UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

FONDS NATIONAL SUISSE
DE LA RECHERCHE SCIENTIFIQUE

THE EFFECTS OF COGNITIVE LOAD AND REFRESHING OPPORTUNITIES ON WORKING MEMORY AND EPISODIC MEMORY

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INTRODUCTION

Do mechanisms underlying working memory (WM) likewise contribute to long-term retention of information (i.e., episodic memory, EM)?

Attentional Refreshing (Johnson, 1992)

- Using attention to prolong the activation of information in WM

Manipulations of attentional refreshing in the literature

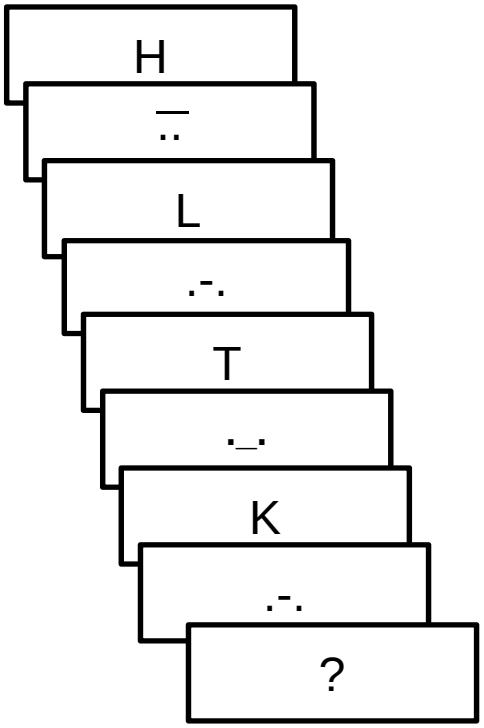
- Cognitive load (Barrouillet et al., 2004, 2007; Camos et al., 2009)
- Refreshing opportunities (Loaiza & McCabe, 2012; Souza et al., 2015)

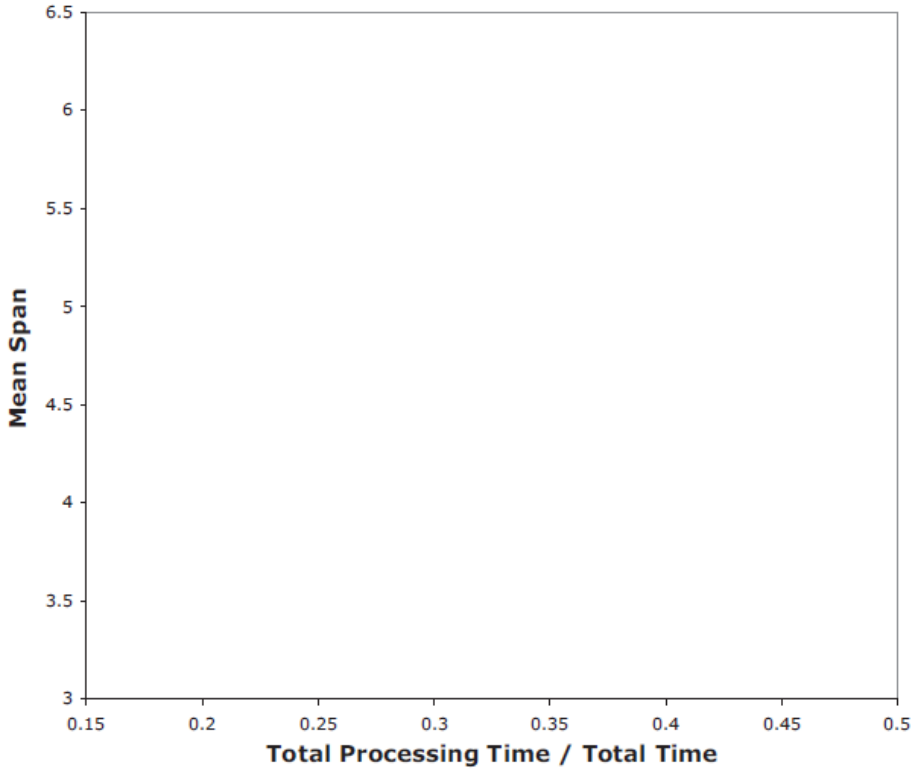
ATTENTIONAL REFRESHING: COGNITIVE LOAD

➢ Increasing cognitive load decreases WM recall

(Barrouillet et al., 2007)

