

When do we plan agreement in our speech: Case from agreement attraction in unaccusatives

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Recent research in language production suggests that speakers' scope of planning in production is affected by the syntactic dependencies (Bock 1986, Momma & Ferreira 2019, Momma & Yoshida 2023), rather than the linear word order (Levelt 1989, Levelt et al. 1999). Momma & Ferreira (2019) (M&F) showed that participants take more time to begin the utterance when the scene they are tasked with describing involves a semantically related distractor verb (*melt-boil*, Figure 1). However, this onset latency effect is only visible in unaccusative scenes such as 'The octopus below the spoon is boiling.'

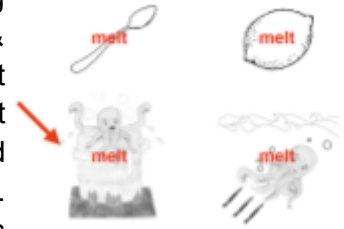


Figure 1: M&F Trial

They take their findings as evidence for early verb planning in unaccusative sentences, which has a tighter syntactic relation between the subject and the verb. They argue that the verb *boil* is planned before the noun *spoon* is planned. We use this asymmetry in planning to investigate when inflectional morphology, like number agreement is planned.

Hypotheses (Figure 2). In principle, agreement planning can be done in an **eager** fashion, that is planning agreement as soon as they plan the verb, or in a **need-based** fashion, that is agreement is only planned when it needs to be uttered. Given that unaccusative verbs are planned while the second noun *spoon* is planned, two possible time courses of agreement planning predict two different states of lexical access in unaccusative sentences. In the eager hypothesis, speakers plan the agreement when they plan the verb and the subject head and thus only have access to information related to *the octopus* at the time of planning the agreement. On the other hand, in the need-based hypothesis, speakers plan the agreement independently, after they plan the subject head, the second noun, and the verb. Meaning they have similar access to information related to both nouns. Both hypotheses predict the same thing for unergative sentences: when the verb is planned participants should have access to both nouns, independent of agreement planning hypothesis.

Agreement Errors in Production. Speakers may produce sentences like '*The key to the cabinets are rusty,' when another noun (cabinets) with a mismatching number is present (Bock & Miller 1991, Eberhard et al. 2005). These errors are attested in many production studies using completion paradigms in which participants were given a preamble 'The key to the cabinets...' and asked to complete the sentence. Even though there are many studies that use verb completion tasks, only a small set of studies uses similar scenes to the ones in M&F (Kandel & Phillips 2022, Veenstra et al. 2014, Nozari and Omaki 2022). This is important to test the relative timing of the agreement planning and the different states of lexical access. Kandel & Phillips (2022), using nonce verbs, found that people have more likelihood of pausing in the pre-verbal position when they are describing a scene with different numbered nouns. However, their study did not test the timing of agreement with respect to different verb types, and the type of the nonce verb they used was not clear.

The current work ($N_{subject}=80$, $N_{trial}=96$) aims to understand the relative time course relation of agreement and intransitive verbs. Our items (Table 1) were adapted from the scenes in M&F. We manipulated the following: (i) verb type (unaccusative/unergative), (ii) semantic relatedness between the superimposed distractor and the verb (related/unrelated), and (iii) attractor number (singular/plural). Participants were asked to describe scenes with distractor verbs superimposed (Figure 1). If agreement planning is eager we expect to see uneven agreement attraction effects between unergative and unaccusatives, as speakers should only have access to the head noun. On the other hand, if agreement was planned in a need-based fashion, we would predict similar error percentages in unergative and unaccusatives.

Our results (Figure 3 and 4) suggest comparable error rates with both unaccusatives and unergatives, suggesting that agreement is planned independently of its host verb. Speakers made agreement errors when nouns have mismatched numbers regardless of the verb type manipulation. A similar pattern is also observed in the pause likelihood measure: participants paused more often to utter the verb when the nouns have mismatched numbers. We also see a pattern in which the semantic relatedness caused more errors in unaccusative sentences, but less errors in unergatives. Current follow-up studies will probe the specific source of this unexpected pattern, as well as attenuated attraction rates.

Condition	Target Sentence	Related	Unrelated
Unaccusative	The octopus under the <u>spoon/spoons</u> is boiling	melt	fall
Unergative	The octopus under the <u>lemon/lemons</u> is swimming	run	smile
Control	The babies below the <u>waffle/waffles</u> are hiding	find	consider

Table 1. Target sentences and distractor words used in the experiment. The experiment was conducted in PClbex (Zehr & Schwarz 2018). In addition to Unaccusative and Unergative conditions, where the subject head is always singular, we included control trials with plural subjects to prevent participants from forming heuristics for auxiliary selection. Attractors are underlined.

