

Animacy Effects on Production and Comprehension of English Object Relative Clauses



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BACKGROUND

Animacy

whether an entity is alive or not

- **Inanimate:** rock, car, cup...
- **Animate:** human beings, animals

Object Relative Clause (ORC)

active Head Noun Agent
the baby that the man carries

passive Head Noun Agent
the baby that is carried by the man

Animacy Effect on ORC Structure Choice

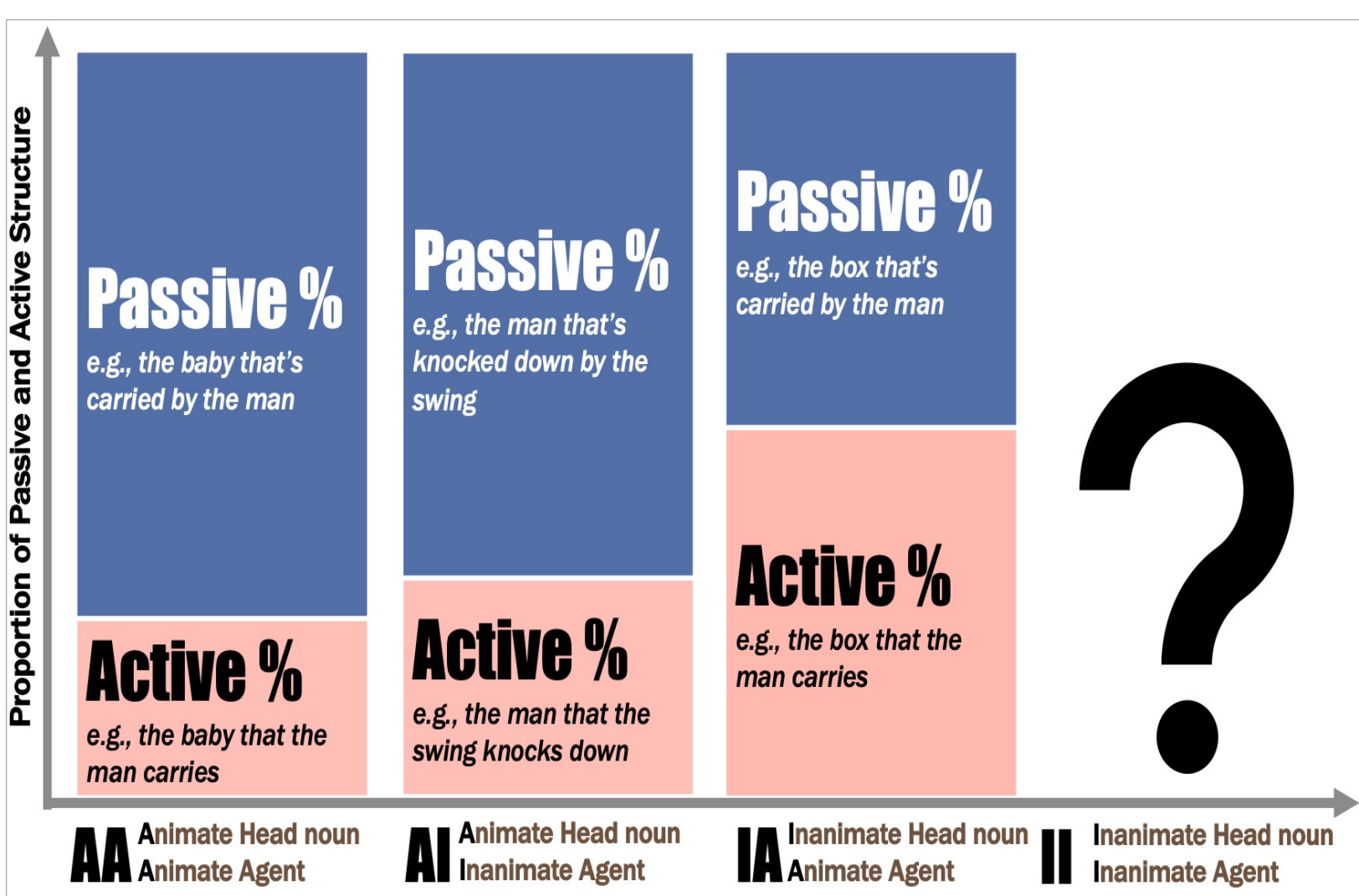
Previous Findings:

Different **passive** use rates across animacy conditions.