Complex Span

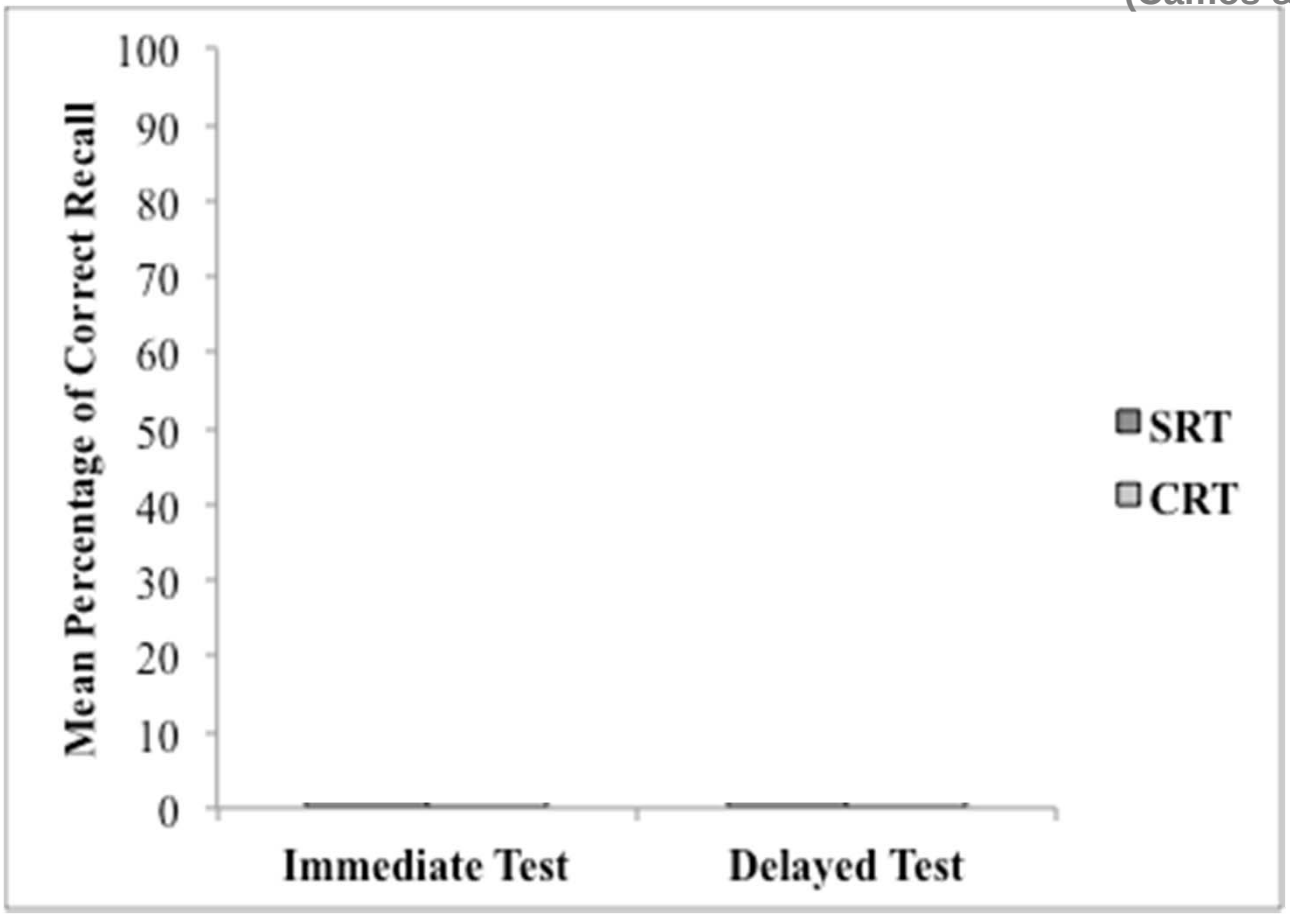




ATTENTIONAL REFRESHING: COGNITIVE LOAD

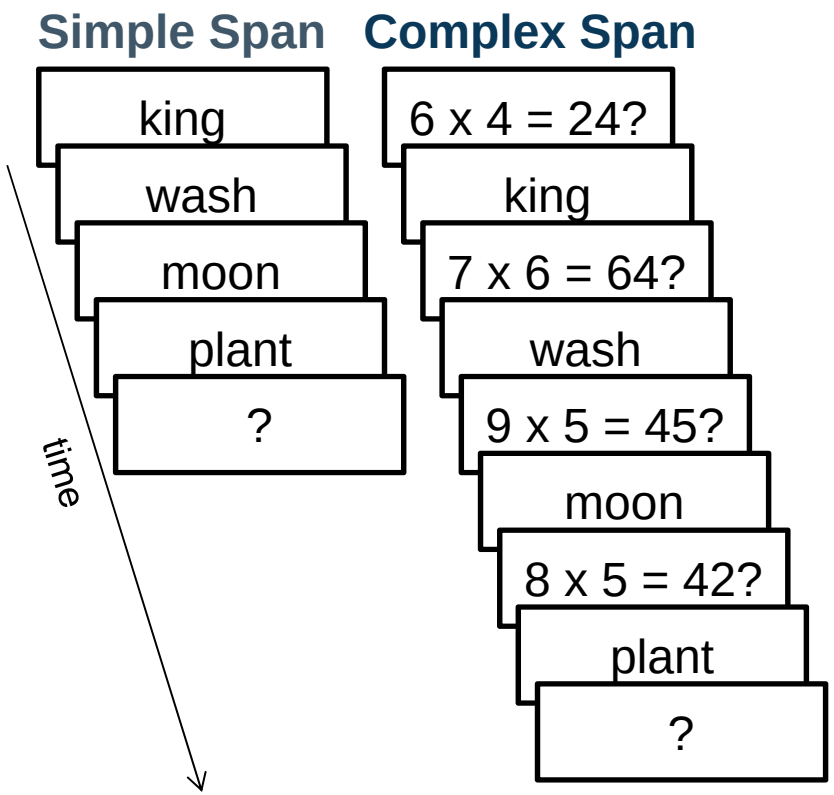
- **Increasing cognitive load decreases WM recall**
  (Barrouillet et al., 2004, 2007; Camos et al., 2009)