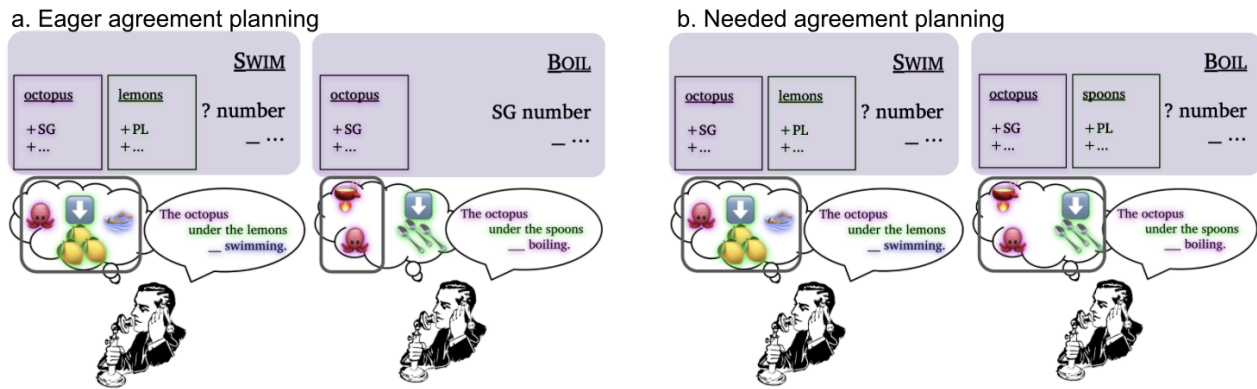


Figure 2. Schematic representation of lexical access states depending on the agreement planning hypothesis. Nouns that speakers have access to at the time of planning the agreement are shown in rectangles.

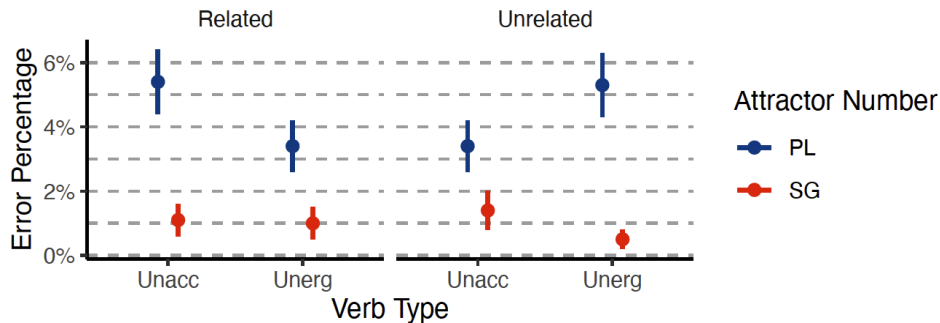


Figure 3. The average percentages of agreement errors according to the experimental conditions. Error bars signal standard errors calculated following Morey (2008) and Cousineau (2005).

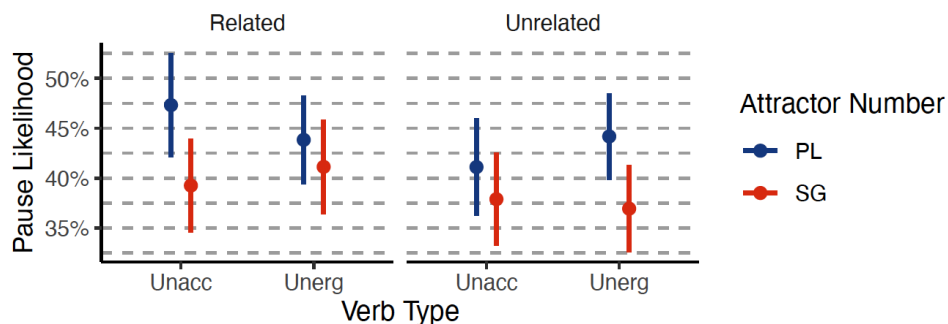


Figure 4. The average likelihood of pause between the verb and the auxiliary according to the experimental conditions. Error bars signal standard errors calculated following Morey (2008) and Cousineau (2005).