

## Common and Distinctive Semantic Feature Knowledge in Persons with Aphasia

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### Purpose

How semantic representations are stored and processed is an area of interest in aphasiology. Deficits in semantic knowledge are often a symptom of aphasia. Thus, the present study investigated the nature of semantic feature knowledge in persons with aphasia. The relationship between feature knowledge and the ability to choose among semantically related foils was also examined. In addition, the relationship between semantic feature knowledge and comprehension and naming abilities was investigated.

### Participants

Ten adults with aphasia resulting from no more than two left-hemisphere cerebrovascular accidents participated in the study.

**Participant Characteristics**

Participant	T/NP*	Age <sup>b</sup>	TPO <sup>c</sup>	BNT <sup>d</sup>	BDEALCI <sup>e</sup>
1	F	59	15	12	77.5
2	NF	74	360	0	10
3	F	70	5	15	87.5
4	NF	72	102	0	5
5	NF	66	66	0	27.5
6	F	77	4	1	53
7	NF	79	240	0	6
8	F	72	4	11	72
9	F	72	5	5	60
10	F	50	9	14	77
<b>Mean</b>	---	<b>69.1</b>	<b>81</b>	<b>5.8</b>	<b>47.6</b>
<b>SD</b>	---	<b>9.7</b>	<b>123.3</b>	<b>6.5</b>	<b>32.5</b>

\*Fluent aphasia, NF nonfluent aphasia  
<sup>b</sup>Age in years  
<sup>c</sup>Time processed in minutes  
<sup>d</sup>Boston Naming Test – shortened version (max=15)  
<sup>e</sup>BDAE Language Competency Index (percentile max=10)

### Methods

- Participants completed subtests from the shortened version of the Boston Diagnostic Aphasia Examination and the shortened version of the Boston Naming Test to determine comprehension and naming abilities.
- Participants completed tasks for choosing among semantically unrelated and related foils and a sorting task involving common and distinctive features controlled for high and low importance.

### Experimental Tasks

- Stage 1: Target determination by choosing among semantically unrelated foils
- Stage 2: Feature sorting task for correctly identified targets
- Stage 3: Choose targets from semantically related foils

### Example of stimulus items

Item	Common	Distinctive	Heurist
High Importance Common Features	Vegetable	Animal	Exotic
High Importance Distinctive Features	Orange	Eat nuts	Feed with
Low Importance Common Features	Chick	Erwin	In wood shop
Low Importance Distinctive Features	Put in cake	Small	Chew

### Participant Groupings

Ability to choose among semantically related foils was used to divide the participants into groups. Five participants were grouped as having the ability to choose among related foils and five participants were grouped as having difficulty choosing among related foils.

### ANOVA Results

Results from experimental tasks were computed using SPSS software. A three-way ANOVA was used to investigate the main effects and interactions for group, commonality versus distinctiveness of features, and importance of features. Results of the ANOVA showed a significant main effect for group,  $F(1,8)=17.33, p=0.00$ , importance,  $F(1,8)=11.11, p=0.01$ , commonality versus distinctiveness,  $F(1,8)=8.10, p=0.02$  and a significant three-way interaction between importance and commonality versus distinctiveness and group,  $F(1,8)=6.09, p=0.04$ .

Results of the Three-Way Mixed ANOVA (N=10)

Source	df	Effect Size	Mean Square	F	Significance
Group	1,8	0.68	384.40	17.33	0.00
Importance	1,8	0.58	72.9	11.11	0.01
C/d <sup>1</sup>	1,8	0.50	25.6	8.10	0.02
Group X Importance	1,8	0.00	0.10	0.02	0.91
Group X c/d	1,8	0.13	3.60	1.14	0.32
Importance X c/d	1,8	0.14	2.50	1.26	0.30
Group X Importance X c/d	1,8	0.43	12.10	6.09	0.04

