When do we plan agreement in our speech?

Case from agreement attraction in unaccusatives

@ Puzzles of Agreement, October 25, 2024

Utku Turk, Ellen Lau, and Colin Phillips
University of Maryland, College Park

www.utkuturk.com
utkuturk@umd.edu

(1) *The **key** **were** rusty.

Bock & Miller 1991, Wagers et al. 2009, Kandel & Phillips 2022

(2) *The **key** to the *cells* **were** rusty.

Bock & Miller 1991, Wagers et al. 2009, Kandel & Phillips 2022

$+$**SG** $+PL$ $+$**PL**

(2) *The **key** to the *cells* **were** rusty.

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Planning sentences?

Planning sentences?

Uhhhh… Utku… the snail…

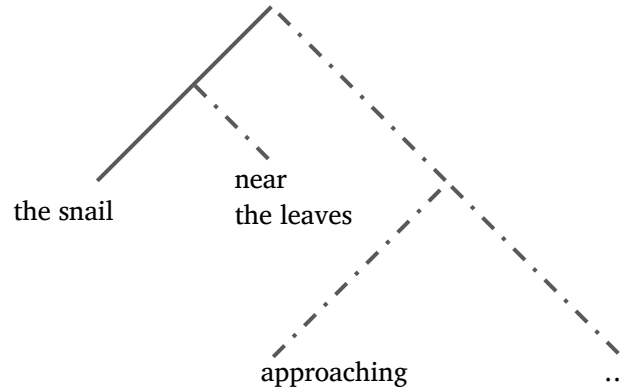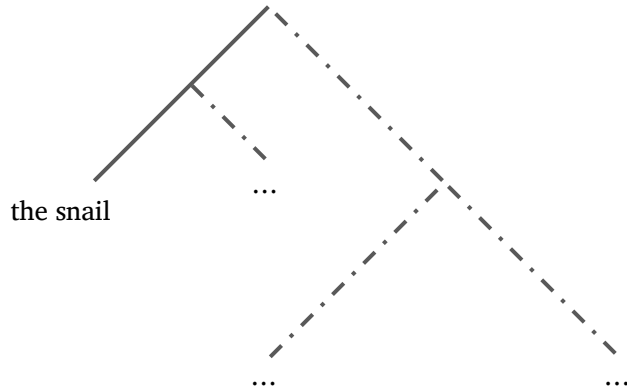# The scope of planning

- What information do speakers tend to encode first?

- "Uhh… Utku… the snail…"

…

The scope of planning

- What information do speakers tend to encode first?

- Remember the "Uhh… Utku… the snail…"

- Did you just plan "the snail" or you also planned "near the leaves" or "approaching"?

the snail   …

…   …

the snail   near
             the leaves

             approaching   …

Planning sentences?

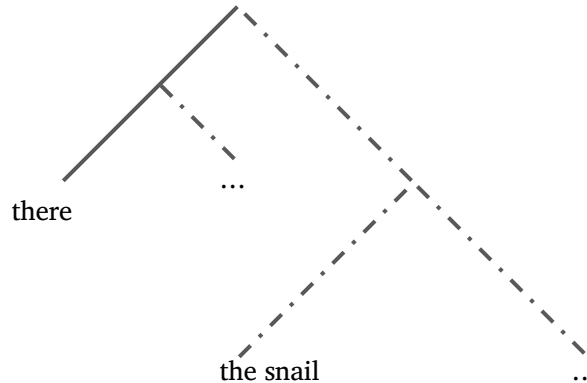- No real consensus on what has to be planned before an utterance.

Planning sentences?

- No real consensus on what has to be planned before an utterance.

- What people agree is

    - Speakers filter *message* into a *preverbal message*

    - *Preverbal message* is chunked into smaller units

    - *Formulator* transform conceptual information to syntactic objects

    - *Articulator* maps *formulator* outputs to the motor behavior

Wheeldon & Konopka 2023, Levelt 1989, Levelt et al. 1999
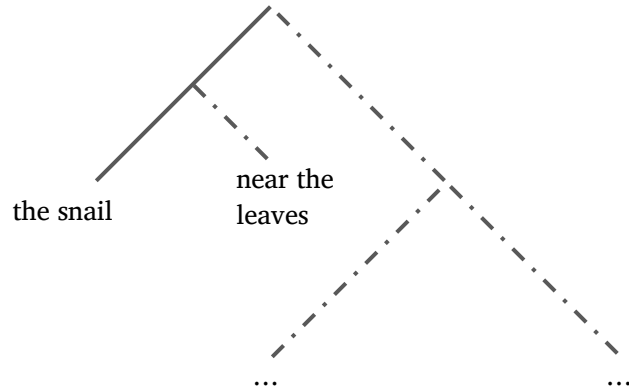
Planning sentences?

