Structural Similarity and Semantic Integration Effects on Exchange Error Production

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INTRODUCTION

Which semantic and syntactic properties increase ordering error likelihood?

Phrase and word exchanges occur during grammatical encoding (Bock & Levelt, 1994).

Phrase exchange: Functional level—Two full phrases assigned to each other’s intended syntactic role
I got into this guy with a discussion. (Intended: I got into a discussion with this guy.) (Garrett, 1980)

Word exchange: Functional level—Two lemmas assigned to each other’s intended syntactic role, OR
Positional level—Two lexemes assigned to each other’s intended serial position
I left the briefcase in my cigar. (Intended: I left the cigar in my briefcase.) (Garrett, 1980)

Grammatical encoding stage follows message-level encoding stage.
- Influenced by both semantic (message/conceptual) and syntactic properties

Semantic/Conceptual Properties

Semantics integration (Solomon & Pearlmutter, 2004)
Degree of message-level relatedness between utterance elements to be planned
Reflects how closely linked parts of messages are
Affects phrase exchange (functional level) error rates (DiBattista & Pearlmutter, 2010):
Errors more likely for integrated than for unintegrated stimuli

Syntactic Properties

Correspondence of grammatical function and grammatical category (Garrett, 1980)
Exchanging phrases and words tend to have the same (or similar) grammatical roles.
E.g., two NP heads exchange; two PP objects exchange.

Word errors tend to occur between utterance components with the same grammatical category.
E.g., verbs exchange with verbs, or adjectives exchange with adjectives.

Another type of grammatical similarity: Structural Similarity
- Not previously explored in corpus analyses
- Should influence grammatical encoding processes, as other types of grammatical similarity do

Internal structural similarity or similarity of syntactic context:

Similarity of internal structure
the blue shelf above the green sink
Same internal syntactic structure
the blue shelf above the sink
Different internal syntactic structure

Similarity of syntactic context
the blue shelf above the green sink
Same syntactic context
the blue shelf above the sink
Different syntactic context

Extension of Garrett (1980):
Errors will be more likely for structurally similar utterances, extending corpus work showing greater error likelihood when grammatical function and category correspond.

Compared to utterance components lacking structural similarity
- NPs with same internal structure more likely to exchange.
- Words in same syntactic contexts more likely to exchange.

METHOD

Which color schemes and structural similarity conditions are effective?

Three color schemes, collapsed into two structural similarity conditions
4 color schemes, collapsed into 2 structural similarity conditions

Color application on pictures determined presence of placement of utterances adjectives.

Four color schemes, collapsed into 2 structural similarity conditions

Both Components Colored Same Structure
Neither Component Colored Different Structure

Neither Component Colored Same Structure
Both Components Colored Different Structure

METHOD (CONT’D)

<table>
<thead>
<tr>
<th>Structure</th>
<th>Picture</th>
<th>Color Scheme</th>
<th>Correct Description (Preferred)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same</td>
<td>Both Components</td>
<td>the blue shelf above the green sink</td>
<td></td>
</tr>
<tr>
<td>Different</td>
<td>First Component</td>
<td>the blue shelf above the sink</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Second Component</td>
<td>the shelf above the green sink</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS

Error responses to ‘Neither Colored’ pictures excluded: Ambiguous error category assignment
Weighted linear regressions on empirical-logit transformed error proportions
Fixed effects: Integration, Structural Similarity, Preference, and their interactions
Either participants or items as random effect

Untransformed Error Rates

Structural similarity affects exchange error rates,
- Presence of structural similarity increases likelihood of errors.
- Phrase errors sensitive to internal structural similarity
- Word errors sensitive to syntactic contextual similarity
- Experimental support for type of grammatical similarity not previously investigated

DISCUSSION

Nonsignificant preference effect for word errors; less power to detect it with so few word errors.

REFERENCES & ACKNOWLEDGEMENTS


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