- **AA > IA** (e.g., Gennari et al., 2012; Humphreys et al., 2016) (Language: English, Spanish, Serbian, Mandarin Chinese)
- **AI > IA** (Rodrigo et al., 2018) (Language: Spanish, Japanese)

Task Used:

Picture-based elicitation tasks



Similarity-Based Competition Mechanism

(e.g., Gordon et al., 2001; Gennari et al., 2012)

- Speakers use passives to reduce competition between conceptually similar nouns (e.g., two animate nouns).
- Active ORCs are harder to produce due to the need to handle similar nouns in succession.

Animacy-Based Accessibility Mechanism

(e.g., Bock et al., 1992; Perera & Srivastava, 2016; Rodrigo et al., 2018)

- Animate nouns are more accessible and likely to claim the subject position.
- This leads to more passive constructions when the head noun is animate.

Gap: No prior studies have examined Condition II, making it difficult to identify the mechanisms driving passive preferences in each condition.

Research Questions

RQ 1: How does animacy influence the structure choice of English ORC production by L1-English speakers?

Hypothesis: We predict a stronger preference for passive structures in conditions AA, AI, and II, driven by a combination of animacy-based accessibility and similarity-based competition.

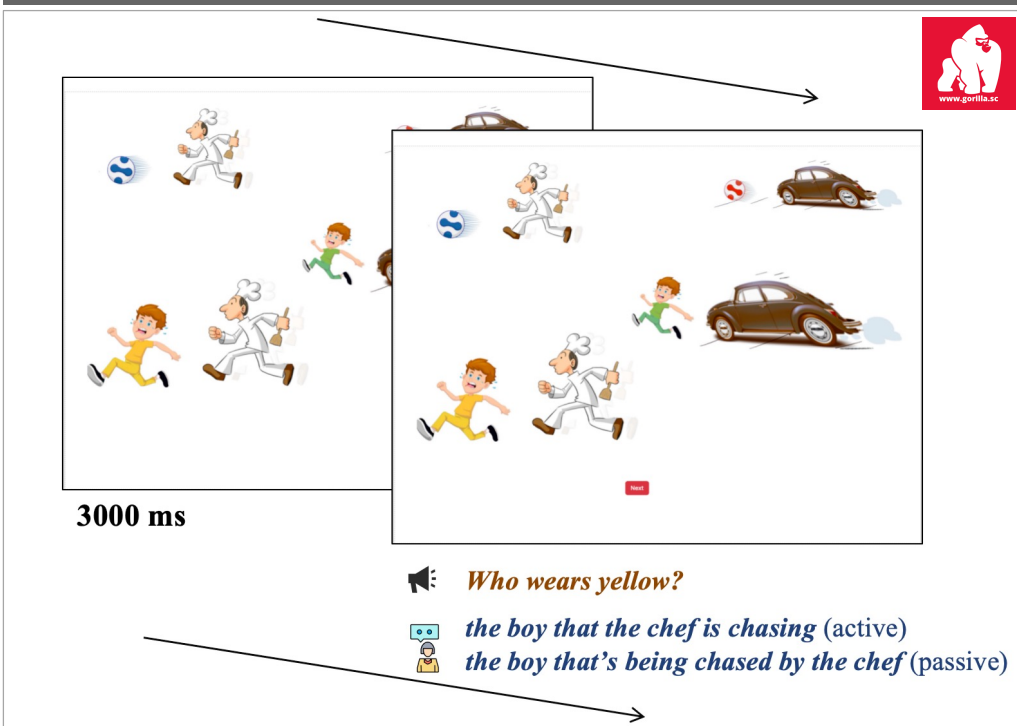
RQ 2: How does animacy influence comprehension accuracy and response time for English ORCs among L1-English speakers?

