

Semantic Category Effects in Sentence Production

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Introduction

Verbs can be categorized into semantically coherent categories according to meaning components which are relevant to argument structure (Levin, 1993; Pinker, 1989).

Argument structure biases are controlled by semantic category (Argaman & Pearlmutter, 2002): Verbs that belong to the same semantic category tend to have similar argument structure biases:

e.g.:
Say verbs *announced, claimed, suggested* high SC-bias
Transfer of Message *dictated, explained, showed* medium SC-bias
Manner of Speaking *mumbled, shouted, whispered* low SC-bias

Research Question

Is semantic category psychologically valid? Is there a semantic category level of representation in the mental lexicon?

Syntactic Priming

An unintentional and pragmatically unmotivated tendency to repeat the general syntactic structure of an utterance (Weiner & Labov, 1983; Bock, 1986)

Syntactic priming is stronger across the same verb (when prime and target verbs are identical) than across different verbs (Pickering & Branigan, 1998).

Current Experiment:

Is priming across same verb category stronger than across different verb categories?

Method

- 100 participants
- silently read a prime set of 5 sentences, then verbally completed sentence-initial fragments, consisting of a proper name and a verb
- performed a secondary memory task: had to state whether a probe word had appeared in the prime sentences
- target verbs were 18 SC-taking verbs and 12 alternating dative verbs (e.g., *gave, sent*);
- 30 fillers

Two factors were manipulated in the prime set:

BIAS - argument structure bias of the prime set

4 to 1 - four sentences with structure of interest (SC for SC-taking verbs or double object for dative verbs), one sentence with alternative structure (direct object NP or prepositional object)

1 to 4 - one sentence with structure of interest, four with alternative structure

MATCH - semantic relationship between prime set verbs and target verb

same verb - target verb is repeated in all prime set sentences

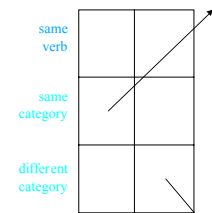
same category - prime set verbs from same category as target verb

different category - prime set verbs from a different category than target verb

Example item:

Target: *Holly stated...*

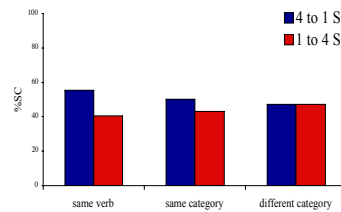
4 to 1 **1 to 4**



The protesters claimed that they had the right to strike.
Alice conveyed that she had an idea for the new ad layout.
The injured biker reiterated her desire to continue the ride.
The CEO revealed that the plan for next quarter was ready.
The officer reported that the incident occurred during the late shift.

The sergeant barked the orders to his platoon.
Jason muttered an excuse about his homework.
Brenda murmured that she couldn't answer the question.
Annie whispered the rumor to the other club members.
The lifeguard yelled the name of the missing boy.

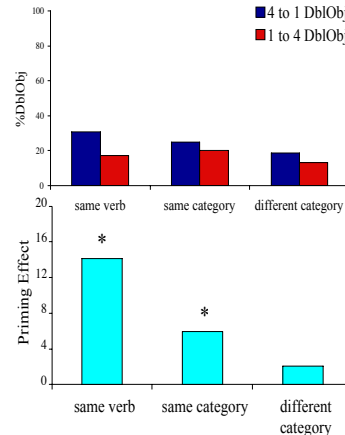
Results



Collapsing over verb types

(SC-taking and Datives):

- significant bias effect
- significant bias X match interaction



References

- Argaman, V. and Pearlmutter, N. J. (2002). Lexical semantics as a basis for argument structure frequency biases. In P. Merlo and S. Stevenson (Eds.), *The Lexical Basis of Sentence Processing*. Amsterdam: John Benjamins.
- Bock, J. K., (1986). Syntactic persistence in language production. *Cognitive Psychology*, 18, 355-387.
- Pickering, M. and Branigan, H. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory and Language*, 39, 633-651.
- Weiner, E. J., and Labov, W. (1983). Constraints on agentless passive. *Journal of Linguistics*, 19, 29-58.

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Contrast Analyses

Means in the three match conditions were used to test several hypothesis about the priming effect size in the same category condition relative to the same verb and different category conditions:

Hypothesis	Weights			F ₁	F ₂
	Svrb	Scat	Dcat		
Svrb > (Scat, Dcat)	2	-1	-1	6.95**	8.12**
(Svrb, Scat) > Dcat	1	1	-2	5.47*	4.47*
Svrb > Scat > Dcat	1	0	1	8.25**	8.22**
Scat > (Svrb, Dcat)	-1	2	-1	0.09	0.54

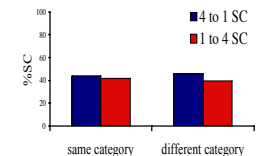
Svrb = same verb; Scat = same category; Dcat = different category

The contrast with the most explanatory power indicates that the priming effect of the same category condition is intermediate in size.

Follow Up

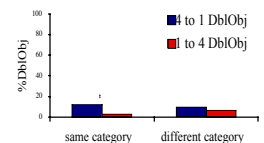
Alternate Methodology:

- target is preceded by only one prime sentence
- only same category and different category conditions
- participants read prime sentence out loud.



Preliminary Results (40 items, 36 Participants):

a significant priming effect only for the same category condition of the Dative verbs



Conclusions

- replicated Pickering and Branigan (1998) -- priming across identical verbs is stronger than across different verbs;
- priming across verbs within a semantic category is weaker than across identical verbs but stronger than across verbs from different semantic categories.

These results suggest:

Verb semantic category information is tracked and used by the sentence production system.

The mental lexicon includes a semantic category level of representation.