

Directing internal attention during sentence reading

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Language comprehension is a complex process that relies in part on retrieving previously encountered linguistic representations when they become relevant for interpretation [e.g., 1]. Evidence from general memory research suggests that successful retrieval depends on an internal selective attention that selects and prioritises relevant representations [2]. Whether such attentional selection mechanisms are engaged during language comprehension remains unclear. Across three preregistered experiments, we tested the hypothesis that anaphoric expressions function analogously as internal attentional cues, prioritising goal-relevant words held in working memory. To isolate internal attention from semantic retrieval, we used spatial/ordinal anaphoric expressions (e.g., *the former/latter*) as retrodictive cues (retrocues). Participants read sentences containing two target nouns (e.g., I like *cities* and *villages*), followed by an anaphoric expression (e.g., *the former...*) referring to one of the target words. Subsequently, participants were prompted to identify which target word had been referred to. The first two experiments manipulated the predictability of the anaphoric expression. Experiment 1A compared valid retrocues with neutral retrocues that referred equally to both target words. Experiment 1B replaced neutral retrocues with invalid retrocues, rendering the cues non-predictive. Behavioural data were analysed using paired t-tests for accuracy and response time. Both experiments found improved response performance for validly cued words, even when the anaphoric retrocue was non-predictive. In the third experiment, sentences were presented word-by-word with target words lateralised left/right. Behavioural data were analysed using a mixed-effects model, and eye movements were assessed using a 'towardness' measure and cluster-based permutation tests. Eye tracking revealed gaze biases time-locked to the onset of the anaphoric retrocue, directed toward the prior spatial locations of cued words. These cue-locked gaze biases provide online evidence of attentional orienting within memory, independent of response-stage decision processes. These results replicate classic patterns of attentional selection of memory contents in visual working memory. Together, our findings refine retrieval-based accounts of language comprehension by demonstrating that internal attention supports the selection of language content maintained in memory.

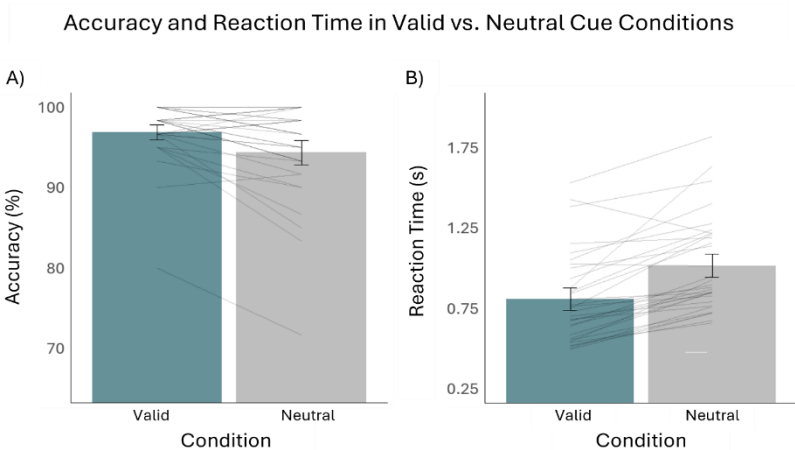


Figure 1. Results for Experiment 1a: Accuracy (%) and reaction times (s) in valid vs. neutral retrocue conditions.

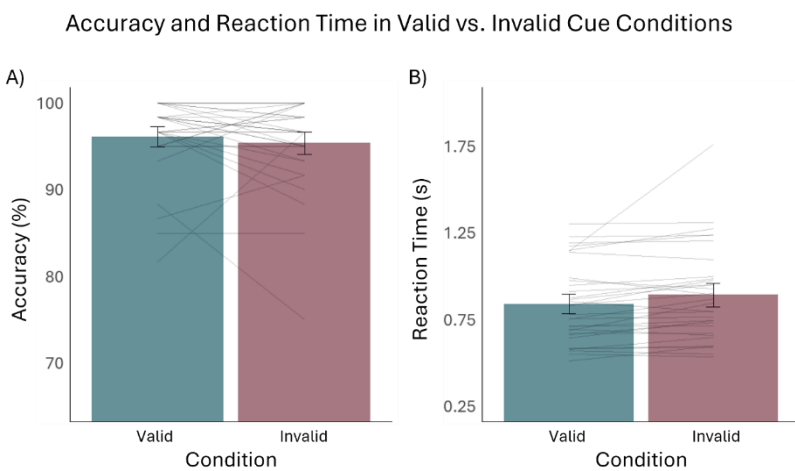
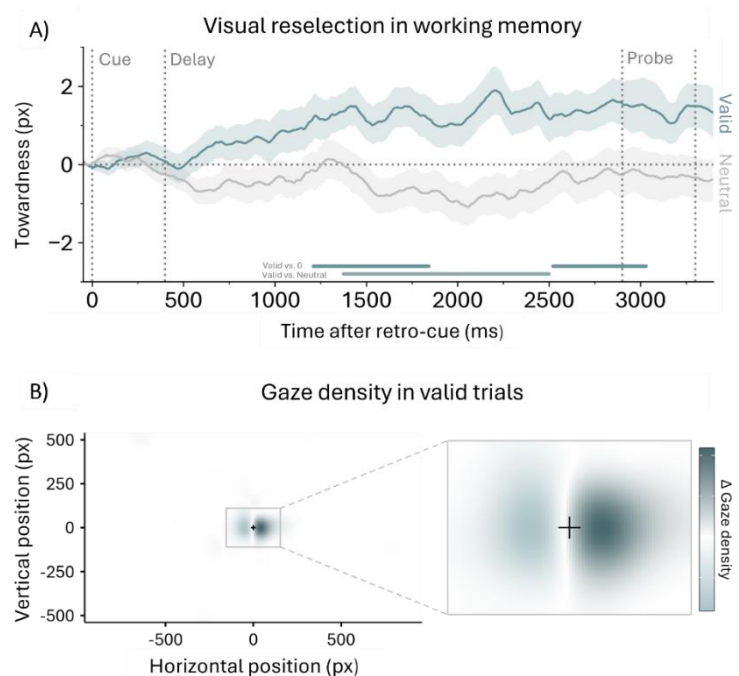


Figure 2. Results for Experiment 1b: Accuracy (%) and reaction times (s) in valid vs. invalid retrocue conditions.

Figure 3. Eye tracking results for Experiment 2: Gaze bias in valid vs. neutral retrocue conditions. Reselection of items in working memory biases gaze toward the location of the cued item. A) Average horizontal gaze bias expressed as towardness for valid and neutral cue conditions. Time courses and shadings show $M \pm SEM$ across participants in correct-response trials. Horizontal lines at the base of the figure indicate significant clusters. B) Difference in gaze density (Δ) during the post-cue delay period indicating right versus left items in valid trials.



References

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- [2] Van Ede, F., & Nobre, A. C. (2023). Turning Attention Inside Out: How Working Memory Serves Behavior. *Annual Review of Psychology*, 74, 137–165.