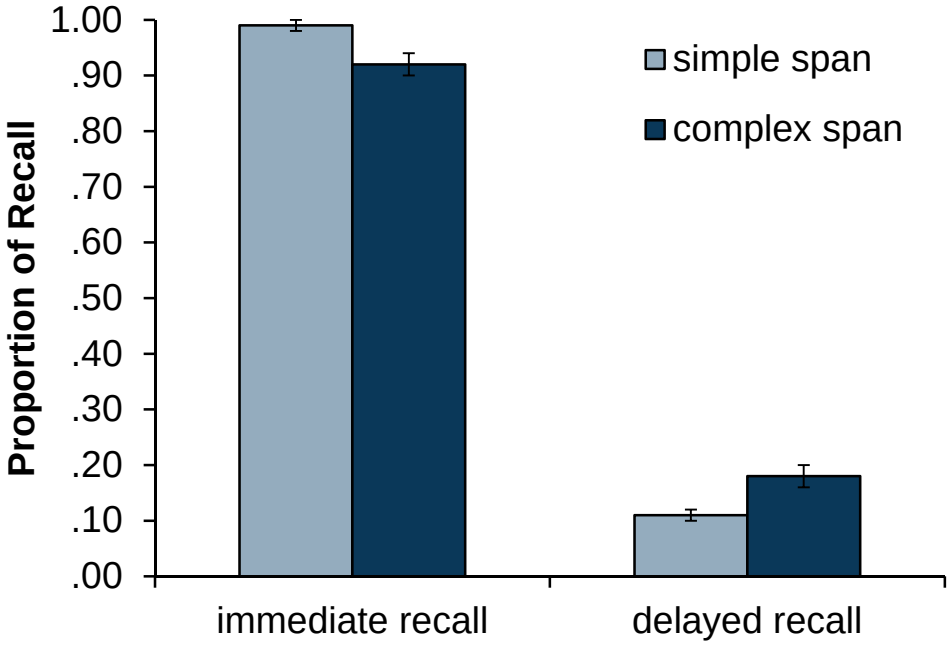
…and EM recall
(Camos & Portrat, 2015)



ATTENTIONAL REFRESHING: REFRESHING OPPORTUNITIES

- **Increasing refreshing opportunities increases EM recall**
  (McCabe, 2008; Loaiza & McCabe, 2012)



