# Do the kinds of features that patients generate during Semantic Feature Analysis affect treatment outcomes?

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## BACKGROUND

- Semantic Feature Analysis (SFA) is an aphasia treatment that improves naming for **trained words** and **untrained, semantically-related words.**[1]
- Gravier et al.[2] found that the **number of patient-generated features** was **predictive of naming** for both **direct training** and **generalization.**
- Suggests that ***patient-generated*** access to semantic features is important for **generalization.**

***BUT*** do the **types** of features generated matter?
***OR*** does **diversity** in feature generation improve response?

**Hypothesis 1: Description** (imageability) and **personal-association** (salience) categories will be **predictive** of gains on **all** items for both ***total number*** **and** ***unique*** *number* of features.

**Hypothesis 2:** Effects will depend on whether **successful repeated retrieval** (total features) **or activated semantic diversity** (unique features) is key.

## METHODS

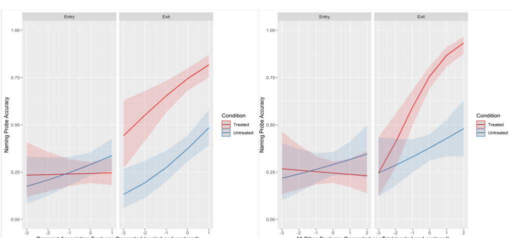
Separate trial-level **logistic mixed-effect regression** analyses[3] for self-generated semantic features **for each feature type** and for **total** and **unique** features generated.

## RESULTS

*Question 1:* For **four feature categories** (excluding personal association), generating more features was related to improved naming **more for trained items than untrained items** (table 2.)

- Likelihood ratio[4] & bayes factor[5] suggest personal association features affected direct training and generalization equally.

*Question 2:* **No evidence** that the number of **unique** features generated in any category was related to naming improvement. (table 3.)




## DISCUSSION

- **Repeated, successful feature retrieval** is predictive of **treatment outcomes;** greater feature diversity is not.
- Generation of personally-relevant features may be associated with greater generalization.
- Effect sizes were relatively small.

# The total number of features generated, not feature diversity, is associated with better outcomes in Semantic Feature Analysis

# Generating personal association features is equally related to naming improvement for direct training and generalization

## PARTICIPANTS

*Table 1. Participant Demographics (n = 38)*

| | | Mean (sd) | Median | Range |
|---|---|---|---|---|
| **Age (years)** | | 60.4 (12.4) | 63.5 | 24 - 78 |
| **Education (years)** | | 15.1 (3.3) | 14 | 10- 25 |
| **Months post-onset** | | 68.7 (58.7) | 57 | 7 - 245 |
| **Aphasia Severity** | | 52.1 (4.5) | 51.1 | 45.3 - 62.3 |
| | | | Frequency | Percentage |
| **Gender** | | Male (Female) | 33 (5) | 86.8 (13.2) |
| **Race** | | W (AA+NA+H) | 31 (7) | 81.6 (18.4) |
| **Handedness** | | Right (Left) | 34 (4) | 89.5 (10.5) |

*Aphasia Severity = CAT mean T-Score AA = African-American, NA = Native American, H = Hispanic, W = White*

## TREATMENT

**Feature Types:**
*Personal Association*
*Location/Context*
*Superordinate*
*Description*
*Use/Function*


## ANALYSIS

**Outcome measure**: naming accuracy at entry and exit.
**Fixed Effects**: Item-type (treated/untreated), Time (entry/exit), Feature Generation (with interactions)
***Question 1****: Total number of features generated*
***Question 2****: Number of unique features generated*
**Covariate:** Severity **Random intercepts:** participants and items

**Likelihood Ratio:** Bits of Evidence[4]: -1.97
Given the data, Likelihood of no difference is 4:1
**BIC Estimated Bayes Factor[5]:** 32: strong evidence for 'no difference'

