Evidence that thematic role is the major determinant of antecedent activation in reference production

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Introduction

- Speakers have biases in choosing referent or referential form
  (1) John talked to Mary. _____
  → More likely to continue the sentence with the subject John
  → More likely to use pronouns for the subject John (e.g., [3])

- Less is known about the underlying processes in reference production
  - For example: What determines speakers' bias of referential form? One hypothesis:
    - Increasing antecedent activation → more pronouns (e.g., [2])
    - Subject is more activated than object → subject bias in pronoun use

BUT…
- Relating referring expression choice to activation level of antecedent requires an independent measure of activation

THE CURRENT STUDY
- Measured antecedent activation by the ease of reference planning
- Tested if factors that were found to affect referential form choice (grammatical and thematic role) influenced antecedent activation. We find:
  - **Grammatical role: No**
  - **Thematic role: yes, but agent is in particular highly activated**

Methodology

BASIC IDEA
- Assumption: more activated antecedent → easier reference planning [5]
- The choice of referential form and planning the remaining part of the sentence may contribute to planning difficulties
- Controlling these factors will let us directly evaluate how quickly speakers plan reference to different types of antecedent

Sample stimuli
  (2) Gary informed Anna that he/she got the job.
- The choice of referential form: constrained by principle C [4]
  → pronouns have to be used here
- The planning of the remaining part of the clause other than the referent
  → content is directly provided to participant

Off-line judgement for referent predictability
- How likely a referent is re-mentioned
- Referent predictability has been argued to be an indicator of antecedent activation (e.g., [1])
  - We want to exclude potential confound, at the same time test this claim
- Force-choice task for all stimuli
Gary informed Anna that _____ got the job. (A) he (Gary) (B) she (Anna)

Discussion

1. Thematic role, especially agenthood, determines antecedent activation
   - Possible reason 1: agent is inherently salient in memory
   - Possible reason 2: thematic role parallelism
2. Factors that were found to determine referential form choice did not affect antecedent activation -> raises a question about the activation-based accounts
3. Sources are also faster than goals when articulating the pronoun - could reflect thematic prominence or predictability, further work is needed.

Experiment

Picture-description task
- Participants were given with two screens for each item, presented one by one

- Screen 1 (left): content for the first clause "Gary informed Anna that…"
- Screen 2 (right): content for the whole sentence (always simple transitive)
- Instruction: start to structure the sentence at screen 1, produce the whole sentence once you see the icon 🔊
  - Prevent planning time of the first clause from affecting that of the second clause
- 24 target items

Dependent measures: speed of planning prior to the articulation of references (as in other reference planning studies, e.g., [5])
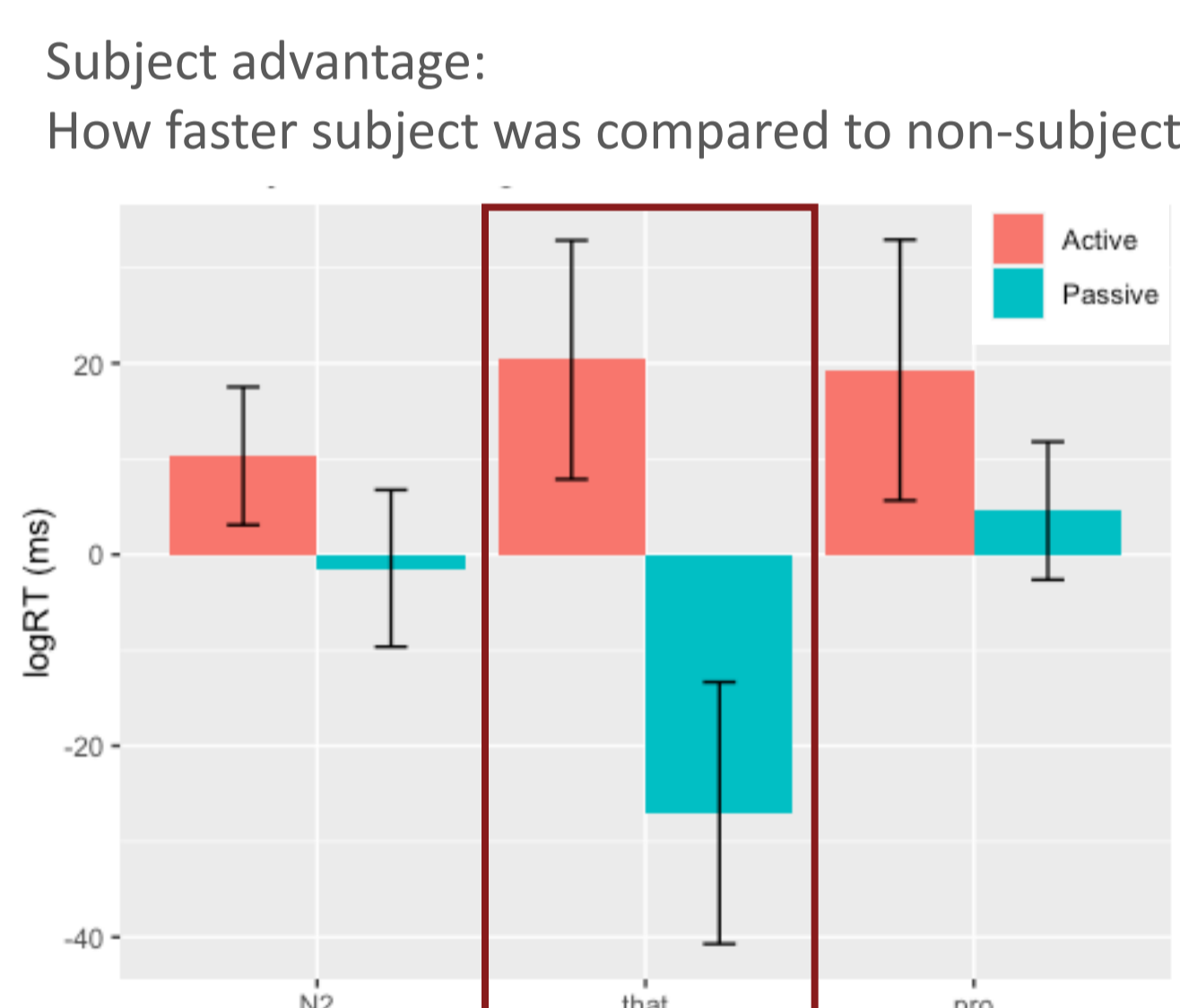

