of the cards. Partner then presents WHEN, WHERE, and WHY cards to participant consecutively, asking a question with each interrogative. Participant expands the chosen sentence to create a subject + verb + object + location + time + reason sentence by answering each question.	Partner: "I would like to talk about 'My wife bakes pies.'" Partner: "What time/season does your wife bake pies?" Participant: "My wife bakes pies after dinner."	If participant has trouble generating an answer: Minimal Cue: Provide a contextual question (e.g., "What time/season does your wife bake pies?"). Maximal Cue: Provide four choices for subject or object with only one correct answer (e.g., "while sleeping", "on Thanksgiving", "during work" and "during swim lessons").
4. Partner asks six yes-no questions. Participant judges plausibility of the six sentences.	Partner: "Do doctors usually bake for their job?" Participant: "No."	If participant's answer is incorrect, partner prompts him/her by asking a question with two choices (e.g., "Does a doctor usually treat patients or bake cakes?").
5. Partner removes all cards from the table and asks participant target verb. Participant attempts to recall and verbalize the target verb.	Partner: "What's the verb we've been working on?" Participant: "Bake."	If participant has trouble recalling the verb, partner provides a cue: Minimal Cue: Provide a contextual question (e.g., "Think about the sentences you just created"). Phonemic Cue: Provide the first sound or syllable of the target verb (e.g., say "bay" to elicit "bake").
6. Partner puts cards from Step 1 on the table again and prompts as in Step 1. Participant repeats Step 1 as independently as possible.	Partner: "Who bakes what?" Participant: "My sister bakes cupcakes."	Partner follows the same cueing as in Step 1 and encourages expansion of sentence. Participant does not have to generate the same answers, since it is not a memory task.

Results

In the treatment probes, data for the production of appropriate subjects demonstrate an unstable and widely variable baseline. As such, no conclusion can be drawn about treatment efficacy for this variable. Inconsistent performance appeared to be related to participant fatigue on certain days. The data for percent appropriate objects also feature a variable baseline, but the overall trend across treatment suggests possible improvement. Generalization probe results showed an overall positive relationship between modified VNeST and production of subjects, verbs, and objects to describe illustrations. Performance on the generalization probe improved from 22% to 56% for subjects, 56% to 78% for verbs, and 44% to 78% for objects.



Other outcome measures also increased. The results from the TAWF-2 revealed a substantial increase in Noun Naming, going from 5/24 (21%) to 10/24 (42%). Although Verb Naming scores remained unchanged, the subject used more appropriate verbs in present progressive forms, increasing from 6/19 (32%) to 11/19 (58%). A decrease in response time across all three subtests was also noted (e.g., accurate responses in less than four seconds increased from 21% to 42% in Noun Naming). The total number of CIUs produced increased from 22 to 68. Percent CIUs also increased from 20.4% to 30.1%. The total number of verbs used in describing all three CIU pictures increased from 5 to 15. Additionally, the subject's MLU increased from 2.05 to 2.70, using CIU administration as a language sample.

Data Coding

- Weekly treatment probes:
- Two dependent variables were measured: production of subjects and objects to go with each provided verb.
 - Appropriate subjects and objects were counted as correct when produced verbally or in writing as long as they were understandable to the clinician (i.e., articulation and handwriting/spelling errors did not affect scores).
 - A single subject or object (e.g., "John") was counted as correct in a maximum of two trials per weekly probe, to encourage production of a variety of words.
- Pre- and post-treatment generalization probes:
- Three dependent variables were measured: production of subjects, verbs, and objects, to describe an illustration depicting an action.
 - The above scoring rules applied to the generalization probes as well.

Treatment Fidelity

- The clinician completed a treatment fidelity checklist after each session.
- The fourth author supervised and directly observed 37.1% of all treatment, providing feedback as needed to ensure treatment fidelity
- In one session, the final VNeST step was not carried out due to time constraints, but all treatment steps were completed in all other sessions.

Inter-Rater Reliability

- A second graduate clinician observed a video recording of four of the eight weekly probes and took data independently.
- By comparing data taken by the primary and secondary clinicians, inter-rater reliability was found to be 95%.

Discussion

- This initial investigation demonstrates a possible method of modifying VNeST to fit a cooperative therapy model.
- It is possible that both roles (coach/player) may facilitate VNeST, though comparison of each role is beyond the scope of this study.
- Further studies with stronger research designs are needed to build on this evidence.
- Future research questions include:
 - How do individual, pair, and group treatment formats compare?
 - Are cooperative and reduced-dosage approaches effective for individuals with different types and severity levels of aphasia?
 - Are at-home and cooperative "coaching" components effective ways to make up for reduced therapy dosage?

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Acknowledgements

- The authors thank the Center of Student Research (CSR), California State University, East Bay for the Student Research Grant.
- We also thank Dr. Shubha Kashinath, PhD, CCC-SLP, for her invaluable feedback and advice.
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