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- **Some of these steps can happen in parallel!!!**

Wheeldon & Konopka 2023, Levelt 1989, Levelt et al. 1999, Kempen & Hoenkamp 1987
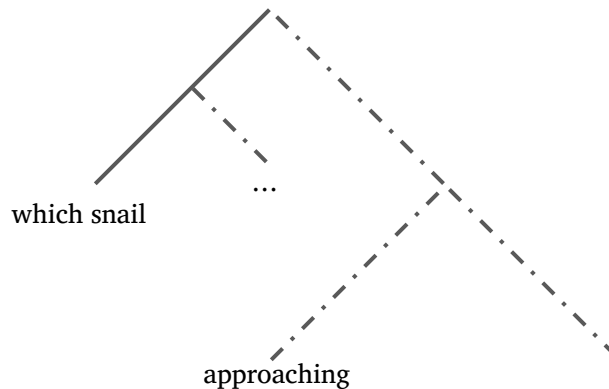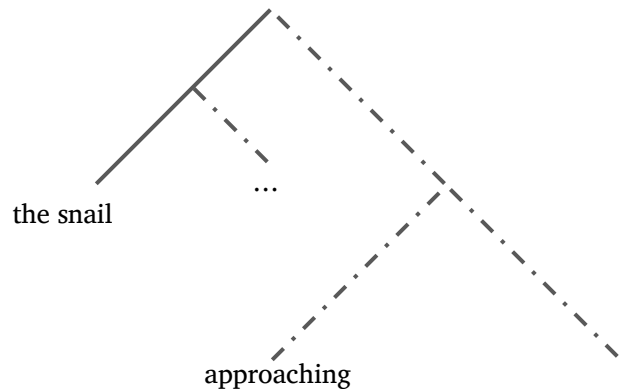
The scope of planning: Linearly?

- What can come next?

- *Linearity governs the scope of chunks.*
  Units of planning follows from the linear order.
  Selection of lexical items governs the possible syntactic structures

the snail

near the
leaves

...   ...

there

...

the snail   ...

Bock & Levelt 1994, Levelt et al. 1999, Roelofs & Ferreira 2019

The scope of planning: Structurally?

- Can far-away stuff come next?

- *Structural relations governs the scope of chunks.*
  Units of planning follows from the syntactic knowledge of the speakers.
  Elements participating in long distance dependencies can be planned together.

the snail

...

approaching

which snail

...

approaching

Ferreira 2000, Frank 2002, Momma 2021, 2022

The scope of planning

Momma and Ferreira (2019), using different intransitive verbs, showed stronger evidence that syntactic differences can be the driving force in determining the scope of fragments.

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The scope of planning

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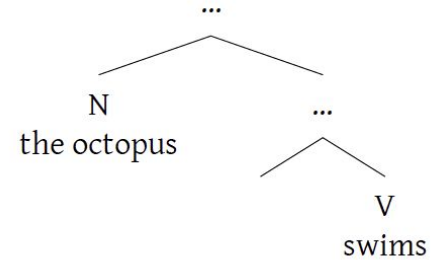
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The scope of planning

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The scope of planning: unergatives

Target sentence:

(3) *The octopus under the spoon is swimming*

The scope of planning: unergatives

Target sentence:

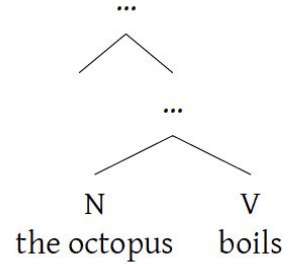(3) *The octopus under the spoon is swimming*

