



DEPARTMENT OF
LINGUISTICS

**Turkish register manipulation
eliminates grammaticality asymmetry in attraction
and *(not really)* challenges retrieval based accounts**

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Agreement in Turkish

(1) *Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor.
manager's **cook** at kitchen nonstop **is** jumping

Agreement in Turkish


(1) *Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor.

(2) **Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor**lar**.
manager's **cook** at kitchen nonstop **are** jumping

Agreement in Turkish

- (1) *Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor.
- (2) **Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor**lar**.
- (3) **Yöneticilerin* **aşçısı** mutfakta sürekli zıplıyor**lar**.
managers' **cook** at kitchen nonstop **are** jumping


Agreement Attraction Effects in Turkish

 *Yönetici-ler-in* **aşçısı**
managers' **cook**

 *Yönetici* *-nin* **aşçısı**
manager's **cook**

mutfakta sürekli zıplıyor**lar**.
at kitchen nonstop **are** jumping

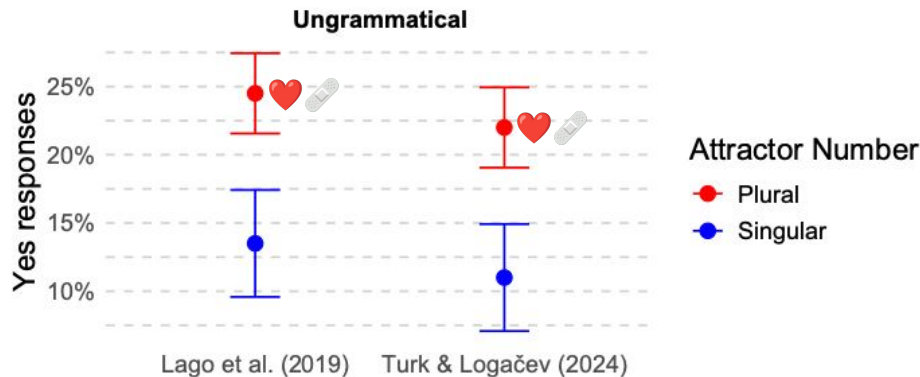
Agreement Attraction Effects in Turkish

 *Yönetici-ler-in* aşçısı
managers' cook

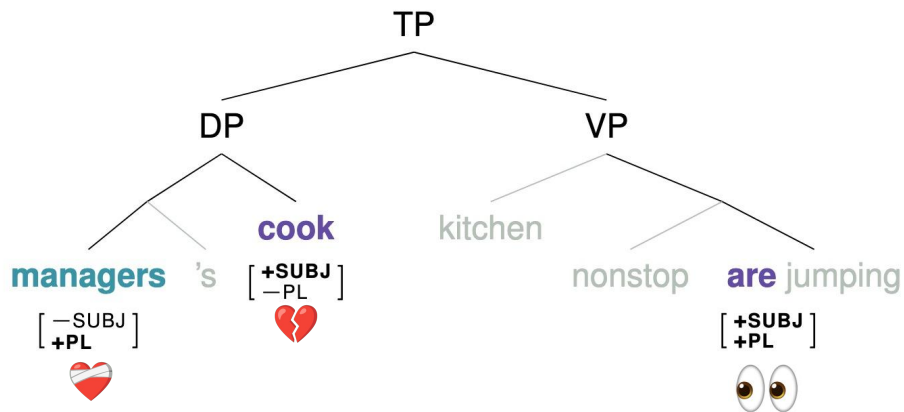
 *Yönetici* -nin aşçısı
manager's cook

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Difference in 'yes'/'acceptable' responses as a function of attractor number

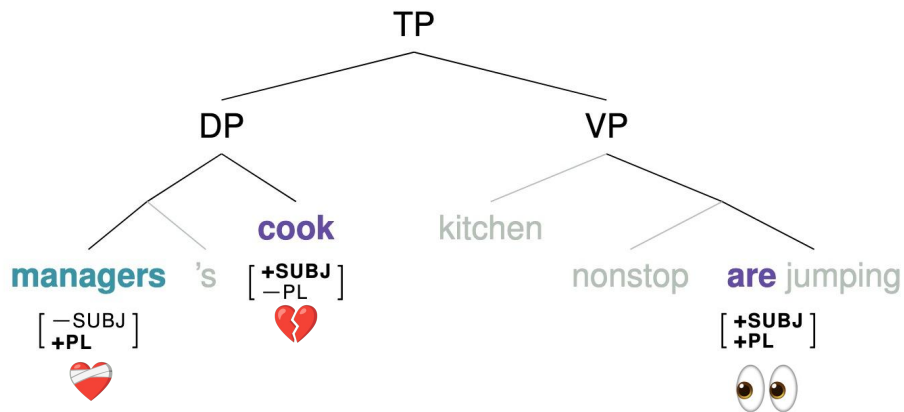


Agreement Attraction: Ungrammaticals

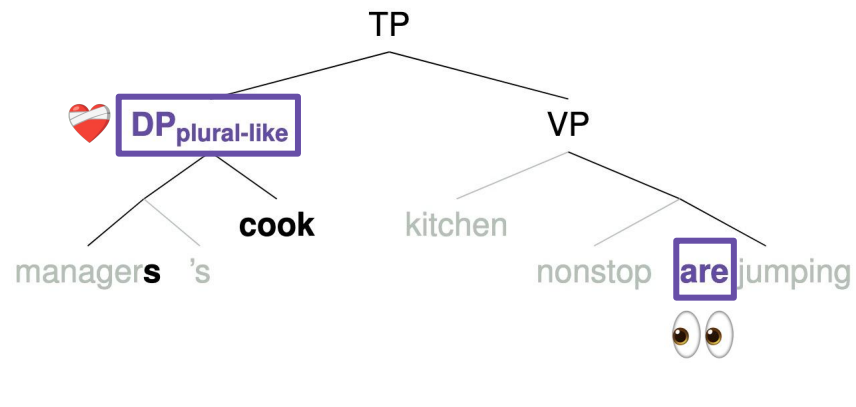


Retrieval: Partial match may occasionally save the retrieval.

Agreement Attraction: Ungrammaticals



Retrieval: Partial match may occasionally save the retrieval.