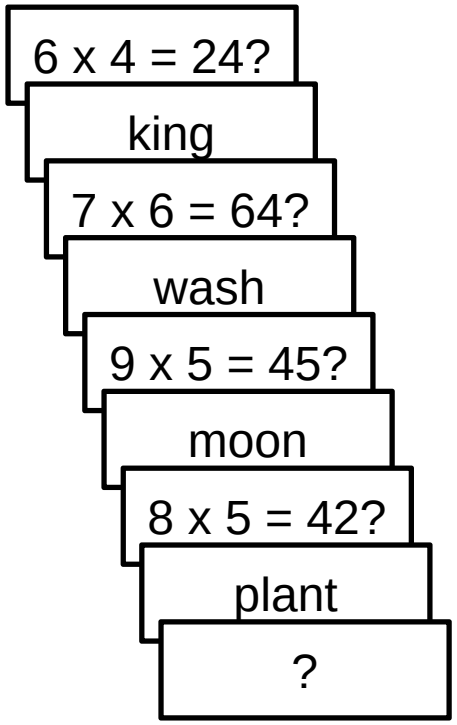


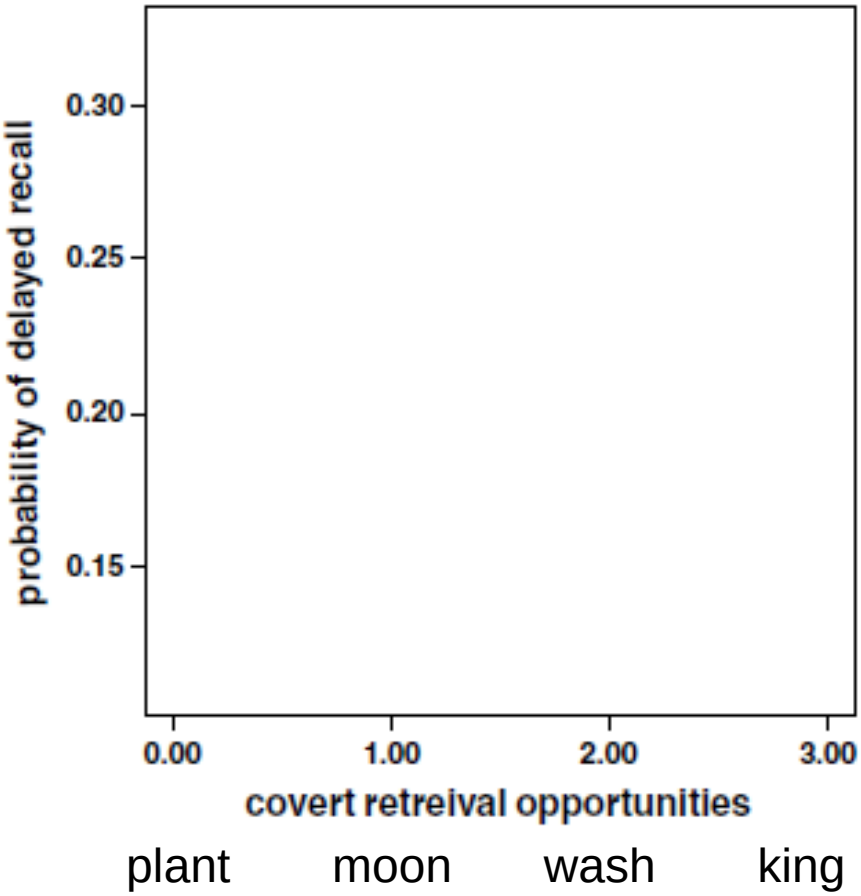
Mc Cabe effect

ATTENTIONAL REFRESHING: REFRESHING OPPORTUNITIES

- **Increasing refreshing opportunities increases EM recall**
  (McCabe, 2008; Loaiza & McCabe, 2012)

Complex Span

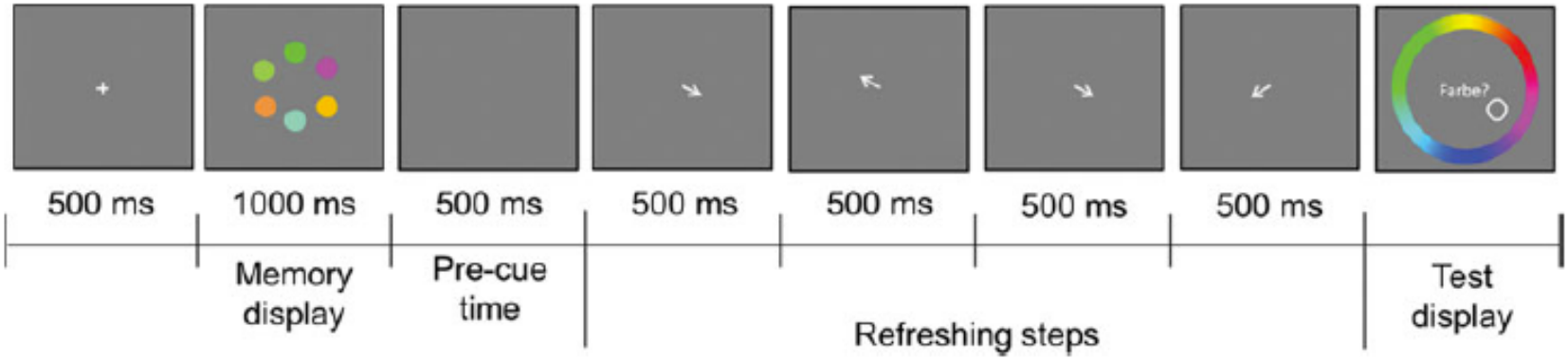


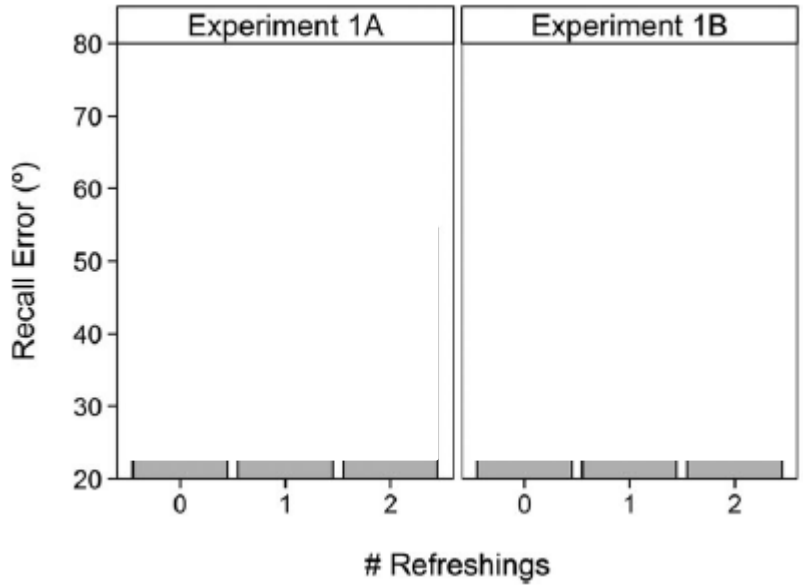


ATTENTIONAL REFRESHING: REFRESHING OPPORTUNITIES

- **Increasing refreshing opportunities increases EM recall**
  (McCabe, 2008; Loaiza & McCabe, 2012)

…and WM recall
(Souza et al., 2015)





PRESENT STUDY

- What are the impacts of cognitive load and refreshing opportunities on the McCabe effect when these factors are orthogonally manipulated within the same experiment?

