

Advance planning and speech error production in a picture description task

Maureen Gillespie (University of Illinois, Urbana-Champaign) & Neal J. Pearlmutter (Northeastern University)
mgillesp@illinois.edu

Production; Speech errors; Speech rate; Picture description task; English

Planning in production is incremental, but some amount of advance planning usually occurs as well. Thus, multiple elements are simultaneously active, which increases the chance of interference, resulting in speech errors (Garrett, 1975). Recently, Gillespie and Pearlmutter (2011; GP) suggested that subject-verb agreement errors (e.g. (1)), are more likely when a plural local noun (*pages*) is planned overlappingly with a singular head (*book*). GP argued local nouns were more likely to be planned within the scope of the head if they were semantically integrated (i.e., tightly conceptually linked, Solomon & Pearlmutter, 2004) or appeared closer in the articulated utterance. According to GP's scope of planning account, agreement errors and anticipatory and exchange errors (e.g., (2)) should pattern similarly. In two experiments, participants described picture displays using complex subject noun phrases, as in (3), with singular head nouns and singular or plural local nouns within PP modifiers, and then completed them as sentences. Semantic integration was manipulated by varying the preposition linking the head and local nouns (3a vs. 3b). Agreement errors, morpheme ordering errors, and speech onset times (SOTs) were recorded. Analyses used mixed-effects models.

In Experiment 1 (122 participants), agreement errors were more likely when the local noun was plural than when it was singular ($t = 4.28, p < .001$). Ordering errors were too rare to analyze. Some speakers' SOTs were affected by semantic integration and local noun plurality, while other speakers' SOTs were not affected by any manipulations affecting words after the head noun, suggesting speakers varied in how much planning they completed before speech onset. Supporting GP's scope of planning account, speakers who showed effects of integration condition and local noun number in SOTs produced significantly more agreement errors, suggesting that increased advance planning increases speakers' chances of experiencing interference during agreement computation.

To follow up on SOT differences across speakers in Experiment 1, and because increasing speech rate has been shown to increase anticipatory phonological errors (Dell et al., 1997), half of the 162 participants in Experiment 2 were given instructions to speak very quickly while the remainder were instructed to speak fluently. Agreement errors were again more likely when the local noun was plural than when it was singular ($t = 5.50, p < .001$), and the mismatch effect was numerically larger in the fast condition (15.3%) than in the fluent condition (11.2%). Anticipatory morpheme ordering errors were rare (~5% of all picture description errors), but showed nearly identical patterns across instruction version. Data collection is ongoing.

Taken together, these findings support GP's scope of planning hypothesis and suggest that the degree of advance planning during sentence production affects grammatical encoding, and that agreement errors and ordering errors may be linked by some of the same underlying processing mechanisms: Speakers are more likely to experience interference when multiple elements are simultaneously prepared for production.

The book with the torn pages *ARE...

The book with the torn pages -> The pages with the torn book

- a. The apple for the pie(s) Integrated
- b. The apple near the pies(s) Unintegrated

References

- Dell, G.S., Burger, L. K., & Svec, W.R. (1997). Language production and serial order: A functional analysis and a model. *Psychological Review*, 104, 123-147.
- Garrett, M.F. (1975). The analysis of sentence production. In G. Bower (Ed.) *Psychology of learning and motivation*. (Vol. 9, p. 137-177). New York: Academic Press.
- Gillespie, M. & Pearlmutter, N.J. (2011). Hierarchy and scope of planning in subject-verb agreement production. *Cognition*, 118, 377-397.
- Solomon, E.S. & Pearlmutter, N.J. (2004). Semantic integration and syntactic planning in language production. *Cognitive Psychology*, 49, 1-46.