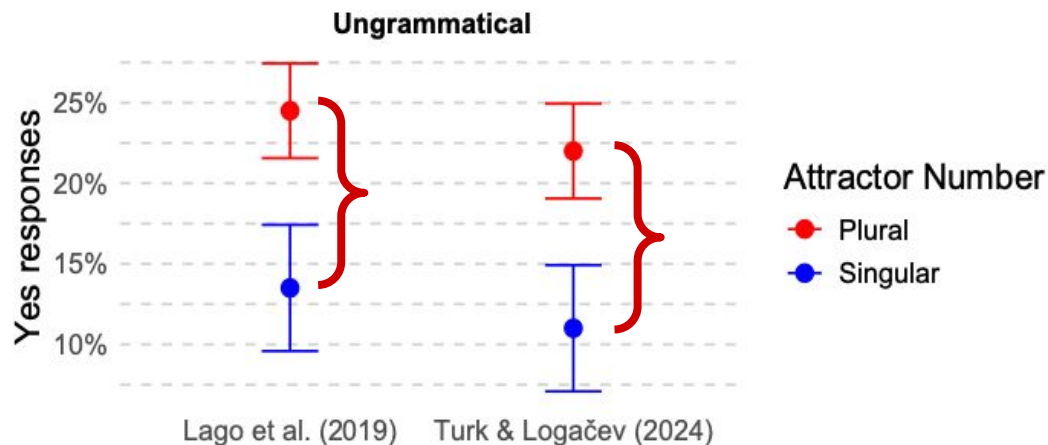


Representational: Probing acceptability in ungrammatical sentences

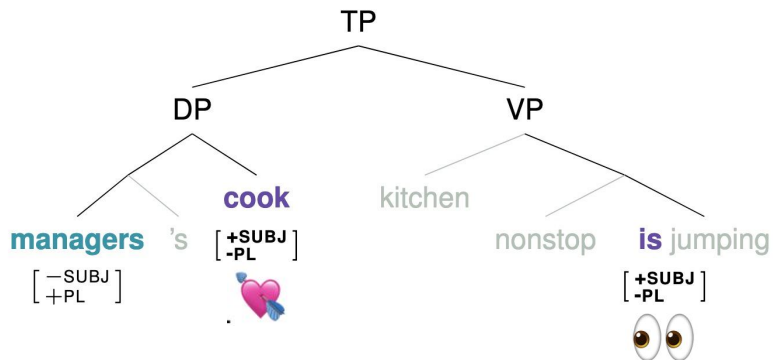
Agreement Attraction: Predictions

Both theories:

- Plural attractor increases “yes” response in ungrammaticals

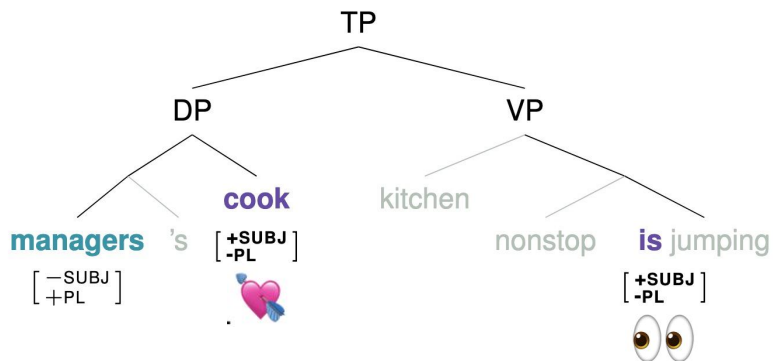


Agreement Attraction: Grammaticals

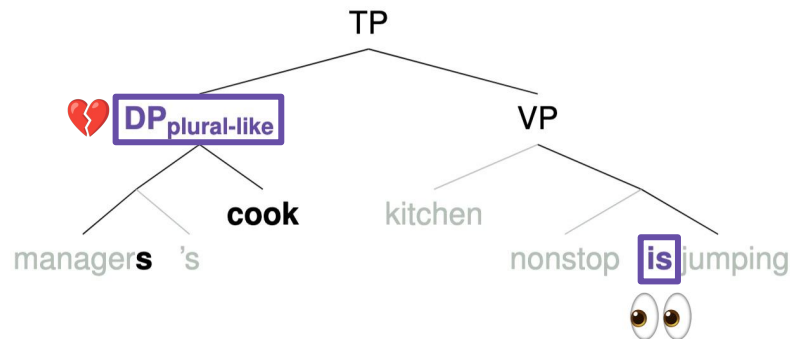


Retrieval: Less interference when the true subject is a perfect match.

Agreement Attraction: Grammaticals



Retrieval: Less interference when the true subject is a perfect match.

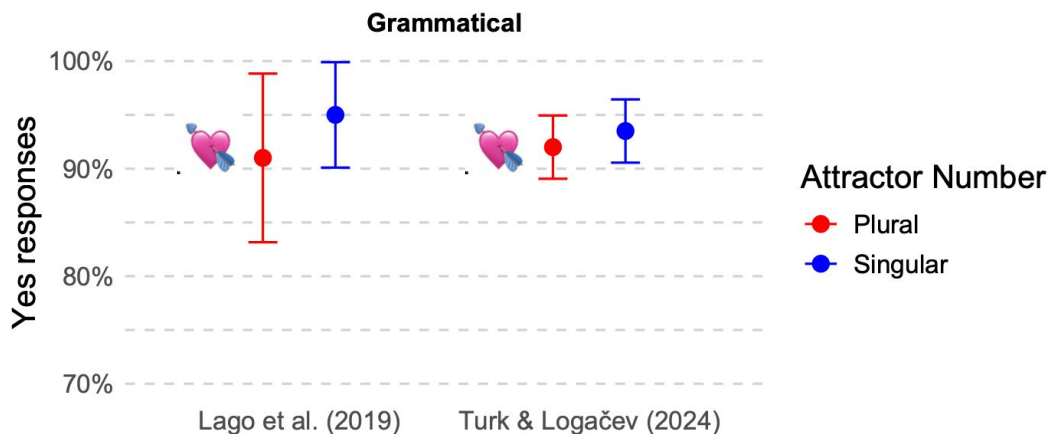


Representational: Probing acceptability even in grammatical sentences.

Agreement Attraction: Predictions

Retrieval

-  Attractor number matters **only in ungrammatical** sentences



Acceptability asymmetry as a by-product

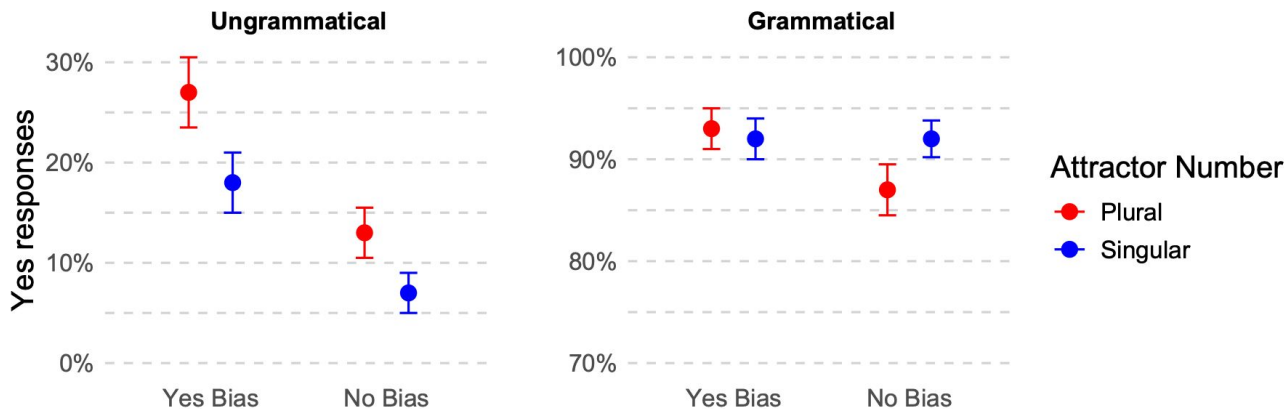
- Hammerly et al. (2019): Between-subject manipulation of the instructions and ratio to ungrammaticals to grammaticals

Acceptability asymmetry as a by-product

- Hammerly et al. (2019): Between-subject manipulation of the instructions and ratio to ungrammaticals to grammaticals
- Turk & Logačev (2023): Grouping participants using their calculated bias in fillers

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Acceptability asymmetry as a by-product

- Hammerly et al. (2019): Between-subject manipulation of the instructions and ratio to ungrammaticals to grammaticals
- Turk & Logačev (2023): Grouping participants using their calculated bias in fillers
 - Takeaway1: between-subject manipulation was hard to implement
 - Takeaway2: calculated bias did not generalize to other experiments

This Study

- **Q:** Can we have agreement attraction in grammaticals without between-subject design

This Study

- **Q:** Can we have agreement attraction in grammaticals without between-subject design
- **How:**
 - Treat the lack of effect as a ceiling problem
 - Use 2 Turkish register facts to increase/reduce acceptability in grammaticals

Turkish Register

- Explicit **formal addressee** triggers plural agreement on the verb.

