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Introduction

Anomia is ubiquitous across persons with aphasia and remains one of the most common targets of treatment. The success of an anomia treatment can be measured by examining its ability to promote generalization, whether to untrained tasks (i.e., stimulus generalization) or untrained stimuli (i.e., response generalization; Thompson, 1989). We focus on response generalization, as there have been mixed findings with the amount and mechanism of generalization (Nickels & Best, 1996). For example, Semantic Feature Analysis (SFA; Boyle, 2010) has shown some evidence of response generalization, where semantically related untrained words are more likely to improve post-treatment than unrelated untrained words (e.g., training *dog* leads to improvement on *cat*, but not *spoon*; Quique et al., 2019). One explanation for response generalization in SFA is that treatment harnesses the structure of semantic memory as activation spreads from trained words to connected untrained words in the language network. Given this model, we hypothesize that more similar untrained words will exhibit greater generalization than less similar untrained words. We sought to examine the degree of relatedness of untrained word probes and its influence on response generalization in previous SFA treatment studies.

Methods

Ten articles from Quique et al's (2019) meta-analysis of SFA were assessed. We considered each study's selection criteria for treatment probes, the relatedness of untrained to trained probes, and considered improvement of untrained probes after treatment. As one measure of response generalization, we calculated the Percentage of Nonoverlapping Data (PND) for naming of untrained probes by participant in each study using Tarlow & Penland's (2016) calculator, where the number of treatment datapoints greater than the highest baseline datapoint is divided by the total number of treatment datapoints (Scruggs et al., 1987). PND provides information about the effectiveness of treatment: highly effective (> 90%), moderately effective (90-70%), questionable effect (70-50%), and ineffective (< 50%) (Scruggs et al., 1987).

Results

Of the ten studies, only four had selected untrained probes based on their relatedness to the trained probes through shared features or category membership. Only one of these studies reported the stimuli used (Wallace & Kimelman, 2013), limiting our ability to systematically quantify the degree of relatedness of untrained probes. Considering Wallace & Kimelman (2013), untrained probes could share features with one or more of the trained probes with a least three or more features in common. PND ranged from highly effective to ineffective across the four studies (Table 1), with no clear relationship between relatedness of untrained probes and PND.

Conclusions

We were unable to answer our initial question: does the degree of relatedness of untrained probes influence response generalization? Further experimental studies should test a continuum of relatedness by asserting more control in the selection of untrained probes. We emphasize a need to better understand the relationship between trained and untrained probes on response generalization given predictions from language models, with an ultimate goal to enhance anomia treatment effectiveness. While we only focused on SFA, our question also pertains to other anomia treatments and types of relatedness (Castro et al., 2021).

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Table 1. Selection of Untrained Probes in Previous Semantic Feature Analysis Studies and Degree of Response Generalization by Participant (Px) using Percentage of Nonoverlapping Data (PND)

Study	Selection of Untrained Probes	Px	PND for Untrained Probes
DeLong et al. (2015)	Probes were either semantically related (2 word sets) or unrelated to trained probes (1 word set). Further, semantically related probes were repeatedly exposed during treatment with (RExp+Ph) or without (RExp) a phonological cue or were administered post-treatment only (LimExp).	1	Related RExp+Ph – 41.93% RExp – 89.19% LimExp – 75% Unrelated – 0%
		2	Related RExp+Ph – 26.67% RExp – 37.88% LimExp – 16.67% Unrelated – 0%
		3	Related RExp+Ph – 83.34% RExp – 59.73% LimExp – 25% Unrelated – 0%
		4	Related RExp+Ph – 85% RExp – 60% LimExp – 25% Unrelated – 66.67%
Lowell et al. (1995)	Probes were either semantically related or unrelated to trained probes (within each of two word sets).	1	Related – 88.89% Unrelated – 88.89%
		2	Related – 82.64% Unrelated to List 1 – 94.45%
		3	Related to List 1 – 34.29% Unrelated to List 1 – 64.29%
Wallace and Kimelman (2013)	Probes either shared many features or no features with trained probes.	1	Shared Features – 18.18% No Shared Features – 45.45%
		2	Shared Features – 100% No Shared Features – 100%
		3	Shared Features – 81.82% No Shared Features – 36.36%
Wambaugh et al. (2013)	Probes were either typical or atypical exemplars of specified categories (within each of either 2 or 4 categories).	1	Typical – 22.98% Atypical – 0%
		2	Typical – 12.5% Atypical – 0%
		3	Typical – 0% Atypical – 0%
		4	Typical – 0% Atypical – 0%
		5	Typical – 0% Atypical 0%

		6	Typical – 4.17% Atypical – 9.38%
		7	Typical – 0% Atypical – 12.5%
		8	Typical – 25% Atypical – 0%
		9	Typical – 60.42% Atypical – 9.38%