No effect of semantic relatedness.
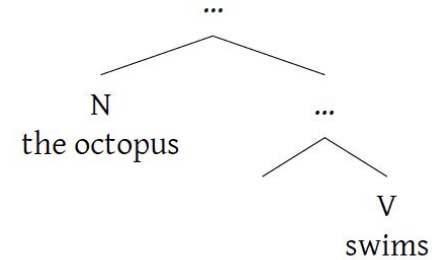
The scope of planning: unaccusatives
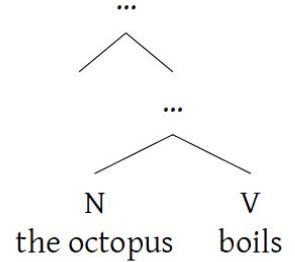
Target sentence:

(4) *The octopus under the lemon is boiling*

The scope of planning: unaccusatives

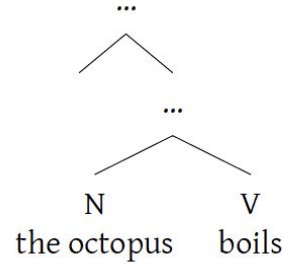Target sentence:

(4) *The octopus under the lemon is boiling*

Speakers take more time to begin the utterance in related conditions.

The scope of planning: entire sentence?

Target sentence:

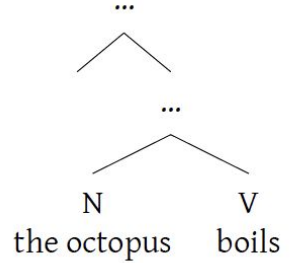(5) *The octopus under the lemon is boiling*

The scope of planning: entire sentence?

Target sentence:

(5) *The octopus under the lemon is boiling*

No effect of semantic relatedness.

(6) *The **key** to the *cells* **were** rusty.

Bock & Miller 1991, Wagers et al. 2009, Kandel & Phillips 2022

(6) *The **key** to the *cells* **were** rusty.

       +SG   +PL   +PL

(7) *The **octopus** under the *spoons* **are** swimming.

       +SG   +PL   +PL

(7) *The **octopus** under the *spoons* **are** swimming.

              +SG   +PL   +PL

(8) *The **octopus** under the *lemons* **are** boiling.

              +SG   +PL   +PL

$+$**SG** $+$*PL* $+$**PL**

(7) *The **octopus** under the *spoons* **are** swimming.

$+$**SG** $+$**PL**????

(8) *The **octopus** under the *lemons* **are** boiling.

The time course and representation of agreement

"Lemma" centric model of production (Levelt et al. 1999)

Against our theoretical understanding (Halle & Marantz 1993, Starke 2009, Bye & Svenonius 2012, Embick et al. 2022)

Questioned by many in experimental research but no direct counter-evidence! (Garrett 1975, Caramazza & Miozzo 1997)
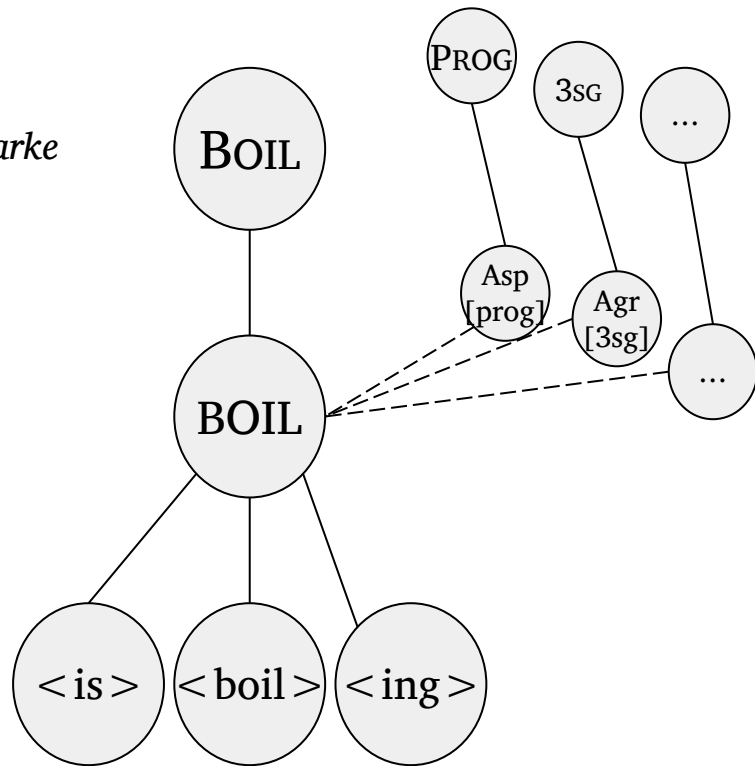
The time course of agreement: Hypotheses

Eager Agreement

+ **SG** 💔**PL**

(8) *The **octopus** under the *lemons* **are** boiling.