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(4) **Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor**lar**.

manager's

cook

at kitchen

nonstop

are jumping

Turkish Register

- Explicit **formal addressee** triggers plural agreement on the verb.

(4) **Yöneticinin* **aşçısı** mutfakta sürekli zıplıyor**lar**.

manager's **cook** at kitchen nonstop **are** jumping

(5) *Yöneticinin* aşçısı mutfakta sürekli zıplıyor**lar, efendim**.

manager's cook at kitchen nonstop **are** jumping **sir/madam**

Turkish Register

- Explicit **formal addressee** triggers plural agreement on the verb.
 - Increase in overall acceptability
 - Introduction of an additional possible controller

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(6) * *Yöneticinin* aşçısı mutfakta sürekli zıplıyor**lar**.
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(6) * *Yöneticinin* aşçısı mutfakta sürekli zıplıyor**lar**.
manager's cook at kitchen nonstop **are** jumping

(7) * *Yöneticinin* aşçısı mutfakta sürekli zıplıyor**lar, lan**.
manager's cook at kitchen nonstop **are** jumping **dude**

Turkish Register

- **Informal addressee** does not control the agreement.
→ By itself, no effect on acceptability
- Combining Informal addressee with sentences containing **job-related-hierarchies**.
→ Induce **Register Incongruence** to decrease overall acceptability

Turkish Register

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(8) *Yöneticinin* aşçısı mutfakta sürekli zıplıyor.
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Turkish Register

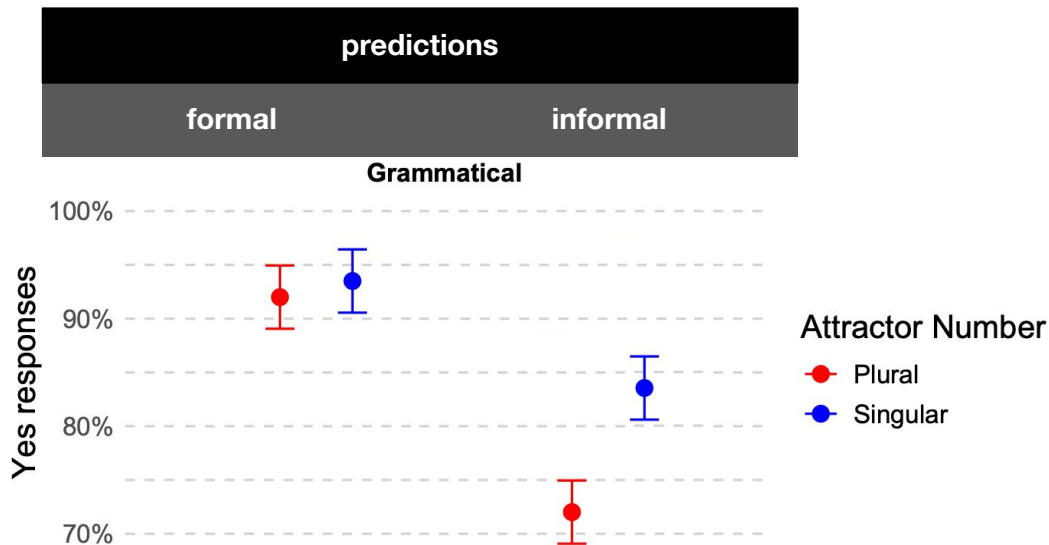
- **Informal addressee** does not control the agreement.
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(8) *Yöneticinin* aşçısı mutfakta sürekli zıplıyor.
manager's cook at kitchen nonstop **is** jumping

(9) # *Yöneticinin* aşçısı mutfakta sürekli zıplıyor, **lan.**
manager's cook at kitchen nonstop **is** jumping **dude**

Turkish Register: Predictions

- **Formal addressee** → increase overall acceptability
- **Informal addressee + Register Incongruence** → decrease overall acceptability
 - No ceiling → Attraction in grammatics



Experimental Items

- Within-subject factors: *Attractor* x *Verb number*

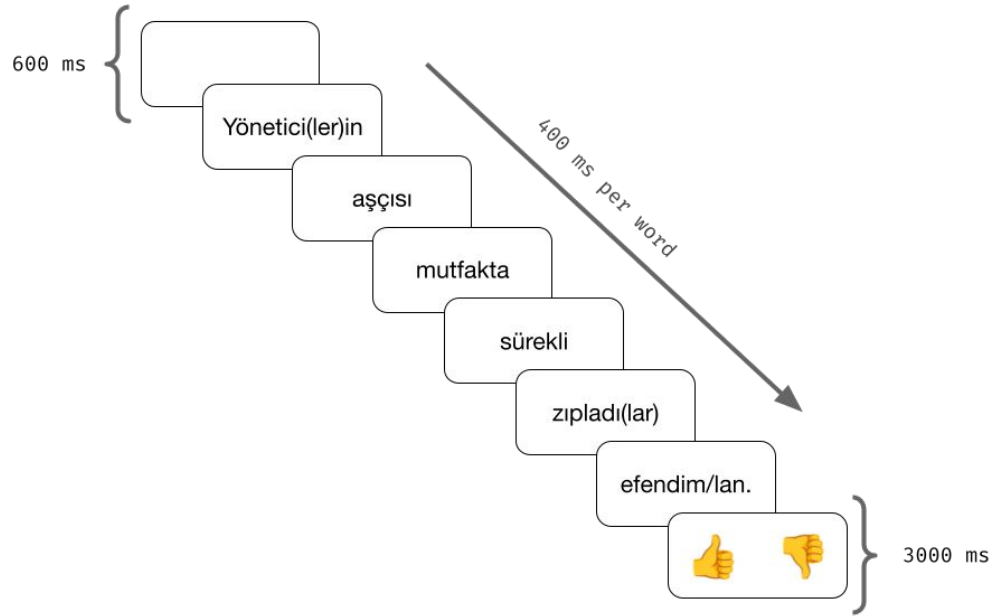
- (10) a. * [_{DP} [_{DP} *Yönetici-ler-in* aşçı-sı] mutfak-ta sürekli zıplıyor-lar.
manager-PL-GEN cook-POSS kitchen-LOC nonstop jump-PROG-PL
“The managers’ cook are/is jumping nonstop in the kitchen.”
- b. * *Yöneticinin* aşçısı mutfakta sürekli zıplıyorlar.
- c. *Yöneticilerin* aşçısı mutfakta sürekli zıplıyor.
- d. *Yöneticinin* aşçısı mutfakta sürekli zıplıyor.