Hypothesis: (1) accuracy: Given mixed findings in previous research (i.e., Humphrey et al., 2016; Wu et al., 2022), we exploratorily predict a minor animacy effect: lower accuracy in AA, AI, and II. **(2) Reaction time (RT):** Based on previous (e.g., Gennari & MacDonald, 2008; Humphreys et al., 2016), we predict: $RT_{(active, AA)} > RT_{(active, IA)}$. For AI and II, we also predict longer RT due to increased processing demands. We expect $RT_{(active, IA)}$ to be the shortest, as this configuration aligns more naturally with active structure expectations.

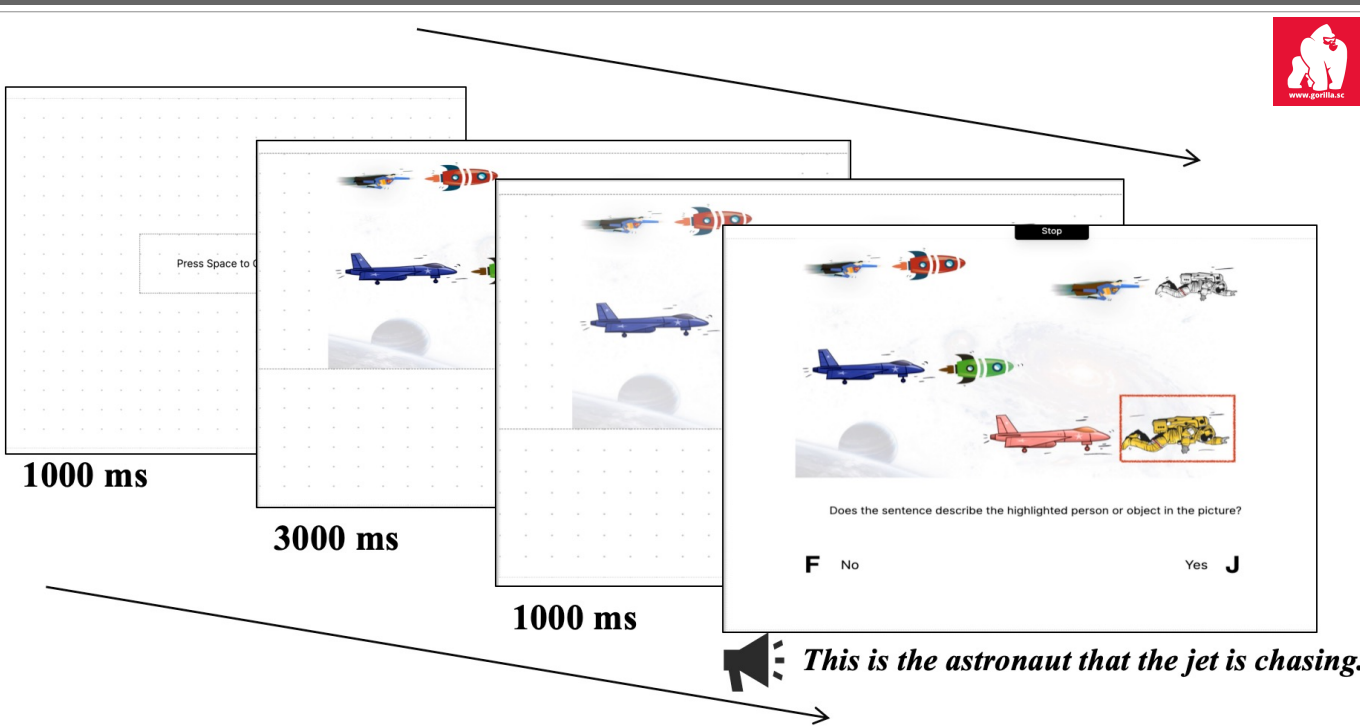
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METHODS

Elicitation Task



Decision Task



PARTICIPANTS:

- **35 L1-English speakers** (19 male, 15 female, 1 non-binary; Age: 18-28, mean=19.91, SD=2.27).