- **Experiment 1:**
  - **Refreshing opportunities**: simple span and complex span
  - **Cognitive Load**: pace (fast, slow)

- **Experiment 2**
  - Complex span only
  - **Refreshing opportunities**: 3 or 6 processing episodes between words.
  - **Cognitive load**: difficulty of processing episodes

EXPERIMENT 1: METHOD

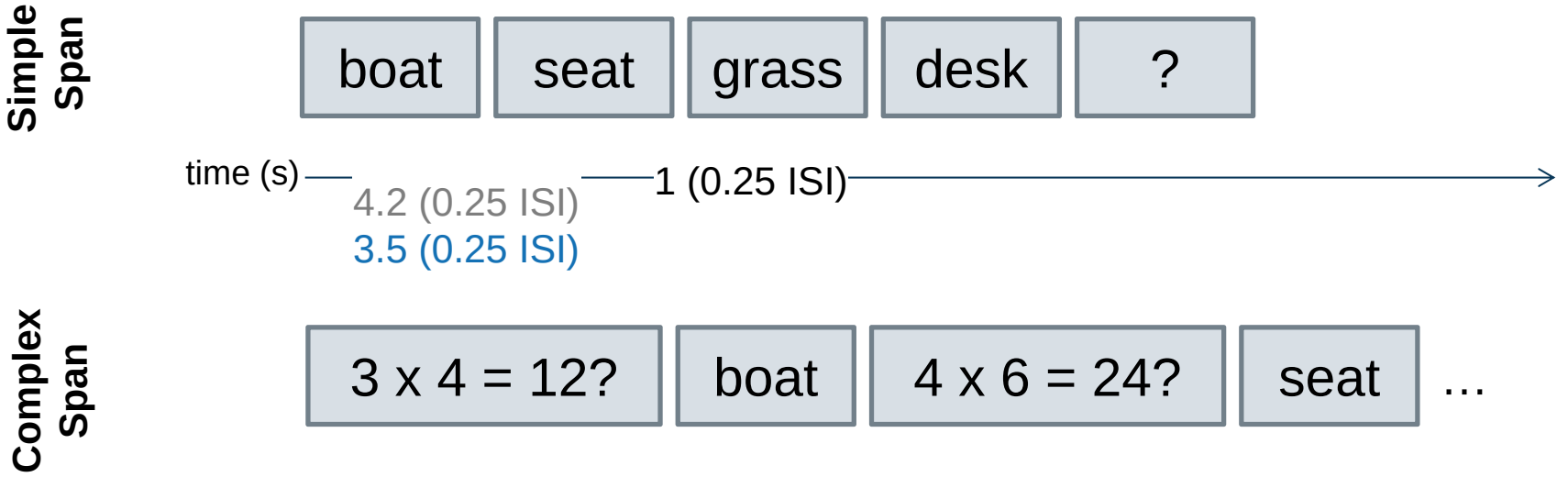
PARTICIPANTS

63 native English speakers (M_{age} = 19.7, SD = 2.1)

MATERIALS AND PROCEDURE

2 blocks of 9 trials, 2-4 memoranda per trial (4-8 letters, 1-3 syllables)

Delayed free recall after each block



EXPERIMENT 1: METHOD

PARTICIPANTS AND DESIGN

63 native English speakers (M_{age} = 19.7, SD = 2.1)

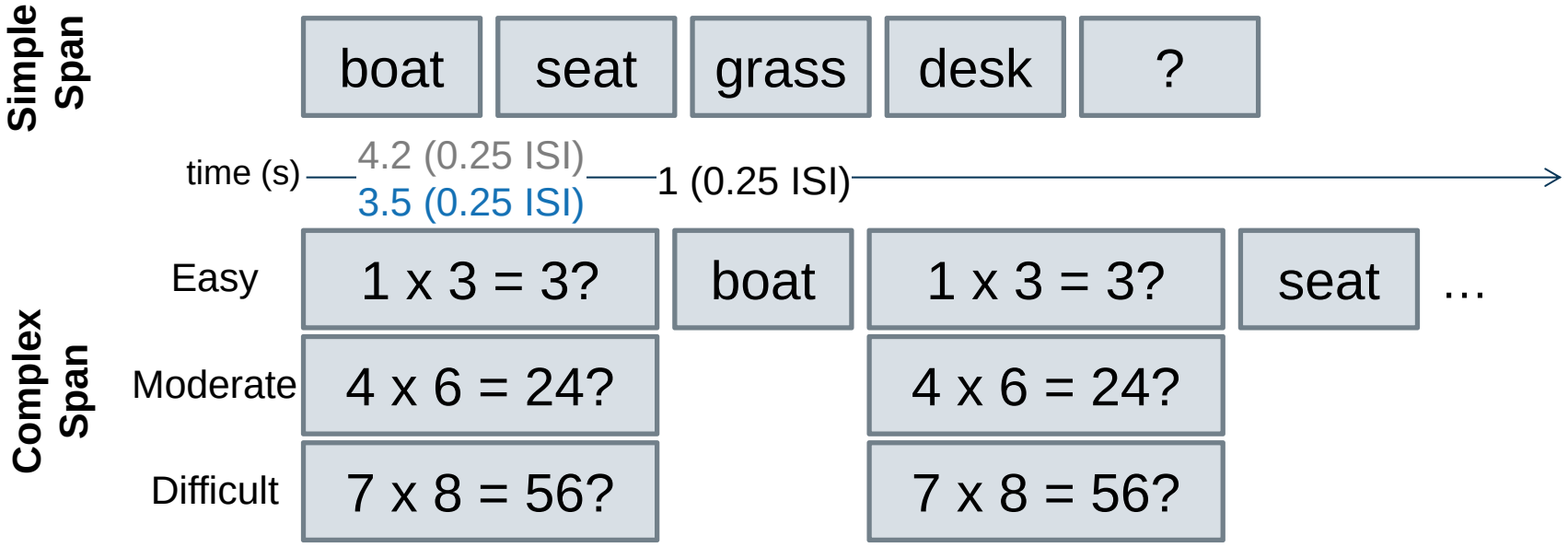
Refreshing Opportunities: Simple Span vs. Complex Span