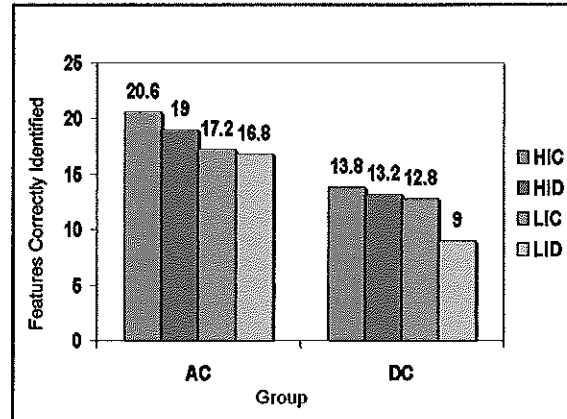
<sup>1</sup>C/d=commonality versus distinctiveness

### Within and Between-Group Differences

Within-group and between-group differences for high- and low-importance common and distinctive feature knowledge were investigated using a series of *t*-tests. Results showed significant differences between groups for identification of high importance common features,  $t(8)=4.14, p<0.00$ , high importance distinctive features,  $t(8)=3.13, p<0.01$ , and low importance distinctive features,  $t(8)=4.55, p<0.00$ . Results showed significant within-group differences for the group who were able to choose among related foils for high-importance common versus low-importance common features,  $t(4)=2.92, p<0.04$ , high-importance common versus low-importance distinctive features,  $t(4)=5.73, p<0.00$ , and high-importance distinctive versus low-importance distinctive features,  $t(4)=3.34, p<0.03$ . In addition, results showed significant within-group differences for the group who had difficulty choosing among related foils for high-importance common versus low-importance distinctive features,  $t(4)=2.71, p<0.05$ , high-importance distinctive versus low-importance distinctive features,  $t(4)=3.38, p<0.03$ , and low-importance common versus low-importance distinctive features,  $t(4)=3.06, p<0.01$ .

*Means and Standard Deviations for Experimental Conditions by Group*

Group	HIC	HID	LIC	LID	
Ability to Choose	Mean	20.6	19.0	17.2	16.8
	SD	0.5	1.9	2.2	1.5
Difficulty Choosing	Mean	13.8	13.2	12.8	9.0
	SD	3.6	3.7	4.2	3.5
Between-group differences	$p=0.00$	$p=0.01$	Not significant	$p=0.00$	



### Correlations

In addition, results also showed that feature knowledge correlated with comprehension scores from the shortened version of the Boston Diagnostic Aphasia Examination and with naming scores from the shortened version of the Boston Naming Test. Specifically, high-importance common feature knowledge correlated significantly with BDAE scores ( $r=0.89, p=0.00$ ) and BNT scores ( $r=0.77, p=0.01$ ). High-importance distinctive feature knowledge correlated significantly with BDAE scores ( $r=0.91, p=0.00$ ) and BNT scores ( $r=0.79, p=0.01$ ). In addition, low-importance distinctive feature knowledge correlated significantly with BDAE scores ( $r=0.93, p=0.00$ ) and BNT scores ( $r=0.86, p=0.00$ ). In addition, all feature conditions, BDAE scores, and BNT scores correlated significantly with the identification of semantically related foils.

*Correlations among Participants' Scores (N=10)*

	BDAE <sup>a</sup>	BNT <sup>b</sup>	Related foils <sup>c</sup>
HIC <sup>a</sup>	0.89**	0.77**	0.97**
HID <sup>b</sup>	0.91**	0.79**	0.90**
LIC <sup>c</sup>	0.93**	0.86**	0.88**
LID <sup>d</sup>	0.93**	0.86**	0.88**
BDAE <sup>a</sup>	---	0.82**	0.94**
BNT <sup>b</sup>	---	---	0.84**

### Discussion

Findings support that both importance and commonality versus distinctiveness of features play a significant role in the semantic feature knowledge of persons with aphasia and impact their ability to choose among semantically related foils. Participants with aphasia who have difficulty choosing among semantically related foils have greater deficits with high-importance common and distinctive feature knowledge and low-importance distinctive feature knowledge than those who are able to choose among semantically related foils. In addition, participants who have more intact semantic representations in regard to high-importance common and distinctive features and low-importance distinctive features appear to have better comprehension and naming abilities. These participants are also better able to choose among semantically related foils. Clinicians should use this information to inform treatment target selection and methodology.