TASKS & PROCEDURE:

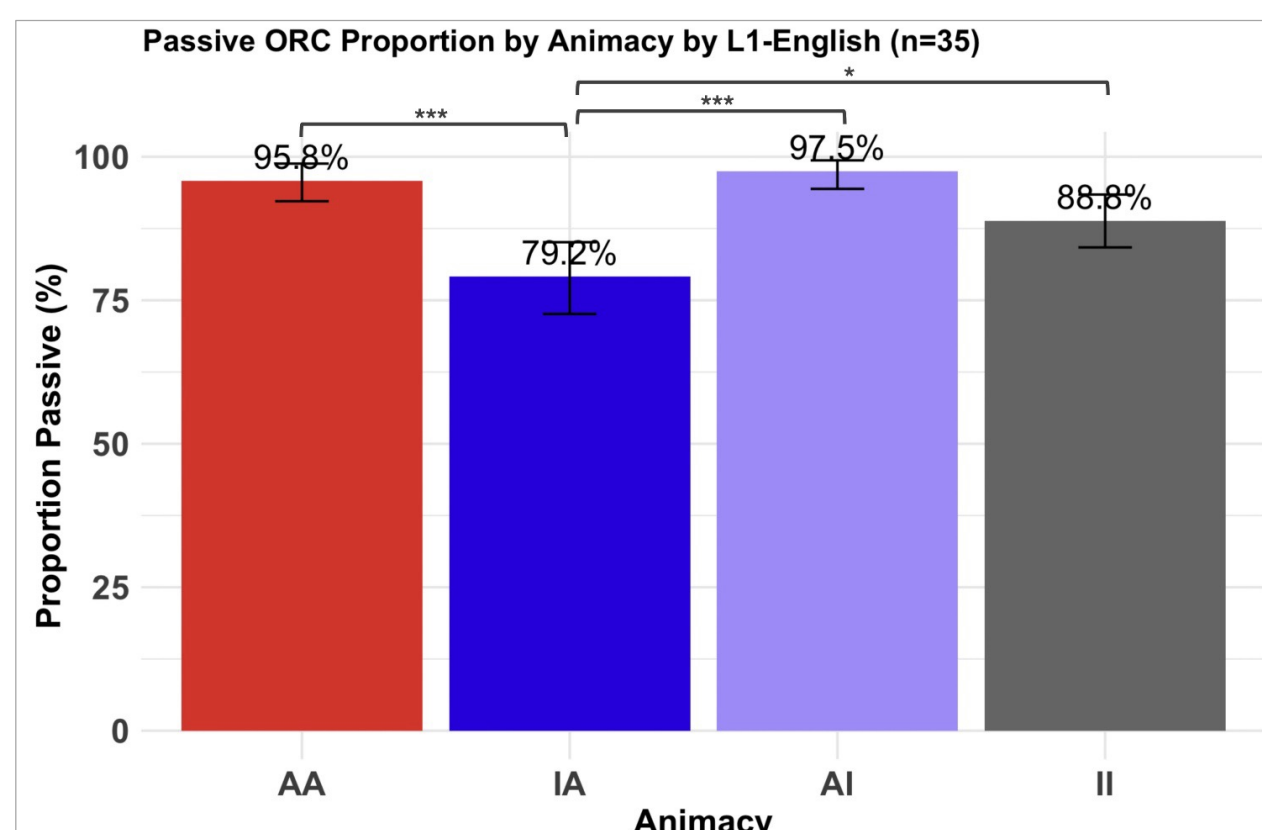
1. Elicitation Task (*structure choice*)
2. Decision Task (*comprehension accuracy and reaction time*)
3. Language Background Questionnaire

