



# The role of working memory in simple-arithmetic strategies

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## Introduction

Although it has been shown that solving simple-arithmetic problems (e.g.,  $8 + 5$ ;  $6 \times 7$ ) relies on working-memory resources (DeStefano & LeFevre, 2004) and on multiple strategy use (e.g., Hecht, 1999; LeFevre et al., 1996a, 1996b), the combination of both research

topics (working memory and strategy use) has not received much attention up until now. The present study was designed to test the role of executive and phonological working-memory components across several simple-arithmetic strategies.

## Method

Participants had to solve simple addition, subtraction, multiplication, or division problems (Experiments 1-4).

**Choice/no-choice method:** There was one choice condition, in which participants were free to choose any strategy they wanted (retrieval, transformation, counting, or other) and two (Experiment 4) or three (Experiments 1-3) no-choice conditions in which participants were

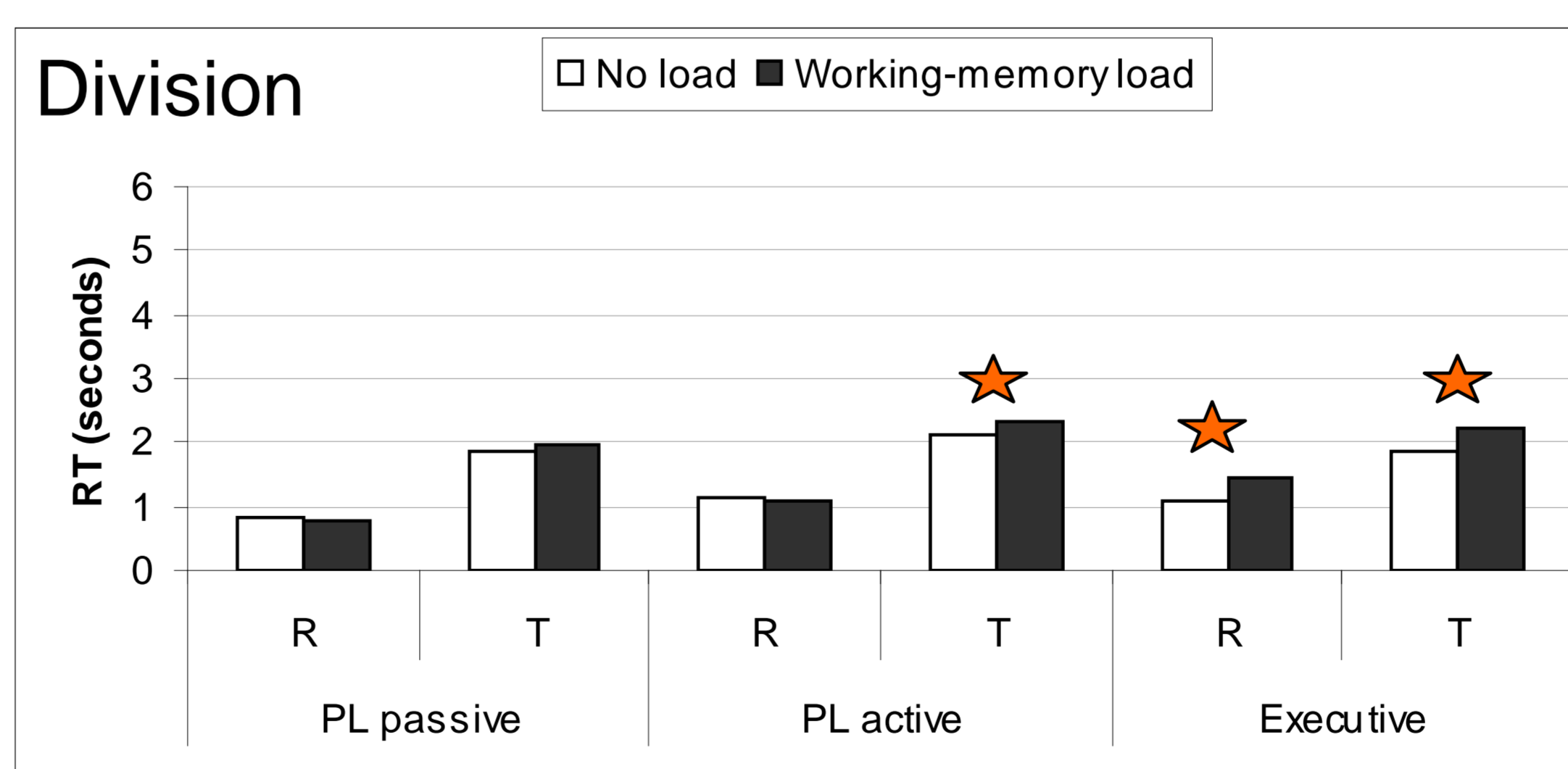
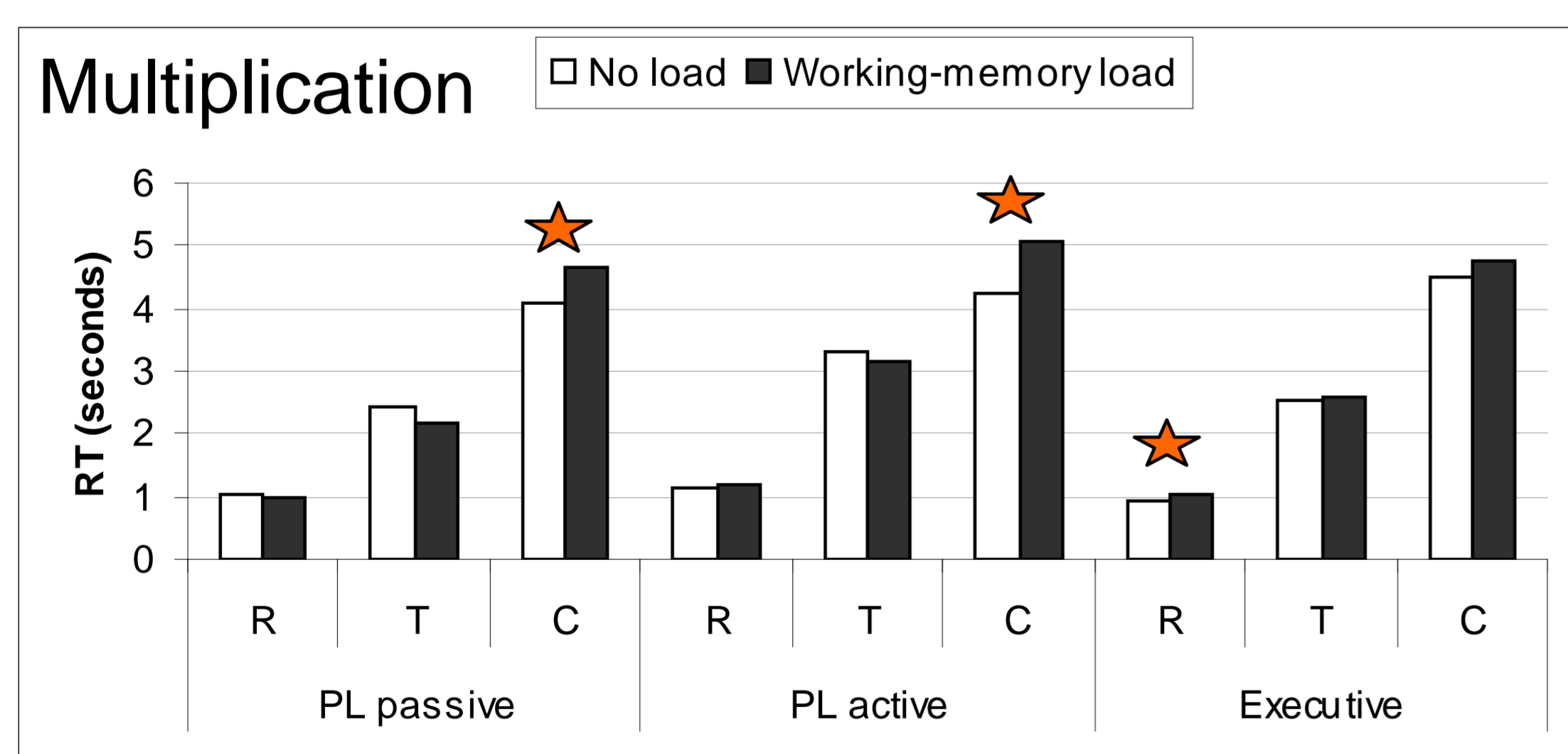
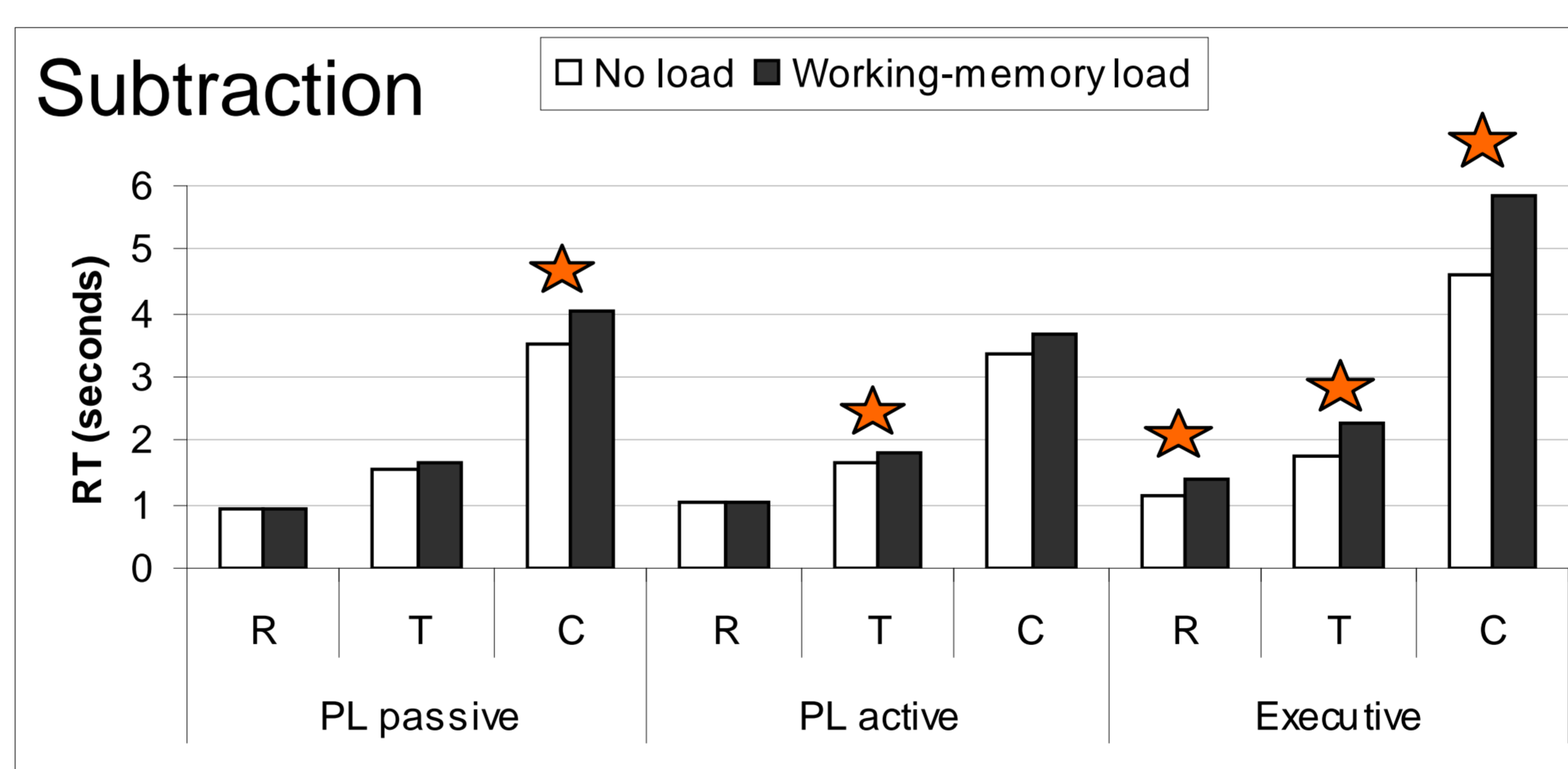
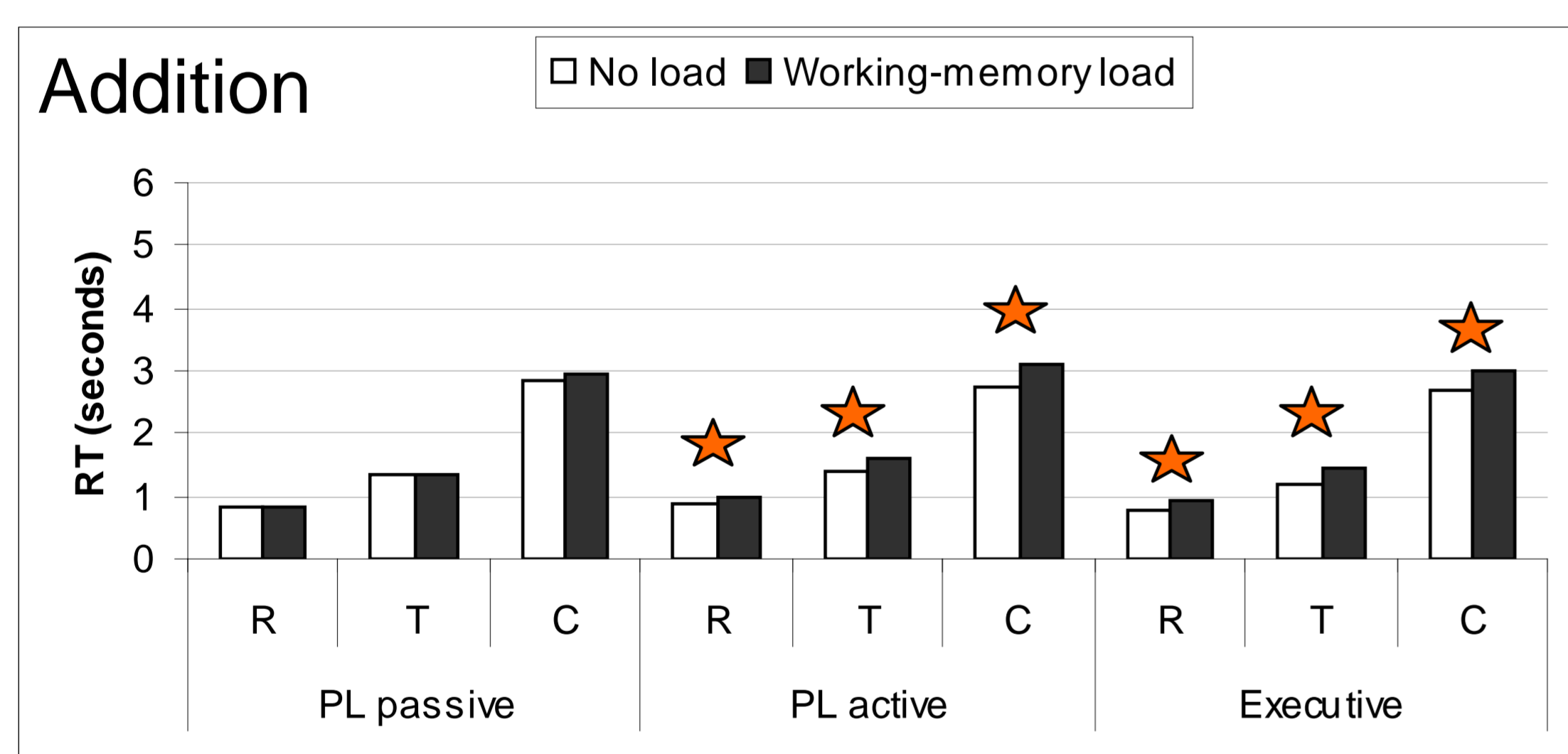
requested to solve all problems with one single strategy.

**Selective interference paradigm:** The passive phonological store was loaded by means of irrelevant speech, the active phonological rehearsal process was loaded by means of letter strings which had to be maintained, and the central executive was loaded by means of a choice reaction time task.

## Results

Analysis of percentages strategy use in choice conditions showed no effects of working-memory load on strategy distribution.

There was some evidence, however, that strategy adaptivity (choosing the fastest strategy on each problem) depended on executive working-memory resources.



Strategy efficiency was investigated by the analysis of no-choice RTs (see Figures 1-4).

The retrieval (R) strategy relied on the central executive only.

The transformation (T) strategy relied on both executive and active phonological working-memory resources.

The counting (C) strategy relied on all working-memory resources

## Discussion

Strategy distribution seemed not to depend on working-memory resources, whereas there was some evidence that strategy adaptivity might rely on the central executive. Strategy efficiency did depend on working-

memory resources, although the role of the central executive was much higher than the role of the phonological loop. Procedural strategies also relied more heavily on working memory than direct memory retrieval.

## References

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