

## Can planned words trigger interference during real-time sentence production?

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Previous research has shown that the production of verbs, reflexives, and object pronouns can be disrupted by preceding nouns with mismatching morphosyntactic features, a phenomenon known as “agreement attraction” [1, 2]. However, production studies have largely been limited to configurations in which the mismatching noun—the “attractor”—is spoken before the target word. Thus, it is unknown whether speakers can be disrupted by the features of a noun that they are planning to say but have not yet produced. We address this gap using possessive pronouns as a test case. English possessive pronouns agree with the gender of the possessor and not the gender of the possessee, e.g., *Susan chased her/\*his grandpa*. Notably, the possessee noun (e.g., *grandpa*) is part of the same planning unit—and has a close syntactic relationship—with the pronoun [3]. Therefore, although it is uttered after the pronoun, the planned possessee noun might act as an attractor and interfere with pronoun selection, resulting in pronoun errors or longer speech latencies. To test this hypothesis, we adapted a paradigm previously used with learners of English [5,6] such that we could detect interference effects in speech accuracies and latencies in native speakers.

**Method.** 112 native English speakers participated in a timed production task. Materials included *pronoun trials* and *verb trials*—the latter were used to ensure that our task could detect attraction effects. We focus on the pronoun trials. The stimuli contained possessor and possessee nouns that matched or mismatched in gender (Table 1). In each trial, participants saw a fixation, followed by a character with a statement, and then a probe word (Figure 1). The task was to recall and reproduce what the character had said using the probe word, which required converting the statement from the first to the third person using a pronoun. More errors and/or delays in responses in the mismatch vs. match condition would indicate that the gender of the possessee noun interfered with pronoun selection. Generalized linear mixed-effects models were used to analyze error rates, and linear mixed-effects models were used to analyze the duration of the verb and pronoun.

**Results.** As expected, we found robust number attraction effects in the verb trials in both accuracy and duration measures (Figure 2). In contrast, pronoun errors were rare (2.1%, 48 out of 2265 trials), with no significant differences between the match and mismatch conditions ( $p > .05$ ). Of all pronoun errors, 13% were gender reversal errors, with numerically more errors in the mismatch than match condition (Table 2). No significant differences between conditions were found in the duration of the pronoun or preceding verb ( $p > .05$ ).

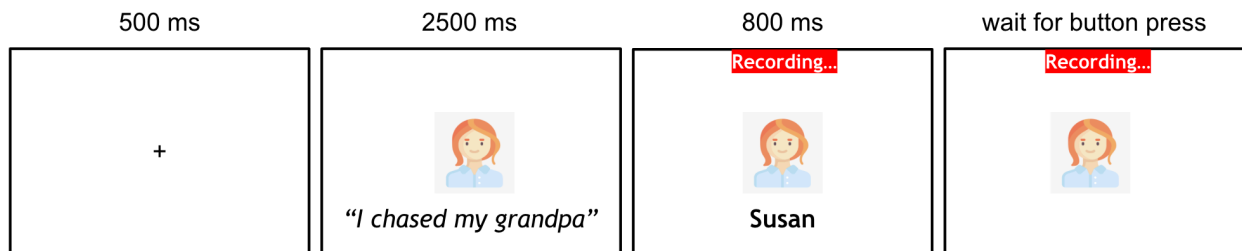
**Discussion.** Our findings indicate that English speakers rarely make gender errors with possessive pronouns, and that a planned-but-unspoken possessee noun rarely interferes with pronoun selection. This contrasts with the attraction effects previously reported with object pronouns, which occurred in sentences in which the attractor noun preceded the pronoun [1,2]. Given the robust number attraction effect found with verbs, our failure to detect interference was not likely due to task limitations. Rather, our results indicate that interference in pronoun production may be limited to articulated, rather than planned, mismatching elements.

We are currently replicating the study with native speakers of German, a language where the pronoun must agree in gender with both the possessor and the possessee noun. Thus, German critically differs from English in that the gender of the possessee is relevant for agreement. The cross-linguistic comparison will help clarifying whether the absence of pronoun attraction with planned-but-unspoken attractors is due to a process that is robust to interference or, alternatively, whether it is specific to languages that do not morphologically mark an agreement relationship between the pronoun and the attractor noun.