Needed Agreement
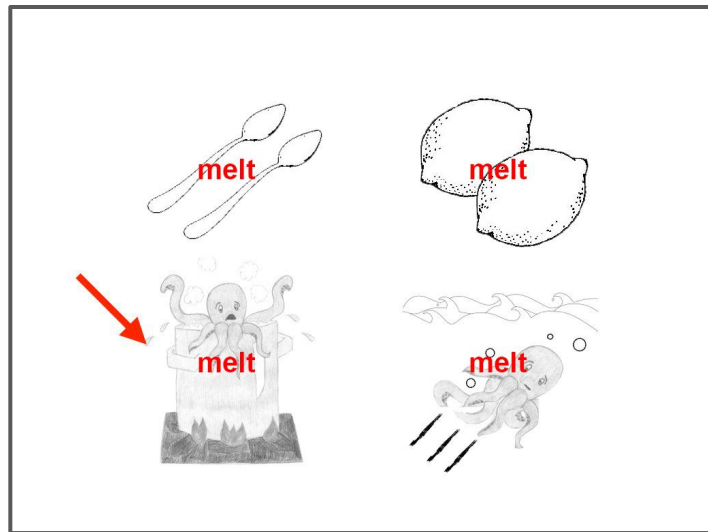
+ **SG** +*PL* 💘**PL**

(8) *The **octopus** under the *lemons* **are** boiling.

Our study: Materials

- Similar to Momma & Ferreira (2019)
  - Verb type (2: unacc x unerg)
  - Relatedness (2: related x unrelated)

- Unlike Momma & Ferreira (2019)
  - Only had verbal distractors (similar to their Exp5)
  - Object number (2: PL x SG)

