Verbs retrieve subjects, not clausal attachment sites

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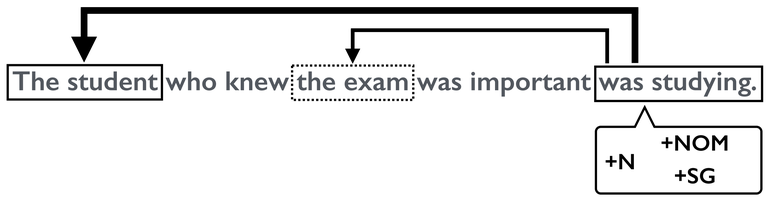
RESEARCH QUESTION: Do the verb's retrieval cues target attachment sites, leading to interference from multiple clauses?

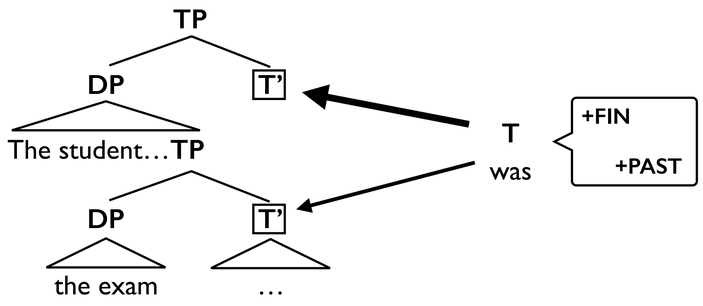
1. Similarity-based interference

- **Cue-based retrieval** guides resolution of subject-verb dependencies [1, 2]
  - ➡ Parser launches a search for the subject at the verb, guided by certain retrieval cues
- **Similarity-based interference** occurs when multiple candidates in memory match the verb's retrieval cues
  - ➡ **What kind of cues are used for retrieval?**
  - ➡ Semantic properties, structural position, and case shown to be relevant cues for retrieval [2, 3]



2. Attachment sites or subjects?

- Interference could be due to multiple subjects or multiple attachment sites for the verb
- Subject properties often correlate with clausal properties
  - ➡ Nominative case in finite clauses; accusative case in non-finite [3]
- Multiple subjects correlate with multiple clausal attachment sites
  - ➡ When the parser encounters a DP, it projects an accompanying T', which serves as an attachment site for the verb



Hypothesis: The verb's retrieval cues target both arguments **and** attachment sites; clauses should also give rise to interference

REFERENCES: [1] **Van Dyke, J. A. & Lewis R. L. (2003).** *Journal of Memory and Language.* [2] **Van Dyke, J. A. (2007).** *Journal of Experimental Psychology: Learning, Memory, and Cognition.* [3] **Arnett, N. & Wagers, M. (2017).** *Journal of Memory and Language.* [4] **Hofmeister, P. & Vasishth, S. (2014).** *Frontiers in Psychology.* [5] **Van Dyke, J. A. & McElree, B. (2011).** *Journal of Memory and Language.* [6] **Vasishth, S. & Lewis, R. L. (2006).** *Language.*

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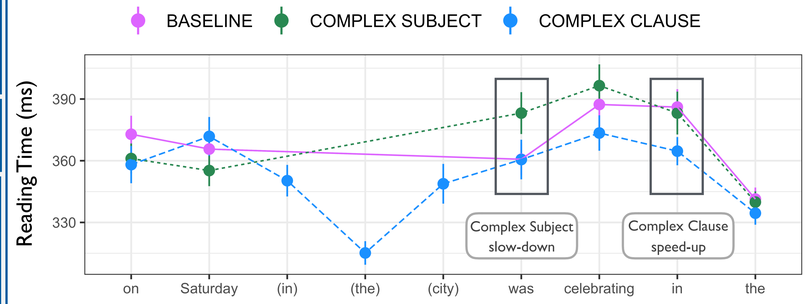
3. Experiment 1a

- Manipulate complexity of intervener with PP modifiers: increased activation leads to greater competition at retrieval [3, 4]