*Table 2. Mixed Logistic Model Coefficients for the* ***total*** *number of features per feature category*

| | Location/ Context | Description | Use/ Function | Superordinate | Personal Association |
|---|---|---|---|---|---|
| **Fixed Effects** | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* |
| Main effects of time | 1.31(.11)*** | 1.33(.11)*** | 1.32(.11)*** | 1.31(.11)*** | 1.29(.11)*** |
| Main effects of condition | -0.68(.12)*** | -.70(.12)*** | -0.67(.12)*** | -0.69(.12)*** | -0.67(.12)*** |
| Main effects of feature category | 0.22(.09)* | 0.22(.10)* | 0.01(.09) | 0.32(.09)*** | 0.27(.09)** |
| Aphasia Severity | 0.53(.11)*** | 0.51(.11)*** | 0.56(.12)*** | 0.46(.11)*** | 0.54(.10)*** |
| Time*Condition | -1.82(.21)*** | -1.86(.21)*** | -1.84(.21)*** | -1.83(.21)*** | -1.82(.21)*** |
| Time*features category | 0.27(.11)* | 0.46(.11)*** | 0.37(.11)*** | 0.38(.11)*** | 0.32(.11)** |
| Condition* feature category | -.017(.12) | -0.22(.12) | -0.07(.11) | -0.17(.12) | 0.10(.11) |
| Time*condition*features category | -.43(.22)* | -0.78(.21)*** | -0.60(.21)*** | -0.61(.22)*** | -0.17(.22) |
| **Random Effects** | $s^2$ | $s^2$ | $s^2$ | $s^2$ | $s^2$ |
| Participants | .30 | .30 | .41 | .28 | .27 |
| Items | .59 | .61 | .58 | .59 | .58 |

*Note. Excluding intercepts, Coef = estimation of the effect on naming accuracy in log odds, SE = standard error. * <.05 **<.01***<.001. Personal Association Features Model: Bits of Evidence: 4:1; Bayes Factor, $BF_{01}$ = 33.8; Posterior probability: .97*

*Table 3. Mixed Logistic Model Coefficients for number of* ***unique*** *features per feature category*

| | Location/ Context | Description | Use/ Function | Superordinate | Personal Association |
|---|---|---|---|---|---|
| **Fixed Effects** | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* | *Coef.(se)* |
| Main effects of time | 1.31(.11)*** | 1.32(.11)*** | 1.32(.11)*** | 1.34(.11)*** | 1.31(.11)*** |
| Main effects of condition | -0.64(.12)*** | -0.63(.12)*** | -0.65(.12)*** | -0.66(.12)*** | -0.65(.12)*** |
| Main effects of feature category | .17(.08)* | 0.16(.08) | 0.27(.09)** | 0.10(.07) | 0.15(.08) |
| Aphasia Severity | .55(.12)*** | 0.54(.12)*** | 0.53(.13)*** | 0.57(.12)*** | 0.56(.13)*** |
| Time*Condition | -1.82(.21)*** | -1.83(.21)*** | -1.82(.21)*** | -1.83(.21)*** | -1.82(.21)*** |
| Time*features category | -0.015(.10) | -0.10(.1) | -0.06(.10) | -0.14(.10) | 0.05(.1) |
| Condition* feature category | -0.13(.11) | -0.22(.11) | -0.09(.11) | -0.11(.11) | -0.12(.11) |
| Time*condition*features category | 0.19(.20) | 0.21(.20) | 0.076(.20) | 0.01(.20) | -0.014(.21) |
| **Random Effects** | $s^2$ | $s^2$ | $s^2$ | $s^2$ | $s^2$ |
| Participants | 0.43 | 0.45 | .50 | .44 | .46 |
| Items | 0.55 | 0.58 | .56 | .55 | .57 |

*Note. Excluding intercepts, Coef = estimation of the effect on naming accuracy in log odds, SE = standard error. * <.05 **<.01***<.001*

**Literature Cited:**

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