Experimental Items

- Within-subject factors: *Attractor x Verb number x Register*

- (11) a. * [_{DP} [_{DP} *Yönetici-(ler)-in* aşçı-sı] mutfak-ta sürekli zıplıyor-(lar), **efendim.**
millionaire-PL-GEN cook-POSS kitchen-LOC nonstop jump-PROG-PL sir/madam
“The manager(s)’ cook **are/is jumping** nonstop in the kitchen, **sir/madam.**”
- b. * [_{DP} [_{DP} *Yönetici-(ler)-in* aşçı-sı] mutfak-ta sürekli zıplıyor-(lar), **lan.**
millionaire-PL-GEN cook-POSS kitchen-LOC nonstop jump-PROG-PL, yo
“The manager(s)’ cook **are/is jumping** nonstop in the kitchen, **yo.**”

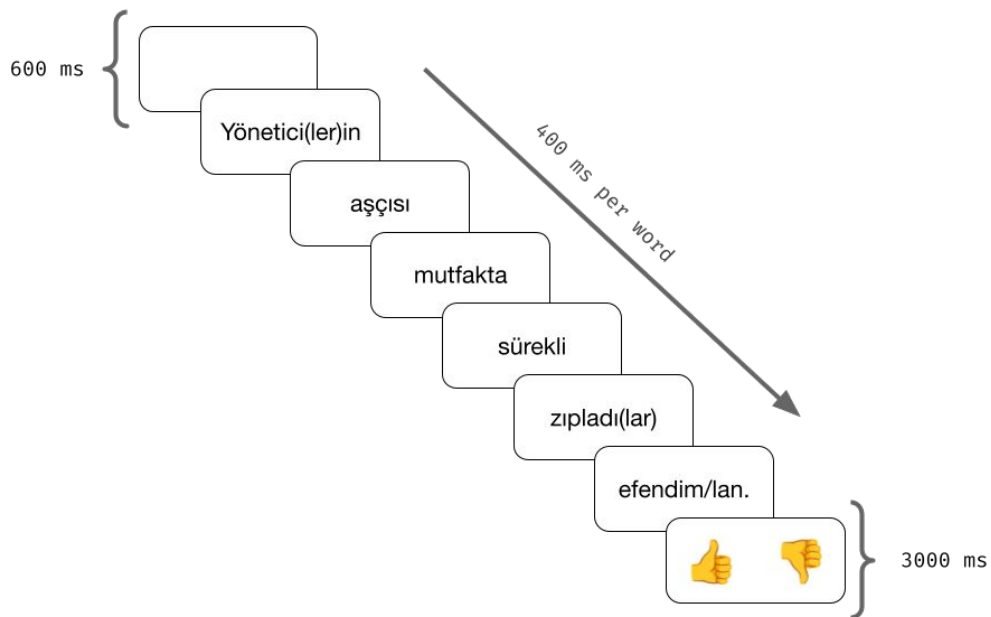
Speeded Acceptability Judgment



Speeded Acceptability Judgment

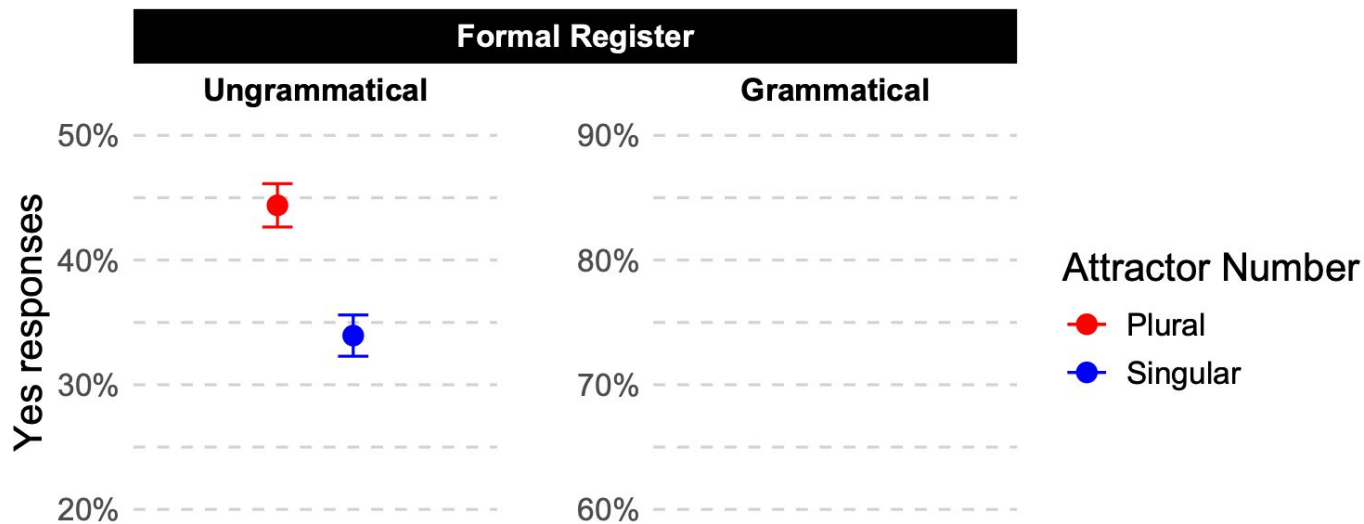
- $N_{\text{subject}} = 174$, $N_{\text{item}} = 48$, $N_{\text{filler}} = 96$