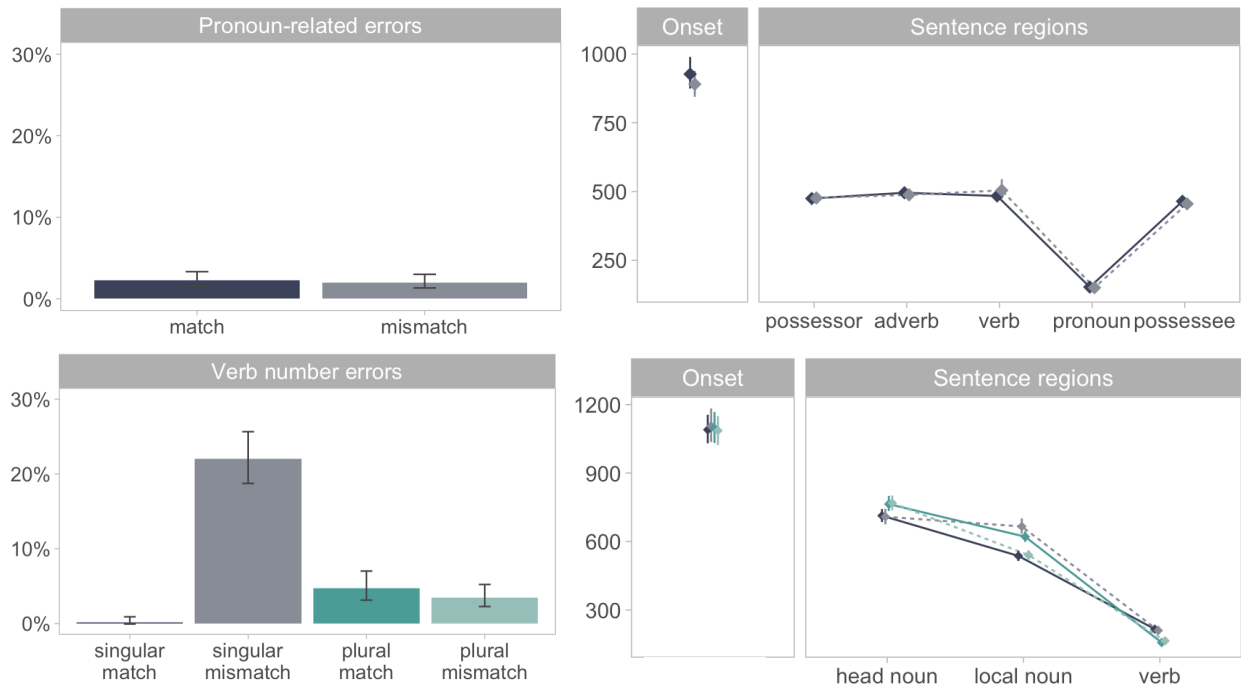
**Table 1.** Sample stimuli. The gender of the pronoun was counterbalanced across items. There were 24 pronoun trials per condition and 32 verb trials per condition.

Trial Type	Condition	Statement	Probe	Target response
Pronoun	gender match	“I chased my grandma”	Susan	Susan chased her grandma
	gender mismatch	“I chased my grandpa”		Susan chased her grandpa
Verb	singular match	“The key to the cabinet...”	rusty	The key to the cabinet was rusty
	singular mismatch	“The key to the cabinets...”		The key to the cabinets was rusty
	plural match	“The keys to the cabinet...”		The keys to the cabinet were rusty
	plural mismatch	“The keys to the cabinets...”		The keys to the cabinets were rusty

**Figure 1.** Illustration of a trial.



**Figure 2.** Pronoun-related error rates (top left) and duration measures (in ms; top right); verb number error rates (bottom left) and duration measures (in ms; bottom right). The colors represent the conditions indicated in Table 1.



**References** [1] Bock, Nicol, & Cutting (1999) *JML* [2] Kandel & Phillips (2022) *JML* [3] Allum and Wheeldon (2007) *J. Exp. Psychol.: Learn. Mem. Cogn.* [4] Slevc, Wardlow Lane, & Ferreira (2007) *MITWPL* [5] Antón-Méndez (2010) *J. Psycholinguist. Res.* [6] Pozzan & Antón-Méndez (2017) *Appl. Psycholinguist.*