Cognitive Load: Difficulty (Easy, Moderate, Difficult); Pace (Fast, Slow)

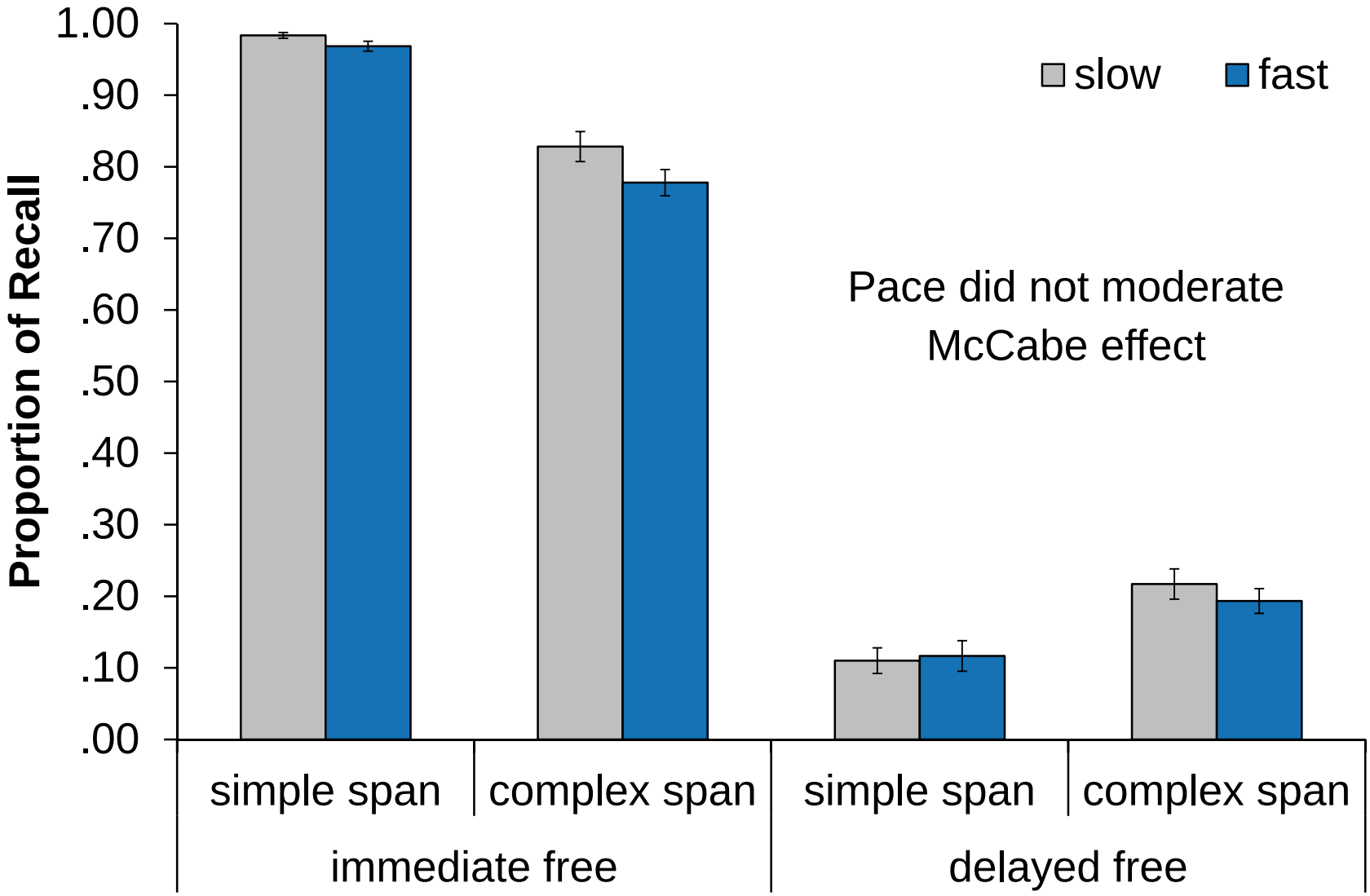
MATERIALS AND PROCEDURE

2 blocks of 9 trials, 2-4 memoranda per trial (4-8 letters, 1-3 syllables)