Gary informed Anna that he got the job
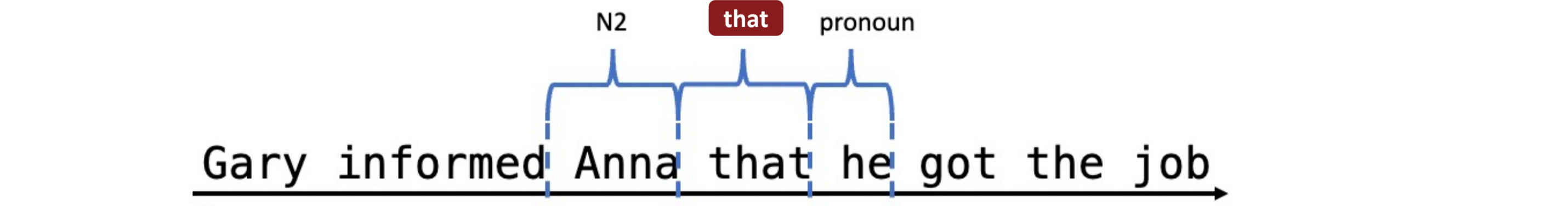
- Three intervals are measured: from the offset of the previous word to the offset of the current word
- Critical measure: **pre-pronoun interval "that"** - Offset of N2 to offset of "that"

- **Prediction:** More activated antecedent → faster planning prior to reference → shorter pre-pronoun interval
- Below we look at whether there is a subject advantage on the three intervals: is subject antecedent always more activated and thus planned faster?