Initially, **the bookie** who expected that … **was** celebrating in the streets.	
Baseline	the fighter would defeat the challenger from the city on Saturday
Complex Subject	the fighter from the city would defeat the challenger on Saturday
Complex Clause	the fighter would defeat the challenger on Saturday in the city

- Word-by-word self-paced reading (n = 61)

Prediction: Slower reading times at retrieval site in Complex Subject and Complex Clause conditions



- Retrieval site (*was*): Complex Subject slower than Baseline (22 ms ± 11 ms; p = .057)
  - ➡ Intervening subjects generate interference
- Spillover (*in*): Complex Clause faster than Baseline (-21 ms ± 10 ms; p < .05)
  - ➡ No evidence for interference from intervening clauses
  - ➡ Potential anti-locality effect [6]: clause-final modifiers boost expectation of exiting embedded clause, which could mask difficulty

4. Experiment 1b

- Items from Experiment 1, but without final matrix PP
- Speeded acceptability judgment task [1], RSVP (n = 76)

	Error Rate	Confidence	RT
Baseline	.35 (.02)	2.2 (.03)	1000 (17)
Complex Subject	.39 (.03)	2.1 (.03)	998 (17)
Complex Clause	.37 (.02)	2.2 (.03)	1007 (17)

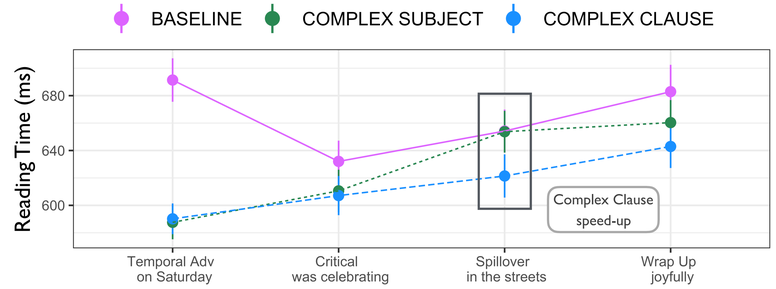
- Error rates highest for Complex Subject, but not significantly different from Baseline (p = .09)
  - ➡ High error rates may indicate overall task difficulty

5. Experiment II

- Used pre-head modifiers to keep number of clause-final modifiers constant and avoid anti-locality effects

Initially, | **the bookie** | who expected that | … | **was** celebrating | in the streets | joyfully.	
Baseline	the fighter | would defeat | the very determined challenger | on Saturday
Complex Subject	the very determined fighter | would defeat | the challenger | on Saturday
Complex Clause	the fighter | would very likely defeat | the challenger | on Saturday

- Phrase-by-phrase SPR (n = 58)



- Retrieval site (*was celebrating*): no significant differences
- Spillover (*in the streets*): Complex Clause faster than Baseline (-33 ms ± 18 ms; p = .065) and Complex Subject (-32 ms ± 19 ms; p = .091)
  - ➡ No evidence for interference from clauses
  - ➡ Reading times may be spuriously inflated due to phrase-by-phrase presentation

CONCLUSION: No evidence for interference from attachment sites; elaborated clauses never led to slow-downs, only speed-ups

- Stronger interpretation: clausal interference **never** occurs
  - ➡ Within potential clausal attachment sites, retrieval cues target properties of potential arguments
  - ➡ Attachment sites retrieved only indirectly via arguments
- Weaker interpretation: **language-specific property** of English
  - ➡ Limited verbal morphology to cue attachment sites
  - ➡ Pro-drop and verb-initial languages may use cues differently, since verb must be integrated into structure before an overt argument appears

FUTURE DIRECTIONS:

- Match / Mismatch paradigm instead of elaboration
  - ➡ Vary tense or aspect of embedded clause to match matrix verb's cues
- Examine languages with richer Tense / Aspect / Mood morphology
  - ➡ E.g. subjunctive vs. indicative in Spanish