Semantic Integration and Hierarchical Feature-Passing in Sentence Production

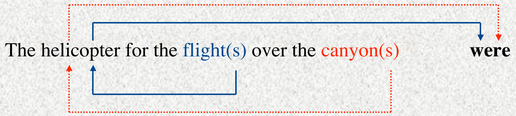
Eric S. Solomon & Neal J. Pearlmutter, Northeastern University

INTRODUCTION

How is number agreement implemented in sentence production?

Hierarchical Feature-Passing

Franck, Vigliocco, & Nicol (2002): Hierarchical feature-passing is the underlying mechanism.



— Higher agreement error rate when N2 was plural compared to when N3 was plural.

— Error rates depend on syntactic distance from plural local NP to highest subject NP node, with shorter distances yielding increased error rates.

Semantic Integration

Solomon & Pearlmutter (in press): Semantic integration influences agreement error rates.

Semantic Integration: the degree to which two elements are linked at the message level during production

The pizza with the yummy topping(s) (tightly integrated)
The pizza with the tasty beverage(s) (loosely integrated)

— Tightly integrated subject NPs elicited more agreement errors than loosely integrated subject NPs, relative to singular controls.

— Hierarchical distance between local NP and subject NP node does not vary.

— Effect of semantic integration is distinct from hierarchical effects.

EXPERIMENT 1

Can semantic integration potentially explain Franck et al.'s hierarchical distance result?

The helicopter for the flight(s) over the canyon(s)

— N1 and N2 more tightly integrated than N1 and N3?

— If so, integration may be able to account for higher error rates when N2 is plural compared to when N3 is plural.

Method

— Stimuli from Experiment 2 in Franck et al. rated for semantic integration on a scale from 1 (not integrated) to 7 (tightly integrated).

— Obtained integration ratings for N1- N2 relationship and for N1- N3 relationship.

— 240 participants, 32 items, 24 counterbalanced lists

Results

Mean semantic integration ratings:

N1-N2 = 4.54

N2-N3 = 3.05

($t = 16.52$, $p < .0001$)

— N1- N2 more integrated than N1- N3.

— Higher error rate for plural N2 in Franck et al. could be due to integration differences rather than hierarchical distance.

EXPERIMENT 2

Does hierarchical distance affect error rates when semantic integration is held constant?

The mango by the pineapple(s) near the blender(s)

— 24 stimulus sets, 60 fillers

— Subject-verb agreement error elicitation procedure

— 43 participants produced completions to preambles

Semantic Integration Ratings

— 140 participants rated preambles for integration as in Experiment 1.

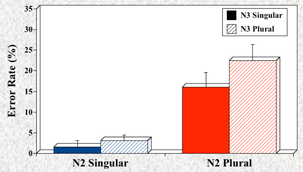
— Mean semantic integration ratings were matched for N1-N2 versus N1-N3 (M = 3.8 for each pair).

Attachment Preferences

— 60 participants showed that the final PP in the stimuli (*near the blender(s)*) modified NP2 rather NP1.

— Attachment rate to NP2 was 70%.

Error Rate Results



— Main N2 number effect; no N3 number effect; no interaction

— Size of number effect larger when only N2 was plural than when only N3 was.

CONCLUSIONS

Semantic integration and hierarchical distance are confounded in Franck et al (2002).

— Higher integration ratings for N1-N2 pairs than for N1-N3 pairs

— Large effect of N2 number in Franck et al. could be due to integration differences.

Larger effect of N2 number than of N3 number even when semantic integration is controlled.

— Hierarchical distance influences error rates even when integration is controlled.

— Both semantic integration and hierarchical distance are relevant factors in producing subject-verb agreement.

REFERENCES

Franck, J., Vigliocco, G., & Nicol, J. (2002). Subject-verb agreement errors in French and English: The role of syntactic hierarchy. *Language and Cognitive Processes*, **17**, 371-404.

Solomon, E.S., & Pearlmutter, N.J. (in press). Semantic integration and syntactic planning in language production. *Cognitive Psychology*.

ACKNOWLEDGEMENTS

This research was supported by The National Institute on Deafness and Other Communication Disorders (NIH Grant 1 R01 DC05237-01).