Results

Experiment 1 (N = 48)
- Do grammatical and thematic role both affect antecedent activation? **NO**
- Grammatical voice (Active vs. Passive) x Antecedent position
  Gary **informed** Anna that **he/she** got the job.   [Active]
  Gary **was informed by** Anna that **he/she** got the job. [Passive]
- Pronoun bias: subj > obj; passive subj > active subj [6]
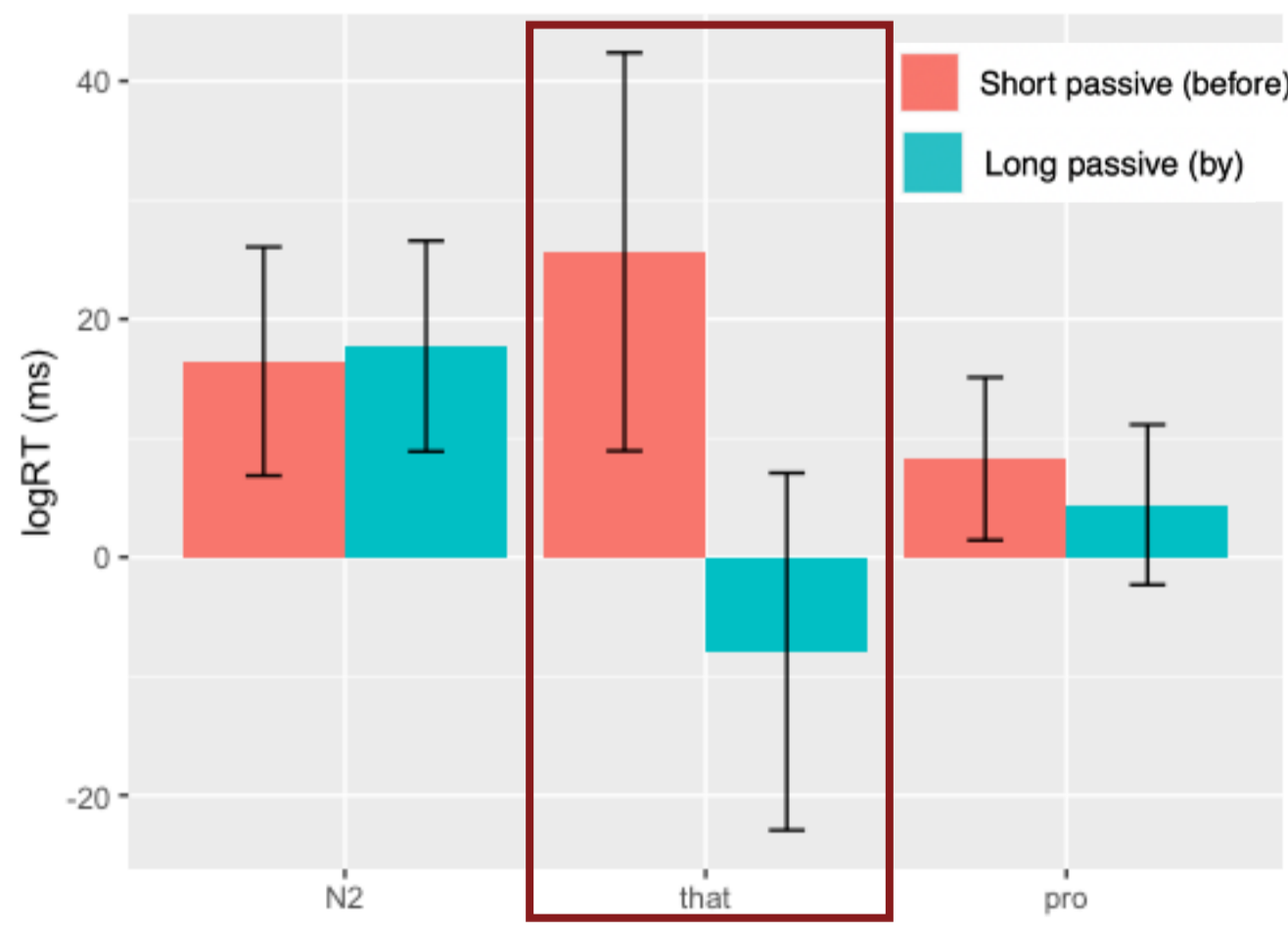- **Prediction:** subject advantage in both conditions, larger in passive