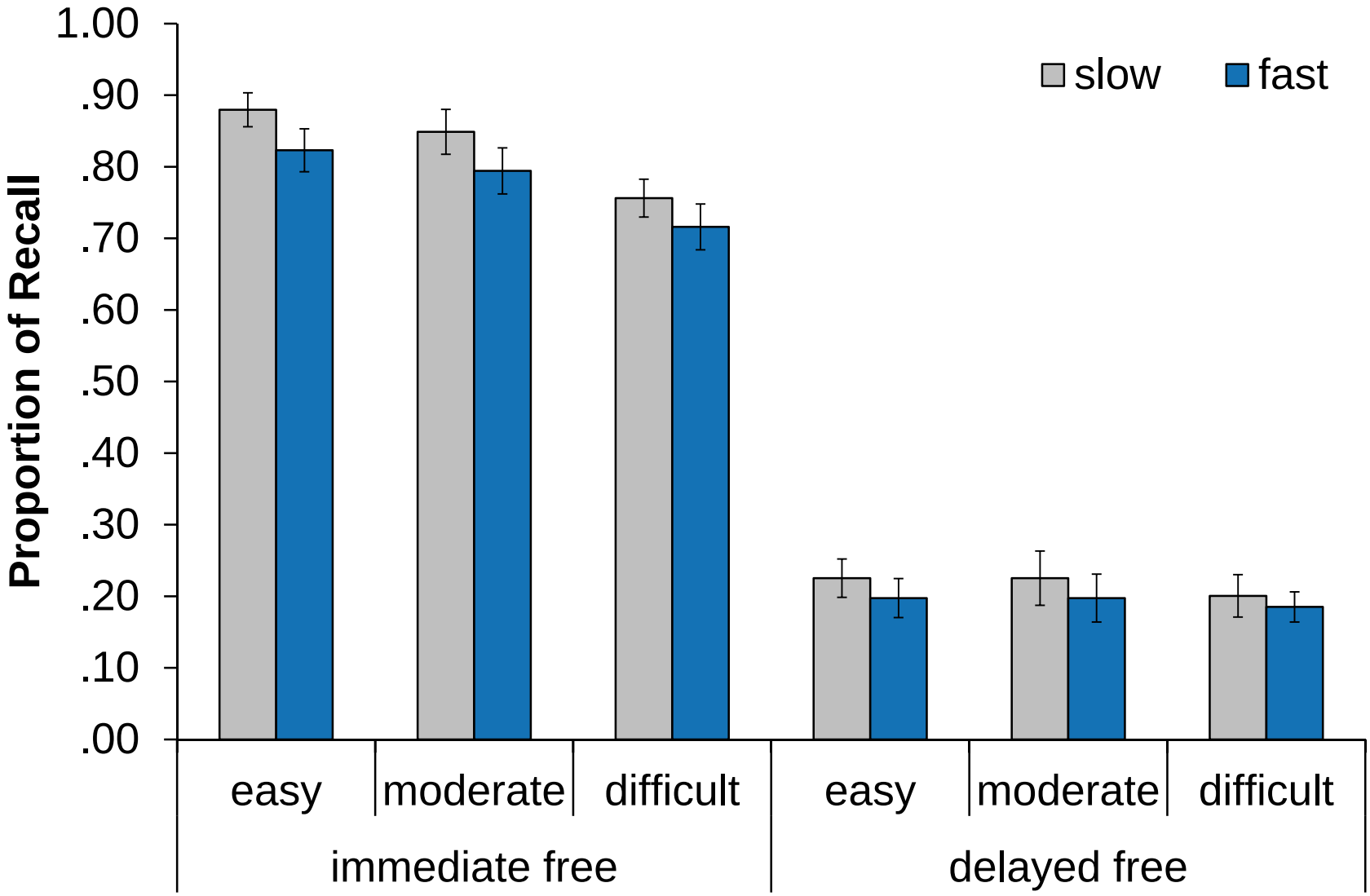
Delayed free recall after each block



EXPERIMENT 1: RESULTS



EXPERIMENT 1: RESULTS



EXPERIMENT 1: SUMMARY

- Manipulations of cognitive load (i.e., pace) did not moderate the McCabe Effect

- However…
  - Pace effect in WM was rather small

Experiment 2

- Increased number of trials and blocks
- More stringent manipulations of refreshing opportunities (3 or 6) and cognitive load (difficulty: SRT vs. parity)
- Verify the effect of refreshing opportunities in WM (Souza et al., 2014)