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Results

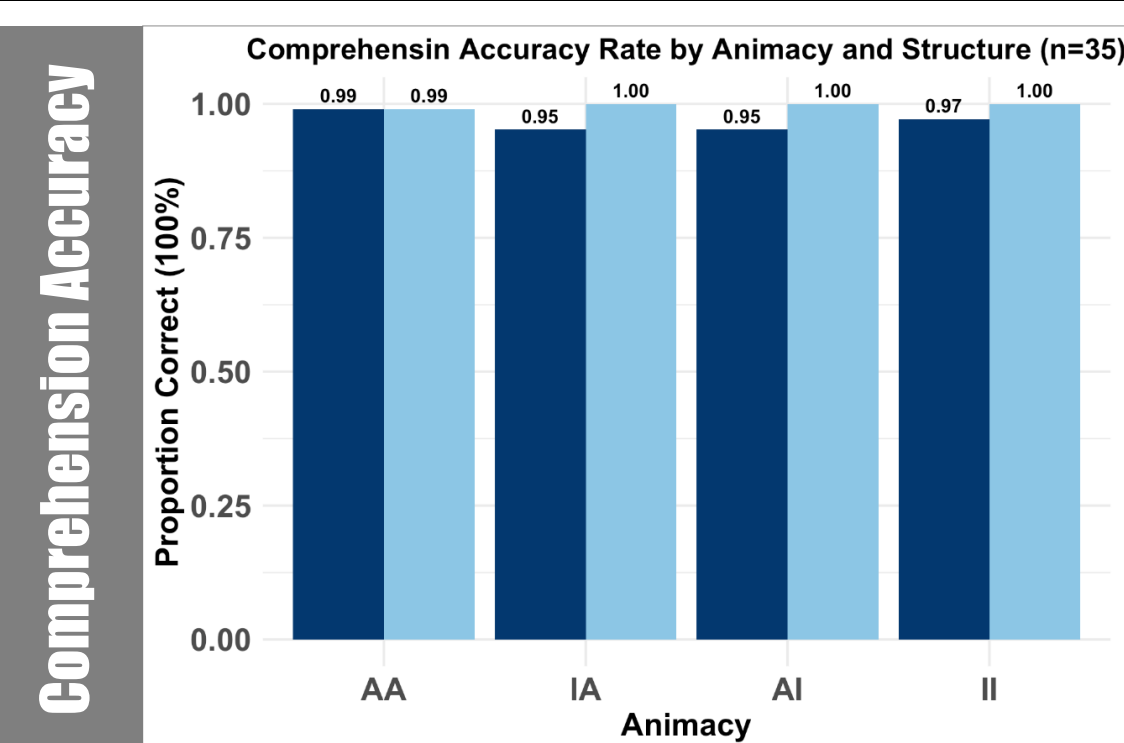
Production Result

- Found the main effect of **ANIMACY** on ORC production's structure choice ($F(3, 27.49) = 13.40$, $p < .001$).
- **Condition IA:** Significantly less passive usage than **AA** ($\beta = -0.17$, $p < .001$).
- **Condition AI:** No significant difference from **AA** ($\beta = -0.02$, $p = .65$). Significantly more passive than **IA** ($\beta = 0.19$, $p < .001$).
- **Condition II:** more passive than **IA** ($\beta = -0.10$, $p = .02$), but not different from AA or AI.



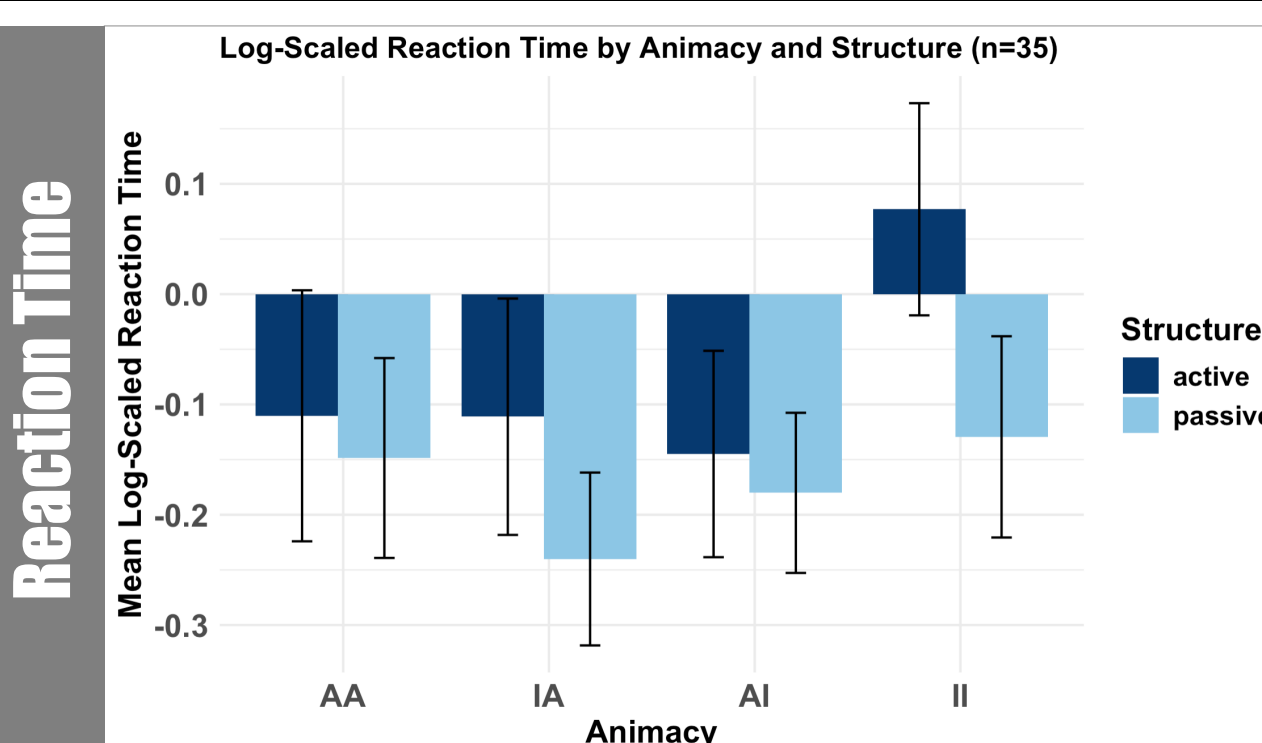
model_production_stru_choice <- lmer(passive ~ condition * (1|Participant) * (1|Item), data = data_production)