- 12 scenes x 2 x 2 x 2 = 96 experimental trials

- **+6 control scenes x 2 x 2 x 2 = +48 control trials**

Our study: Procedure

- Distractors come 150ms before

- Prompted to utter sentence with pictures

- 5 seconds to utter sentence

- Repeated measures
    - Participants saw all conditions (144 trials)
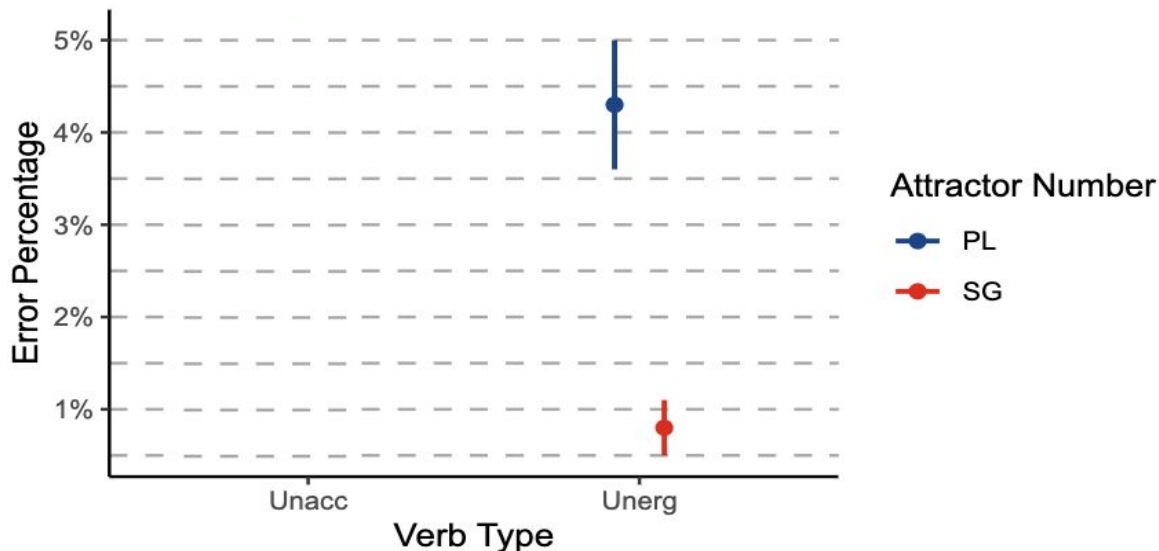
- PCIbex (unlike Momma & Ferreira 2019)
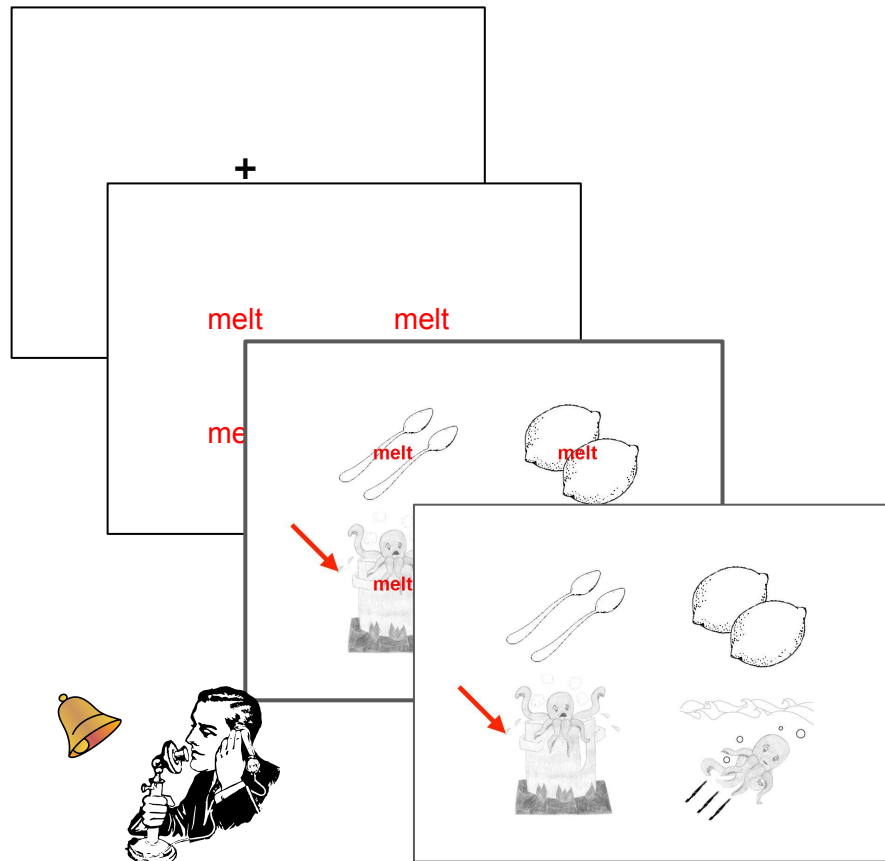
Our study: Results