Experiment 2 (N = 48)
- Another explanation : Was the passive object advantage a result of a special status of prepositional (PP) object? **NO**
- Design: passive type (long vs. short) x antecedent position
  Gary was informed **by** Anna that **he/she** got the job. [long]
  Gary was informed **before** Anna that **he/she** got the job. [short]
  Prediction:
- PP object is agent in long passive but not short passive
- If passive object advantage in Exp 1 was due to agent → object advantage in long passive only
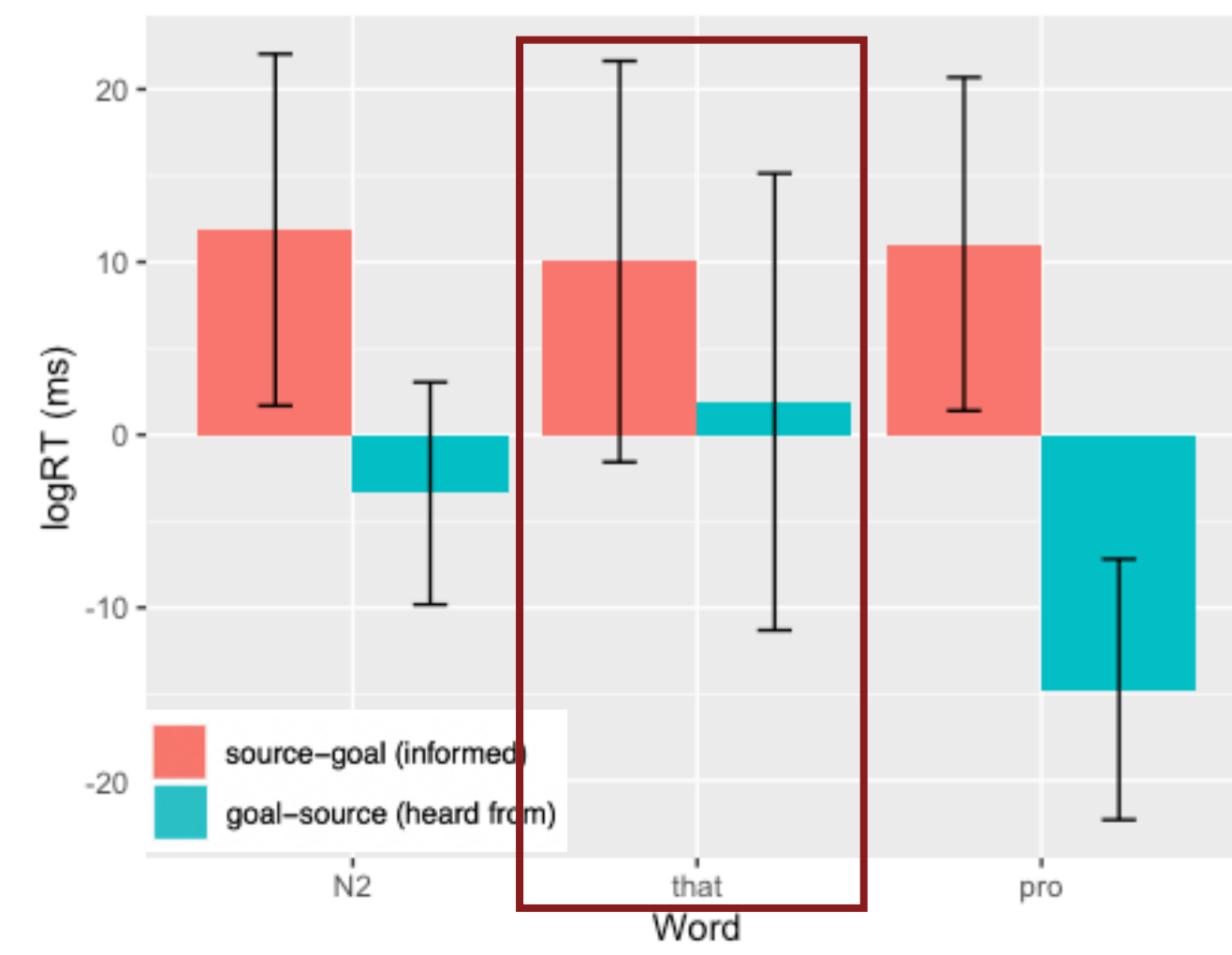
Experiment 3 (N = 48)
- Could it be a source bias instead of an agent bias? **MAYBE**
  - Passive object and active subject are also source
- Design: verb x antecedent position
  Gary **informed** Anna that **he/she** got the job. [= Exp1 active]
  Gary **heard from** Anna that **he/she** got the job.
- Informed: source – goal → source is also an agent
- Heard from: goal – source → no agent
- If it was because of source: obj advantage for "heard from"

Subject advantage: How faster subject was compared to non-subject

Off-line judgement (N = 48)
- No predictability difference b/w voice
- Subject bias in predictability (Passive: 59.5%; Active: 52.6%)

Results
- Reference to **active subject** is planned faster than active object
- Reference to **passive object** is planned faster than passive subject
- **Potential generalization:** Reference to agents is faster than non-agents (Interaction effect: 89% HDI = [-0.32, -0.04])
- Not in line with pronominalization bias

Off-line judgement (N = 48)
- No predictability difference b/w two passives
- No evidence for subject bias (Long passive: 56.7%; Short passive: 55.1%)

Results
- References to **long passive object** is marginally planned faster (89% HDI = [-0.14, 0.03])
- References to **short passive subject** is planned faster (89% HDI = [0.01, 0.16])

Off-line judgement (N = 24)
- Source bias ("inform": 62%, "hear from": 69%)

Results
- Clear source advantage found on pronoun interval (Interaction effect: 89% HDI = [-0.16, -0.02])
- No clear advantage for pre-pronoun interval
  - "informed": 89% HDI = [-0.09, 0.05]
  - "heard from": 89% HDI = [-0.10, 0.04]
- Could be due to referent predictability or the thematic role itself

References: [1] Arnold, J. E. (1998). Reference form and discourse patterns [Doctoral dissertation, Stanford University, 1998]. [2] Ariel, M. (1990). Accessing noun-phrase antecedents. Routledge. [3] Brennan, S. E., Friedman, M. W., & Pollard, C. J. (1987). A centering approach to pronouns Proceedings of the 25th annual meeting on Association for Computational Linguistics, Stanford, California. [4] Chomsky, N. (1993). Lectures on government and binding: The Pisa lectures. [5] Zerkle, S. A., & Arnold, J. E. (2019). Does pre-planning explain why predictability affects reference production? Dialogue & Discourse, 10(2), 34-55. [6] Rohde, H., & Kehler, A. (2014). Grammatical and information-structural influences on pronoun production. Language, Cognition and Neuroscience, 29(8), 912-927.