

## **When and where did it happen? Adjuncts are recalled worse than arguments immediately after reading a sentence**

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**Background:** The processing of adjuncts in comparison to arguments has been under scrutiny in psycholinguistic research for years (cf. Tutunjian & Boland, 2008). For example, it has been shown that arguments are processed faster than adjuncts (e.g. Clifton, Speer, & Abney, 1991), but that it depends on the type of the verb (Kenninson, 2002). Liversedge et al. (1998) showed that the context (the preceding sentence) influences the processing of adjuncts: the congruent target and context pairs were read faster than incongruent pairs. However, studies examining processing of arguments and adjuncts focused on on-line measures (such as RTs), but little if any attention has been given to recall of these expressions, i.e. to the depth of comprehension (cf. Ferreira & Yang, 2019).

**Methods:** We ran three experiments focusing on the recall of adjuncts and arguments in relation to the word order position of these elements. All experiments were run on Czech (because it grammatically allows various word order manipulations) with native Czech speakers. The experiments used self-paced reading (sentences presented as a whole) and open-ended comprehension questions. Exp1 (N=144, 2x4 within-subject design) examined the recall of temporal adjuncts and direct objects in four different word orders (see Item examples). In Exp2 (N=149, 3x2 within-subject design), we focused only on two word orders, but added comprehension questions targeting locative adjuncts. Exp3 (N=87, 2x3 within-subject design) examined the role of context (neutral, locative, or temporal) on the recall of locative and temporal adjuncts. In all three experiments, 24 experimental items were used along with 96 fillers. The order of items was randomized for each participant and the item conditions were counterbalanced using a Latin-square design. The response correctness and error types were coded manually using preestablished coding rules.

**Results:** The results were analyzed using logit-mixed models. We found a strong effect of question type. The recall of direct objects was almost perfect (with less than 3% error rate in Exp1 and Exp2). Interestingly, the recall of locative and temporal adjuncts was distinctively worse. Temporal adjuncts were not recalled correctly in 14.04% in Exp1, in 14.39% in Exp2 and in 19.61% in Exp3. Locative adjuncts were not recalled correctly in 8.75% in Exp2, and in 7.64% in Exp3. Importantly, the word order position played a role with significantly lower rate of incorrect answers if the adjunct was in the sentence-final position. In Exp3, there was a significant negative interaction between context type and comprehension question: congruent context and target pairs yielded better recall than incongruent pairs.

**Discussion:** Altogether, we found strong evidence that readers do not recall different elements of a sentence equally. Locative and temporal adjuncts seem to be recalled to a lesser extent than direct objects. This difference may be interpreted as an effect of the obligatoriness of a syntactic role, but there are potential confounds such as the interference between the adjuncts. Also, we found a reliable effect of the sentence-final position on the recall rate of adjuncts. This may be either interpreted as an effect of sentence focus, or as a general recency effect (cf. Baddeley & Hitch, 1993).

## Item examples

### Exp1

(vertical bars are used for orientation here, in the experiment, sentences were presented as a whole)

(1) V neděli | v knihovně | velmi pečlivě | přečetl | noviny | starší důchodce.

'On Sunday | at the library | very carefully | read | the newspaper | an older retiree.'

(2) Noviny | velmi pečlivě | přečetl | v neděli | v knihovně | starší důchodce.

'The newspaper | very carefully | read | on Sunday | at the library | an older retiree.'

(3) Starší důchodce | v neděli | v knihovně | velmi pečlivě | přečetl | noviny.

'An older retiree | on Sunday | at the library | very carefully | read | the newspaper.'

(4) Starší důchodce | přečetl | noviny | velmi pečlivě | v neděli | v knihovně.

'An older retiree | read | the newspaper | very carefully | on Sunday | at the library.'

Q1: Co přečetl důchodce? (What did the retiree read?)

Q2: Kdy přečetl důchodce noviny? (When did the retiree read the newspaper?)

**Exp2** (Word orders (3) and (4) from the Exp1.)

Q3: Na jakém místě přečetl důchodce noviny? (Where did the older retiree read the newspaper?)

**Exp3** (Word order (4) from the Exp1 + Q2 and Q3.)

Temporal context: Petr vzpomínal, kdy se to událo. Pak se mu to vybavilo. (Petr was trying to remember, when did it happen. Then it came to his mind.)

Locative context: Petr vzpomínal, kde se to událo. Pak se mu to vybavilo. (Petr was trying to remember, where did it happen. Then it came to his mind.)

Neutral context: Petr vzpomínal, co se to událo. Pak se mu to vybavilo. (Petr was trying to remember, what happened. Then it came to his mind.)

## References

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