Comprehension Result



- No main effect of **ANIMACY** ($F(3, 33.63) = 0.32$, $p = 0.81$).
- Significant effect of **STRUCTURE**: lower accuracy rate in actives than passives ($\beta = -.03$, $p = .01$).
- No interaction ($F(3, 33.63) = 0.78$, $p = 0.51$).

model_comp_accuracy <- lmer(Correct ~ condition * comprehension_structure * (1|Participant) * (1|Item), data = data_comprehension)



- No main effect of **ANIMACY** ($F(3, 39.72) = 1.00$, $p = 0.40$).
- No main effect of **STRUCTURE** ($F(1, 39.73) = 1.91$, $p = 0.17$).
- No interaction ($F(3, 39.72) = 0.33$, $p = 0.80$).

model_reaction_time <- lmer(log_Reaction_Time_scaled ~ condition * comprehension_structure * (1|Participant) * (1|Item), data = data_comprehension)

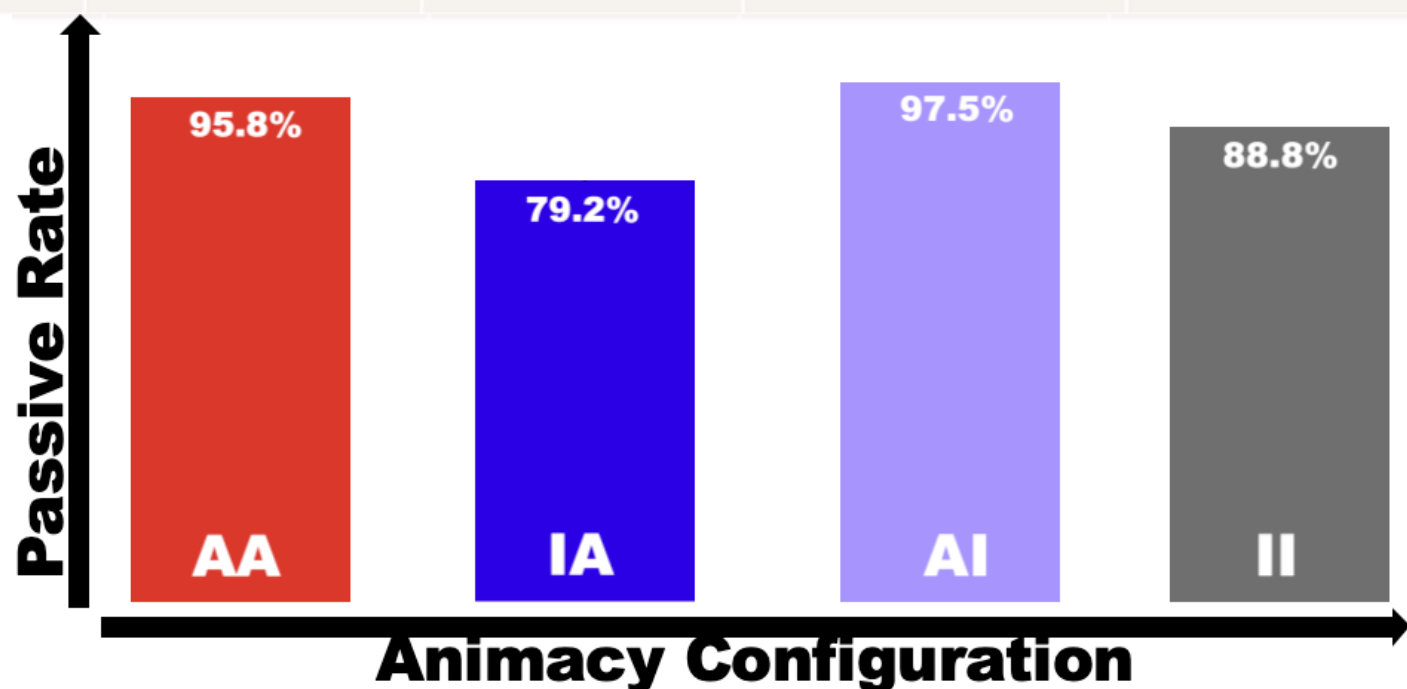
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Discussion

Activation of Processing Mechanisms Across Animacy Conditions

	AA	IA	AI	II
Animacy-Based Accessibility Mechanism	✓	✗	✓	✗
Similarity-Based Competition Mechanism	✓	✗	✗	✓

AA Both mechanisms are activated: an animate noun claims the subject position + competition between two animate nouns.



IA NO mechanism is activated: No animate head noun + Reduced competition between two dissimilar nouns.

AI One mechanism is activated: An animate noun claims the subject position. Reduced competition as the two nouns are dissimilar.

II One mechanism is activated: No animate nouns claim the subject position. High competition between two inanimate nouns.