Proportion of Gram/Ungram = 1



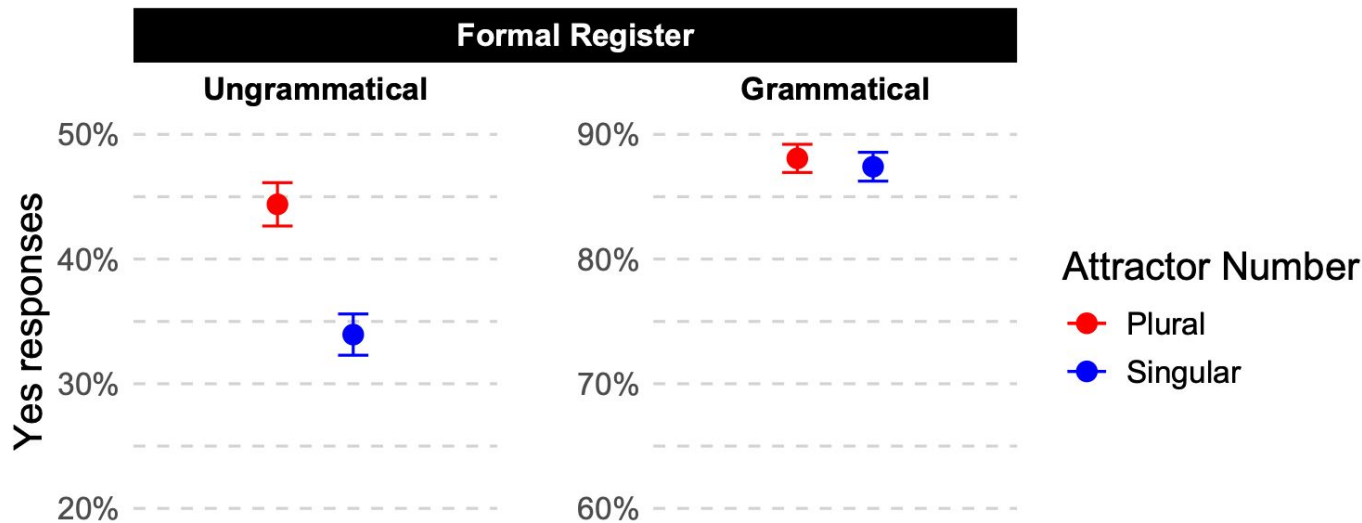
The Study: Results, Formal

- Attraction in ungrammatical sentences



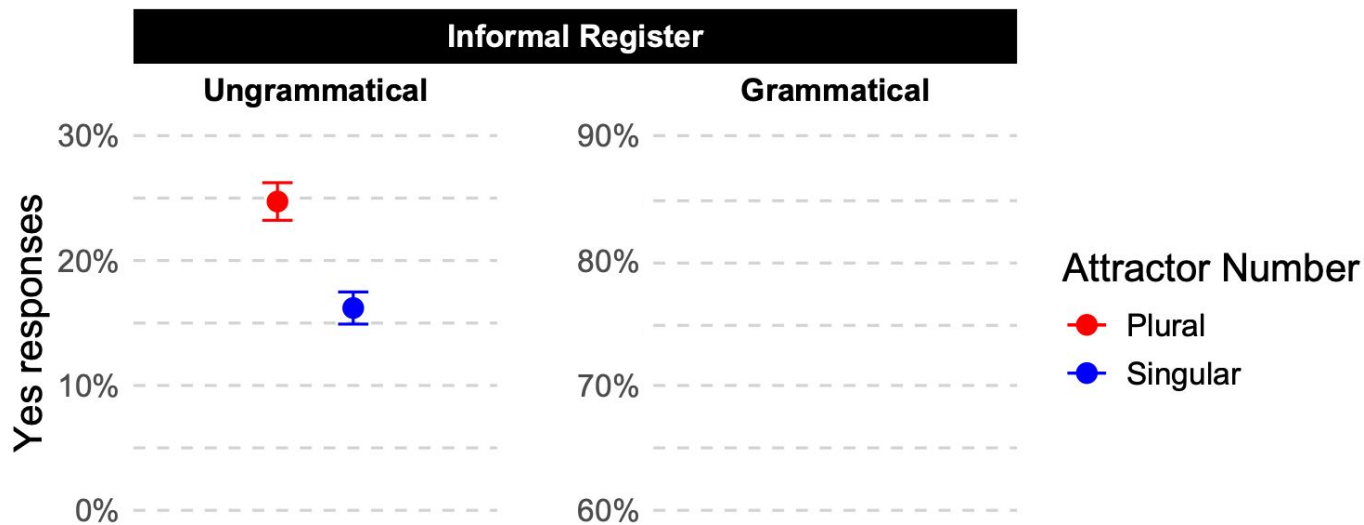
The Study: Results, Formal

- Attraction in ungrammatical sentences
- No attraction in grammatical sentences



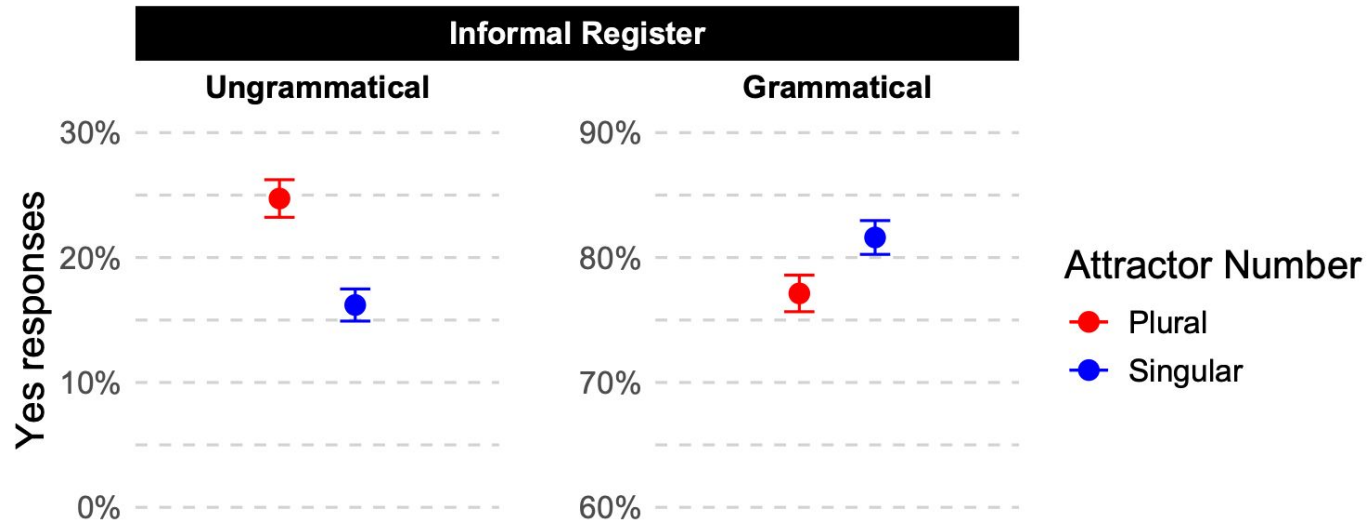
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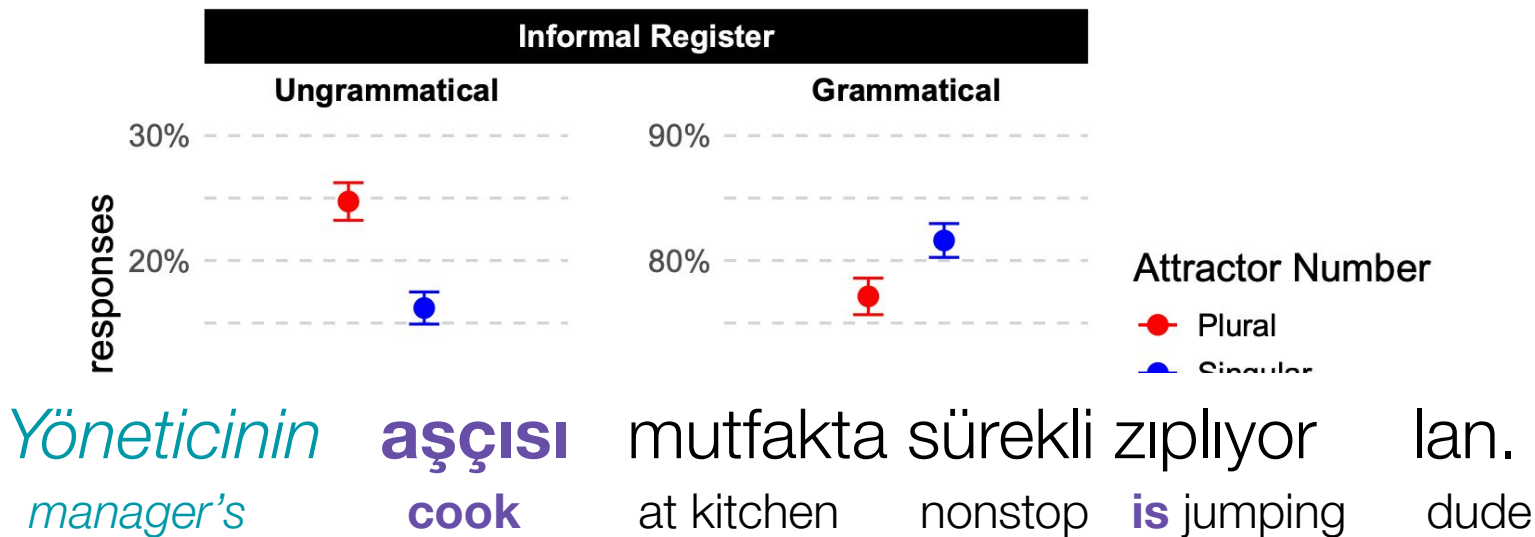
The Study: Results, Informal

