Simultaneity of Planning Increases Interference in Subject-Verb Agreement Production

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INTRODUCTION
How is agreement computed in language production, and when does it fail?

Structural Accounts
Clause Boundedness: Number features of nouns in separate clauses are planned separately because the planning unit in language production is the clause; number features in separate clauses are unlikely to interfere with each other (Bock & Cutting, 1992).

Hierarchical Feature Passing: Features of nouns pass through the syntactic tree to verb targets; occasionally features of hierarchically proximal local nouns pass incorrectly to the verb, causing errors (Franck et al., 2002).

Timing of Planning Accounts

Semantic Integration: A representation of the number of the subject NP is encoded during its planning and then copied to the verb; elements within an utterance that are conceptually linked are planned with more temporal overlap, which allows their features to interfere with each other during encoding (Solomon & Pearlmutter, 2004).

Scope of Planning: A representation of the number of the subject NP is encoded during its planning and then copied to the verb; local nouns planned closer in time to the head noun, due to linear proximity and semantic integration, are more likely to interfere with agreement computation (Gillespie & Pearlmutter, 2009).

Do structural or timing-of-planning properties determine interference effects?

Gillespie & Pearlmutter (2009) found no evidence of structural effects in NP PP PP preambles, supporting a timing of planning account of agreement computation.

Solomon & Pearlmutter (2004) and Bock & Cutting (1992) found a clause boundedness effect when linear proximity and semantic integration were equated in PP and RC stimuli, which supports structural accounts.

EXPERIMENT 1A & B
Is the clause boundedness effect observed when phrasal and clausal stimuli are matched in semantic integration, number of adjectives, and overall meaning?

METHOD
Stimuli & Design
Phrase: The pizza with the missing slice(s)
Clause: The pizza that had the missing slice(s)

Procedure & Participants
-Exp. 1A: Preambles presented visually, read aloud and completed as full sentences.
-Exp. 1B: Preambles presented visually, read silently, repeated aloud after a tone, and completed as full sentences.

RESULTS
No interactions with Experiment 1A vs. 1B

PREDICTIONS
Main effect of N2 number (mismatch effect)
Phrase mismatch > Clause mismatch

SUMMARY
No evidence for clause boundedness or hierarchical distance observed for these well-matched stimuli, which challenges structural accounts and supports timing accounts.

REFERENCES & ACKNOWLEDGMENTS

EXPERIMENT 2
Was unequal number of adjectives responsible for the clause boundedness effect in earlier work?

METHOD
Stimuli & Design
Phrase: The pizza with the missing slice(s)
Clause: The pizza with the large missing slice(s)

Procedure & Participants
Preambles presented visually, read aloud and completed as full sentences.

RESULTS
Plural > Singular

PREDICTIONS
Bock & Cutting (1992)
Mismatch effect
N2 number X length interaction:
Phrase mismatch > Clause mismatch

SUMMARY
Number of adjectives unlikely to have caused clause boundedness effect in previous stimuli, as preambles with more adjectives produced fewer errors.

STIMULI COMPARISON
Bock & Cutting (1992, Exp. 3): The notion of the wild roaming (talking) horse(s)

Implausible --> More adjectives may make stimuli less plausible, leading to greater overall complexity and increased chance of errors.

DISCUSSION
Timing of planning accounts better explain agreement computation.

Experiment 1
- Supports and extends Gillespie & Pearlmutter’s (2009) scope of planning account: Plural local nouns planned close in time to the head noun cause interference, regardless of structural configuration.

Experiment 2
- Likely due to differences in stimuli
- Suggests adjectives are planned before nouns they modify.
- Increasing number of adjectives delays planning of local noun, thus decreasing chance of interference
- Consistent with scope of planning account.

Implications for models of agreement computation
Models of agreement processing may not require a structural component, as equal interference effects were observed from elements within and across clauses.

Something besides structure likely to be responsible for clause boundedness effects in previous studies, though unlikely to have been differing number of adjectives.

Scope of planning makes use of the sequential, temporal nature of language production.
Models of agreement computation should use a measure of a local noun’s relative timing of planning to predict mismatch effects.

Important to determine which interference effects are due to memory encoding, as suggested by timing accounts, and which are due to retrieval (Badecker & Lewis, 2007).

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