Clear attraction effect in unergative sentences:
more agreement errors when there is an additional plural noun nearby.
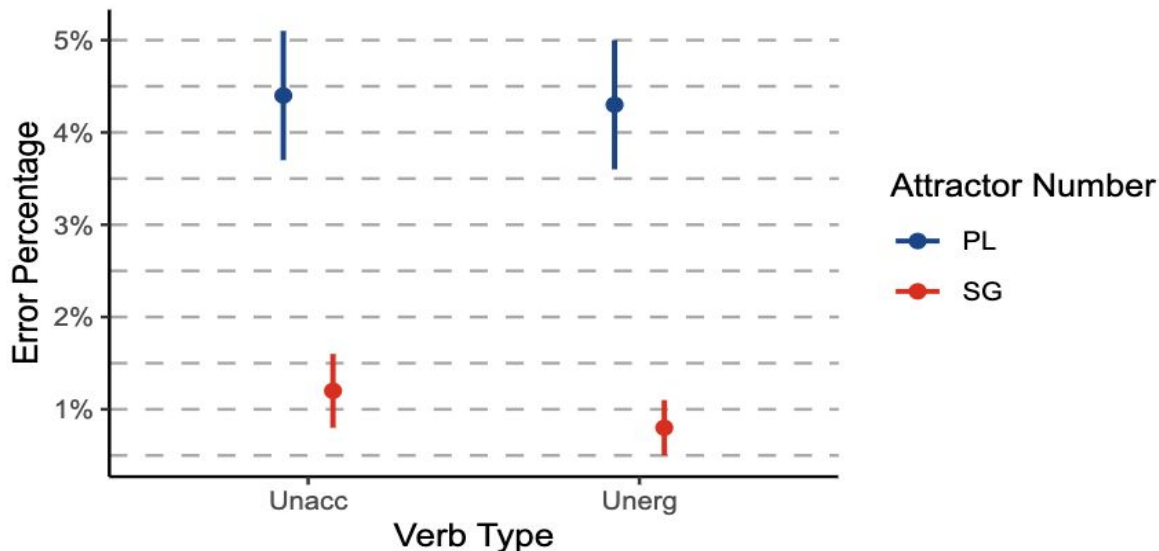
Magnitude-wise smaller attraction effects, but still comparable
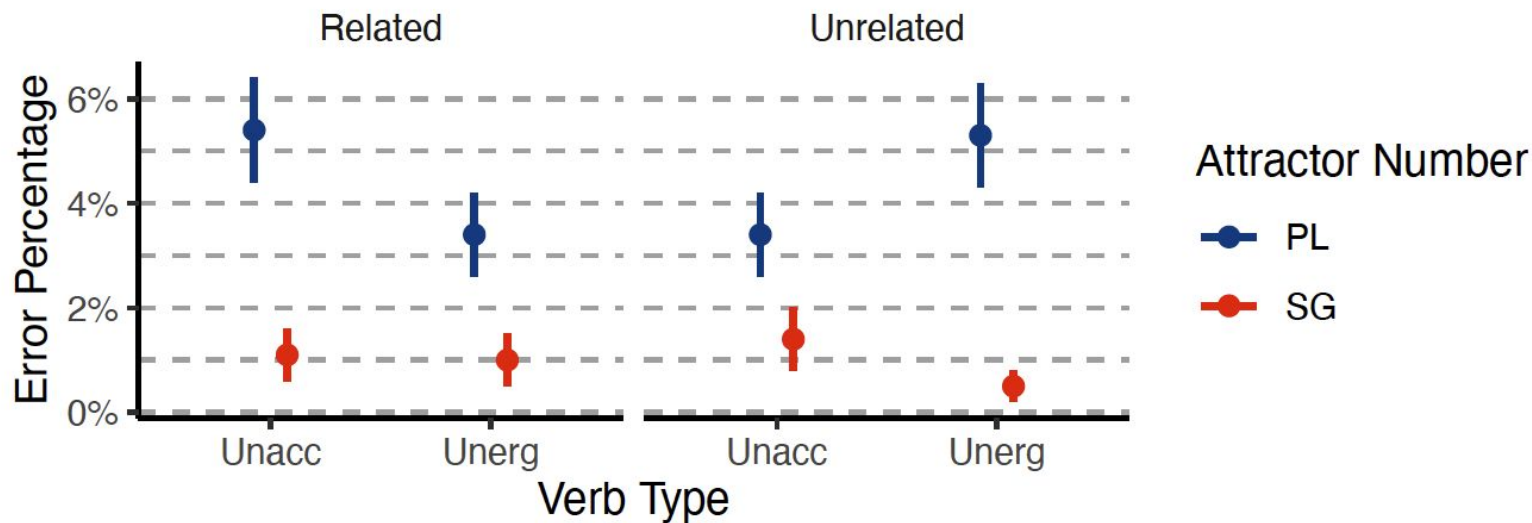
Our study: Results

Comparable attraction errors in unaccusative sentences.

If agreement was planned eagerly, as soon as verb is planned, we would expect to see no attraction in unaccusative sentences!

Our study: Results

We also see a cognitive load effect. It is affected the verb relatedness.
But still the pattern is comparable between verb types.

When do we plan the agreement in our speech?

❖ Agreement seems to be planned when it needs to be uttered, independent of its host.

❖ These results align with theoretical and experimental considerations for independence of morphological processes.

❖ What was snail doing there? Slowly discovering.

❖ Next: Why attenuated attraction? Investigate Relatedness/Verb effect.