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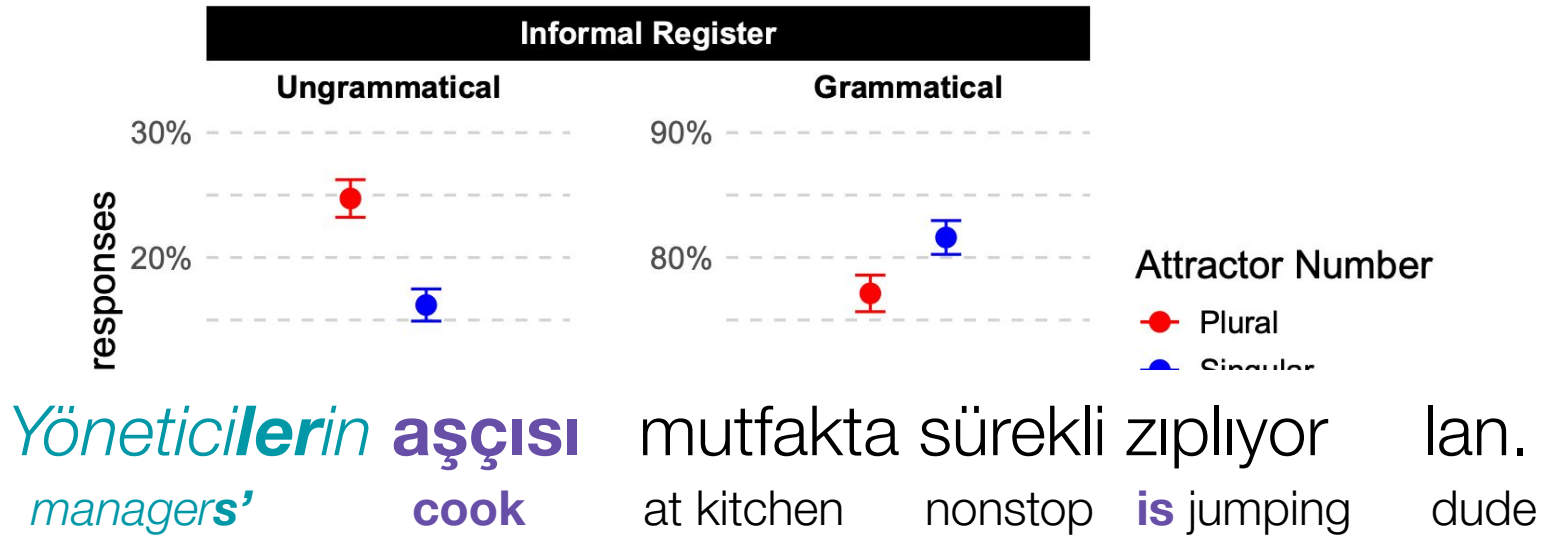
The Study: Results, Informal

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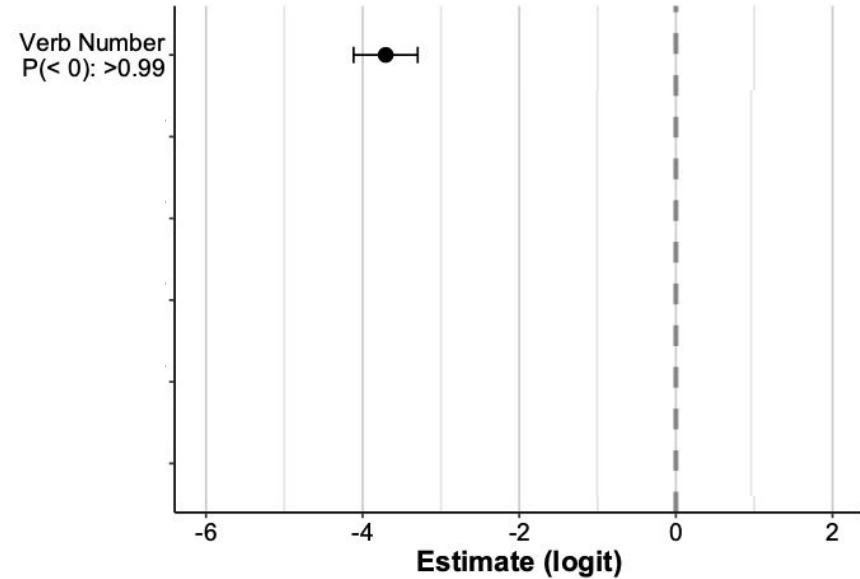
The Study: Results, Informal

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The Study: **Modelling results**

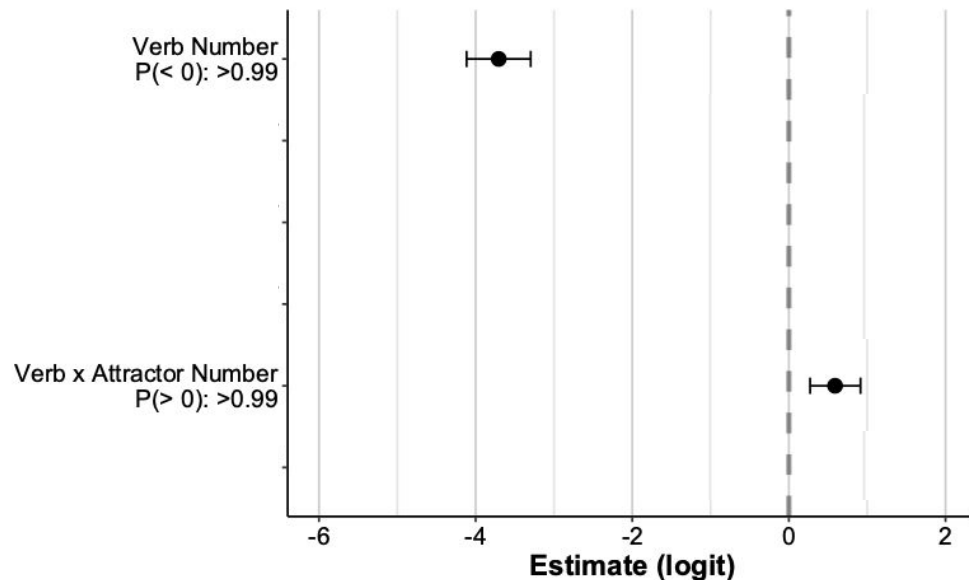
Plural verb → overall less ‘yes’ responses.



The Study: **Modelling results**

Plural verb → overall less ‘yes’ responses.

Plural attractor in plural verb → increase ‘yes’.



