**VNT Scoring Information**

**Portland State University**

**Inclusion criteria:**

Archival audiovisual recordings of BNT-SF administration from 132 individuals were obtained from the AphasiaBank database (MacWhinney et al., 2011) on March 6, 2019, for use in a prior study on BNT transcription. Of those 132 participants, 107 were identified as also having full VNT administration recordings, which were used in the present study. Participants were right-handed individuals who had experienced a single, left-hemisphere stroke resulting in aphasia. A diagnosis of aphasia was operationally defined as an Aphasia Quotient (AQ) of <93.8 on the Western Aphasia Battery - Revised Aphasia Quotient (WAB-R; Kertesz, 2006) or <11 on the Boston Naming Test - Short Form (BNT-SF). Individuals with a concomitant clinical diagnosis of apraxia of speech (AOS) or dysarthria were also included. All spoke English as their primary language, were judged to have adequate hearing and vision (aided or unaided) for testing purposes, and had no significant comorbid neurologic or psychiatric illness.

**VNT scoring protocol:**

The Verb Naming Test (VNT), a subtest of the The Northwestern Assessment of Verbs and Sentences (NAVS), was scored according to the protocol with some minor modifications/expansions made for clarity. See <https://aphasia.talkbank.org/protocol/VNT.pdf> for VNT administration and scoring protocol. In brief, a response produced within 10 seconds of item administration was considered for scoring and self-corrections were accepted. Correct responses included: the target verb in any form (e.g., swim, swam, swimming), phonemic paraphasias of the target verb not resulting in a real word, and verbs semantically similar to and with the same argument structure as the target. Incorrect responses included: phrasal verbs and real word phonemic paraphasias of the target verb.

Minor modification

VNT scoring protocol allows for a second response following a first incorrect attempt and prompt from the test administrator. For the purposes of the present study, only a participant’s first response was considered for scoring and any subsequent response prompted by the test administrator, verbally or nonverbally, was not considered for scoring.

​​In another related study assessing the variability in VNT administration, results revealed inconsistent testing administration across various sites, particularly with prompts that deviated from the manual and contained syntactic and semantic information. When the examiner followed the rules and provided an additional exact or approximate prompt following an incorrect first attempt, it did not significantly affect the likelihood of a correct second attempt (only 9.43% correct second attempts were produced). Oftentimes an additional prompt was not even given after an incorrect first attempt due to examiner error (e.g., phrasal verbs produced or the examiner waited until the subject self-corrected < or >10 sec). Thus, we determined that only the first responses within 10 sec should be considered for scoring.

**Scoring protocol expansions:**

An expanded scoring protocol was developed in order to dispel some ambiguity in the VNT scoring protocol, specifically to operationalize (a) selection of the scored attempt in the context of multi-word/multi-verb responses and (b) application of the VNT’s phonological similarity rule (i.e., ‘50% of phonemes must be correct’).

Scored attempt

The final main lexical verb produced as part of the first response was selected for scoring. Auxiliary verbs, verbs produced as personal commentary, and/or copula ‘to-be’ verbs functioning as main lexical verbs were systematically ignored. Paraphasic responses that were phonologically similar to the target or contained inflectional morphemes (e.g., -ing, -ed, -s) were recognized as verb approximations.

Phonological similarity

A verb approximation or paraphasia was judged to be phonologically similar to the target verb only if the number of correct phonemes (i.e., phonemes shared between the target and response) comprised 50% of the total phonemes present in the response and 50% of the total phonemes present in the target. In other words, the 50% correct criterion had to be met for both target and response in order for the attempt to be deemed a phonemic paraphasia of the target. Only the lemma version of the target and response were used when applying this phonological similarity rule, and any inflectional morphemes present in the response (e.g., -ing, -ed, -s) were ignored. The schwa phoneme was included in the shared phoneme count, and rhotic vowels were treated as vowel plus /r/.

**Verb coding:**

A total of seven verb coding conventions were adopted to capture elements of interest in the dataset, possibly for use in developing future editions of the VNT. Only verbs selected for scoring received a verb code, with the exception of ignorable-verb-only responses. See below for a table of the coding conventions used, along with examples and scoring protocol.

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| --- | --- | --- | --- | --- |
| **Verb Types** | **Definition** | **Example** | **Score** | **Code** |
| Semantic Lexical Paraphasia | real word phonemic paraphasia of a verb that is semantically similar to the target verb | Target: wash; Response: leaning the clothes (for cleaning) | 0 | SLP |
| Semantic NonLexical Paraphasia | nonword phonemic paraphasia of a verb that is semantically similar to the target verb | Target: send; Response: smail the letter (for mail) | 0 | SNP |
| Target Paraphasia | phonemic paraphasia of the target verb | Target: stir, Response: sirring the drink (for stirring) | 1 | TP |
| Target Lexical Paraphasia | phonemic paraphasia of the target verb that results in a real word non-target verb | Target: wash, Response: watching the clothes (for washing) | 0 | TLP |
| Semantic Verb | verb (not a paraphasia) that is semantically similar to the target verb and shares the same argument structure (refer to NAVS Appendix B) | Target: shove, Response: push | 1 | SV |
| Phrasal Verbs | a lexical verb plus one or more particles, used together as a unit (e.g. come in, get up, look out for) | Target: watch; Response: look at | 0 | PV |
| Ignorable Verbs Only | only auxiliary verbs, copula to-be verbs, and/or verbs produced as personal commentary are present | Target: Throw; Response: She is... | 0 | IVO |

*Note*: If a phonemic paraphasia (>50% phonologically similar to the target) was produced within a phrasal verb (PV), the response was scored as incorrect and coded as a PV. For instance, *chut out* for *cut out* is a PV that contains a phonemic paraphasia and thus was coded as PV and given a score of 0. Otherwise, when a phonemic paraphasia was produced with a target verb (e.g., *sirring* for *stirring*), it was coded as TP and scored as correct.

**Scoring procedure:**

Phonemically transcribed participant first responses were scored by two undergraduate research assistants at Portland State University in a pseudorandom order in accordance with the expanded VNT scoring protocol. Phonemic transcriptions were recorded of the participant’s first full response after being presented with the test item/first prompt from the test administrator but before a second prompt. Only responses produced within the 10-second time limit were considered for scoring in accordance with the VNT scoring rules. If the participant self-corrected within 10 seconds, the final response was scored. For more information on VNT transcription procedures, conventions, and definition of terms see [VNT transcription information](https://drive.google.com/file/d/1rnzXymuU0r33BlKgg9Eg3nmBuutosAOL/view?usp=sharing). VNT practice items were excluded from the VNT transcription study and the present VNT scoring study.

Research assistants were instructed to: (a) identify the final main lexical verb attempt selected for scoring, if applicable, (b) identify which final verb(s) were ignored according to the expanded protocol, if applicable (c) assign one of seven ancillary verb codes to scored verb attempts, and (d) score the response as correct (1) or incorrect (0).

**Scoring resolutions:**

Research assistant disagreements were resolved by an ASHA-certified speech-language pathologist (SLP) at the level of scored attempt, ignored attempt, binary score, and ancillary verb code. Following the VNT protocol, the NAVS Appendix B was used to determine correct alternate responses judged to be semantically similar with the same verb argument structure to the target. Verb attempts judged to be phrasal verbs were ultimately scored and resolved by two Research SLPs and two linguists with doctoral degrees related to communication sciences and disorders.