Animacy Effect in ORC Production:

- Evidence for animacy-based accessibility in the absence of similarity-based competition (**condition AI**), similar to Rodrigo et al.'s (2018) findings for Japanese and Spanish.
- Evidence for similarity-based competition in the absence of an animate agent (**condition II**), is a novel finding.
- **This is the first definitive evidence that animacy effects in production cannot be reduced to a single mechanism but rather depends on both.**

Animacy Effect in ORC Comprehension:

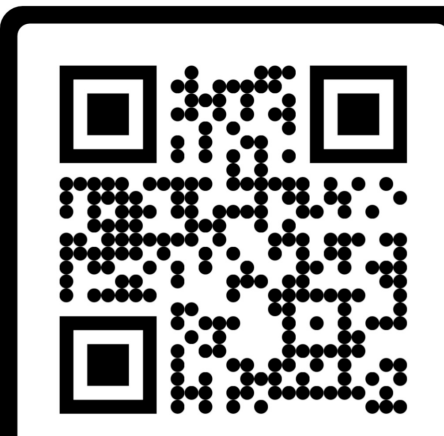
- High overall comprehension, but a slight drop in accuracy for actives.
- No animacy effects in accuracy or response times; possibly a ceiling effect due to the simplicity of the sentences and the task.

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References (selected)

1. Gennari, S. P., Mirković, J., & MacDonald, M. C. (2012). Animacy and competition in relative clause production: A cross-linguistic investigation. *Cognitive psychology*, 65(2), 141-176.
2. Humphreys, G. F., Mirković, J., & Gennari, S. P. (2016). Similarity-based competition in relative clause production and comprehension. *Journal of Memory and Language*, 89, 200-221.
3. Rodrigo, L., Igoa, J. M., & Sakai, H. (2018). The interplay of relational and non-relational processes in sentence production: The case of relative clause planning in Japanese and Spanish. *Frontiers in psychology*, 9, 325103.



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