The Study: Modelling results

Plural verb → overall less ‘yes’ responses.

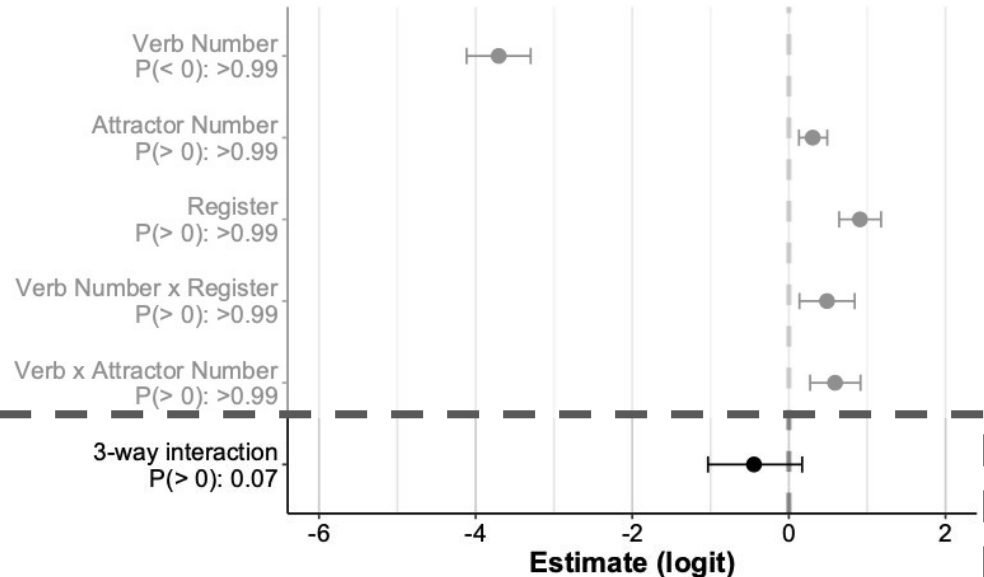
Plural attractor → overall more ‘yes’ responses.

Formal register → overall more ‘yes’ responses.

Formals with plural verb → more ‘yes’

Plural attractor + plural verb → more ‘yes’

Reduced ‘yes’ response interaction in formal conditions compared to informal conditions



Take home messages

- Lack of attraction effects in grammaticals was due to ceiling effects

Take home messages

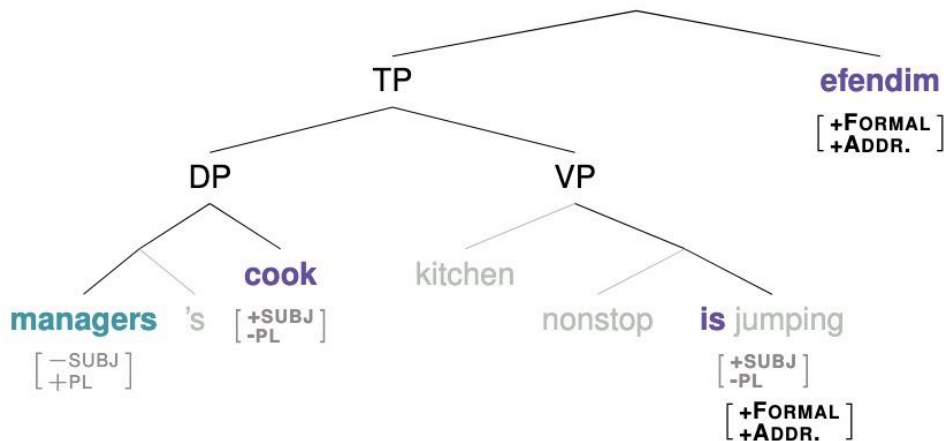
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Take home messages

- Lack of attraction effects in g
- Grammaticality asymmetry is
- This doesn't imply that the retrieval accounts were misguided
→ Increased uncertainty for the agreement controller may disrupt the controller search



Take home messages

- Lack of attraction effects in grammaticals was due to ceiling effects
- Grammaticality asymmetry is not a product of the agreement computation
- This doesn't imply that the retrieval accounts were misguided
 - Increased uncertainty for the agreement controller may disrupt the controller search
- Distortion in agreement representations might be modulating retrieval behavior

Interested in agreement?

- More experimental bias:

Turk & Logačev (2023): response bias, sometimes, accounts for grammaticality asymmetry

- The effect of case marking in Turkish:

Turk & Logačev (2024): syncretism on subject head does not modulate attraction

- When do we plan agreement in production:

Turk, Lau, Phillips (*upcoming*): planning agreement is independent of its host verb

Special Thanks to:

- Pavel Logacev
- Ellen Lau
- Colin Phillips
- Brian Dillon
- Özge Bakay
- Aslı Göksel
- UMD Linguistics
- Boğaziçi undergrads