Selected References
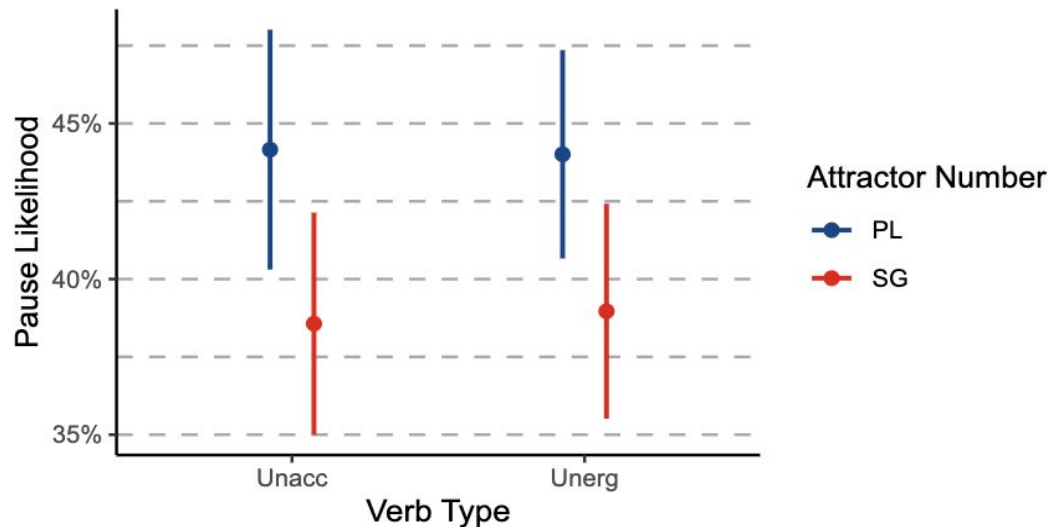
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Wagers, M. W., Lau, E. F., & Phillips, C. (2009). Agreement attraction in comprehension: Representations and
    processes. Journal of memory and language, 61(2), 206–237.

Our study: Results

Compared to Kandel & Phillips (2022) we saw increased pause likelihood on average.

There were still a suggestion of participants pausing more often to utter the verb when the nouns have mismatched numbers in unergative sentences.

Comparable results were also visible in unaccusative sentences, suggesting a similar planning process right before the verb.
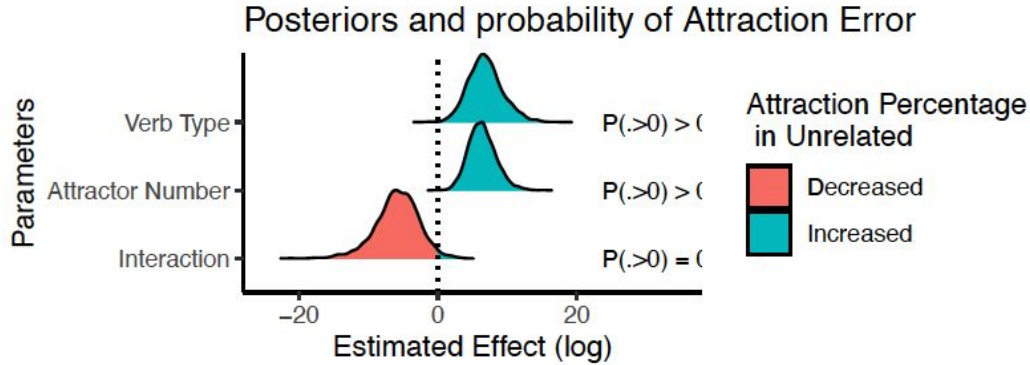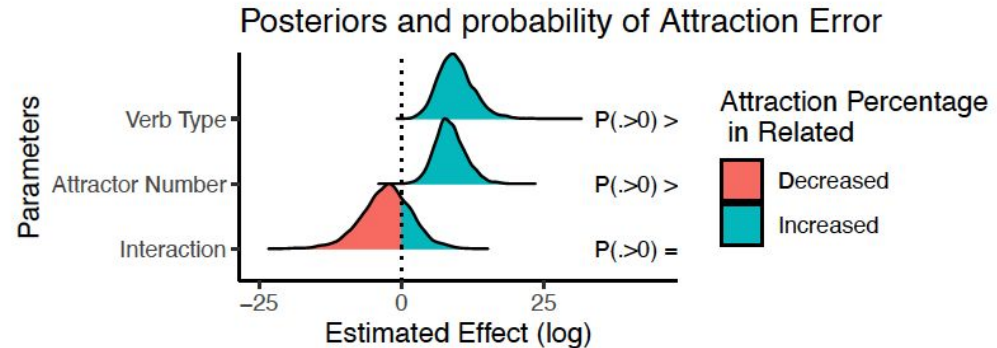
Models?

Relatedness Nested:

Models?

Unrelated

Posteriors and probability of Attraction Error

Related

Posteriors and probability of Attraction Error

Momma & Ferreira Replication?