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at Maryland



BOĞAZIÇI UNIVERSITY
Department of Linguistics

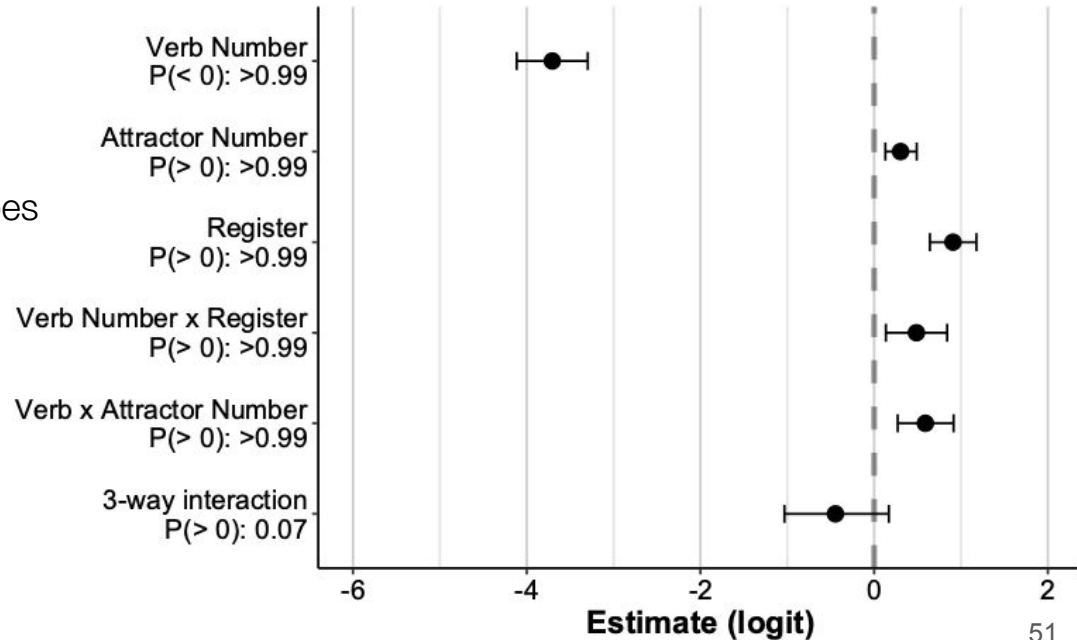
Selected References

- Bock, K., & Miller, C. A. (1991). Broken agreement. *Cognitive Psychology*, 23(1), 45–93.
- Eberhard, K. M., Cutting, J. C., & Bock, K. (2005). Making syntax of sense: Number agreement in sentence production. *Psychological Review*, 112(3), 531–559.
- Engelmann, F., Jäger, L. A., & Vasishth, S. (2019). The effect of prominence and cue association on retrieval processes: A computational account. *Cognitive Science*, 43(12), e12800.
- Gelman, A., & Hill, J. (2007). *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press.
- Hammerly, C., Staub, A., & Dillon, B. (2019). The grammaticality asymmetry in agreement attraction reflects response bias: Experimental and modeling evidence. *Cognitive Psychology*, 110, 70–104.
- Lago, S., Gračanin–Yuksek, M., Şafak, D. F., Demir, O., Kirkıcı, B., & Felser, C. (2019). Straight from the horse’s mouth: Agreement attraction effects with Turkish possessors. In *Linguistic Approaches to Bilingualism* (Vol. 9, Issue 3, pp. 398–426). John Benjamins.
- Morey, R. D. (2008). Confidence intervals from normalized data: A correction to Cousineau (2005). *Reason*, 4(2), 61–64.
- Nicenboim, B., & Vasishth, S. (2016). Statistical methods for linguistic research: Foundational ideas—Part II. *Language and Linguistics Compass*, 10(11), 591–613.
- Turk, U. (2022). Agreement attraction in Turkish. Bogazici Master’s thesis
- Turk, U, Logacev, P. (2024). Agreement attraction in Turkish: The case of genitive attractors. Cognition, Neuroscience, and language.
- Turk, U, Logacev, P. (2023). Novel analysis of response bias challenges representational accounts in attraction. HSP2023.
- Ulusoy, E. (2023). Connectivity and case effects in agreement attraction: The case of Turkish. USCS Master’s Thesis.
- 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.
- Yadav, H., Smith, G., Reich, S., & Vasishth, S. (2023). Number feature distortion modulates cue-based retrieval in reading. *Journal of Memory and Language*, 129, 104400.

The Study: Modelling assumptions

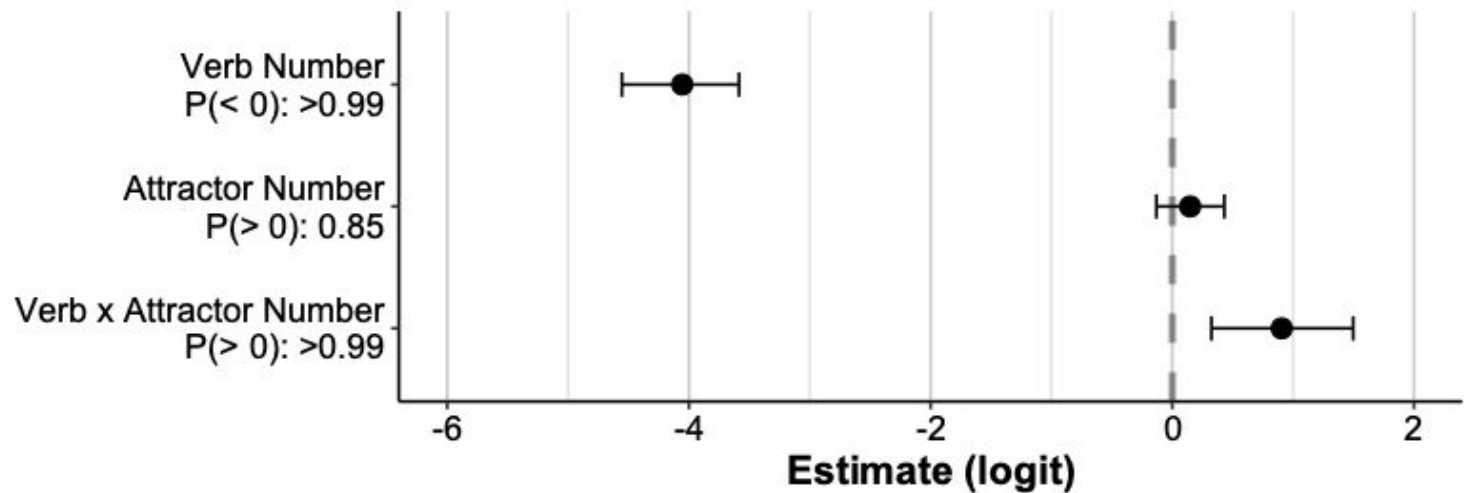
- Modelled 'yes' responses

- Assuming their distribution follows a bernoulli distribution
- Predictors:
 - Verb number x
 - Attractor number x
 - Register
- By participant and item intercepts + slopes
- Interactions are included.
- Controlling for trial order
- Bayesian hierarchical linear model

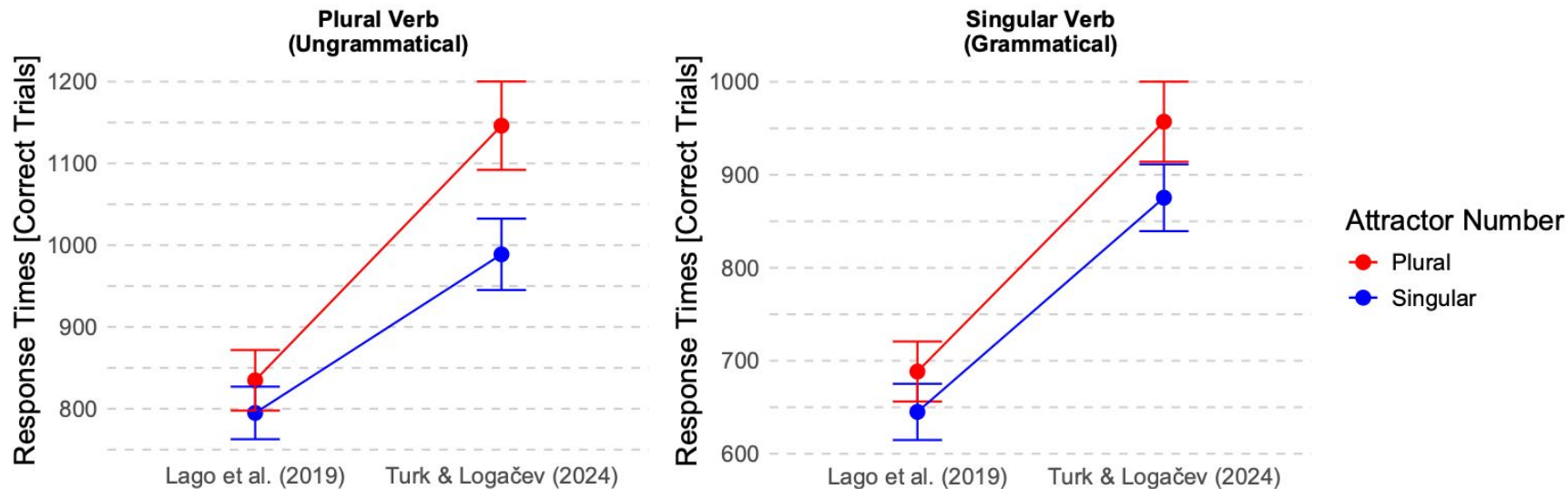


The Study: **Modelling assumptions**

- Modelled 'yes' responses in informals



Previous Experiment Response Times



Our Response Times