EXPERIMENT 2: METHOD

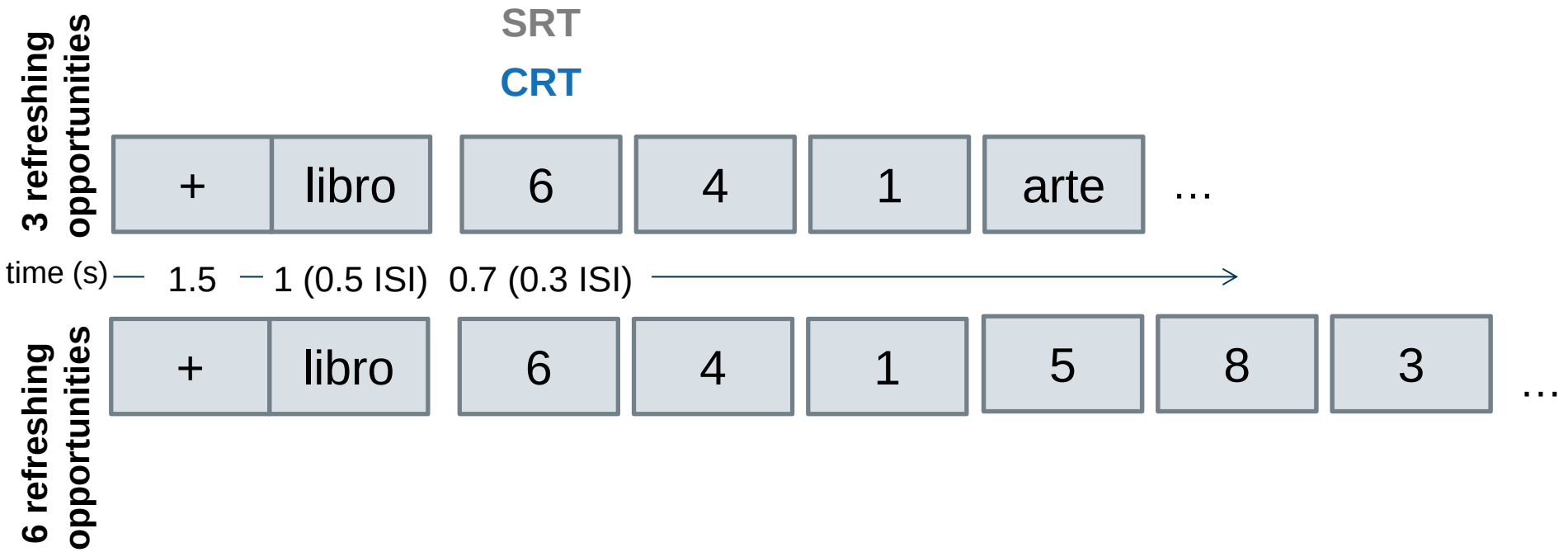
PARTICIPANTS

15 native Italian speakers (M_{age} = 20.1, SD = 1.4)

MATERIALS AND PROCEDURE

4 blocks of 8 trials, 4 memoranda per trial (4-7 letters, 2 syllables)

Delayed free recall after each block



EXPERIMENT 2: METHOD

PARTICIPANTS AND DESIGN

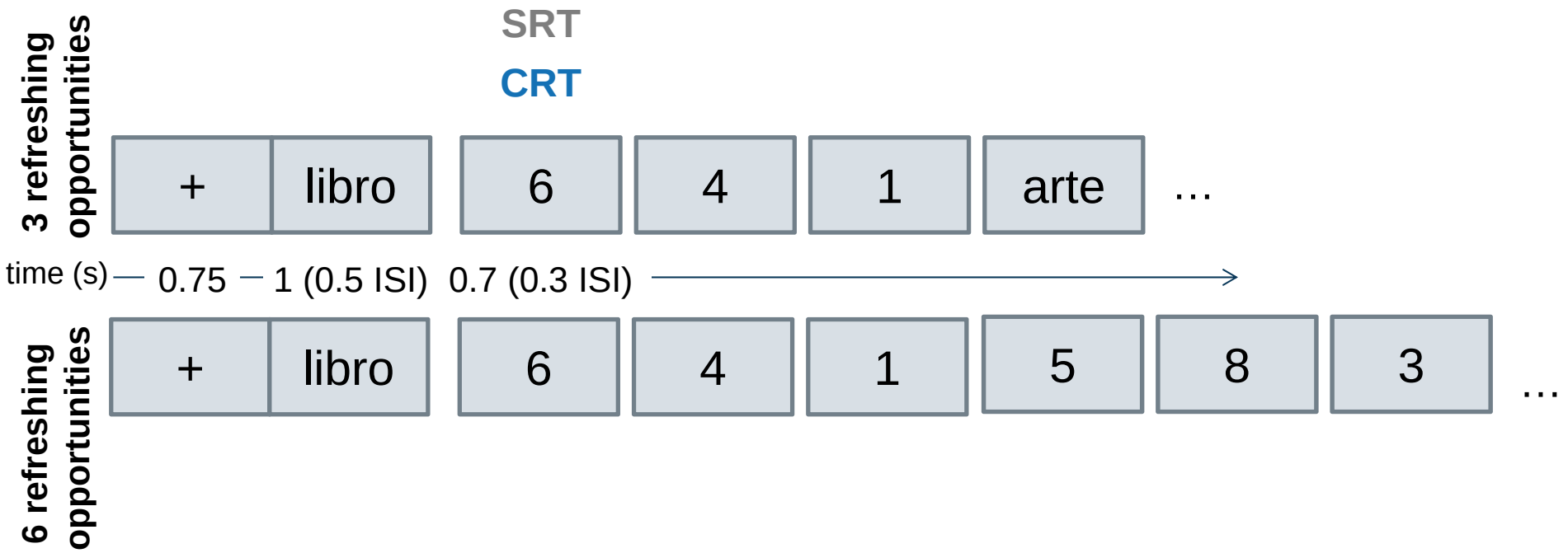
15 native Italian speakers (M_{age} = 20.1, *SD* = 1.4)

Cognitive Load (SRT vs. Parity) x **Refreshing Opportunities** (3 vs. 6)

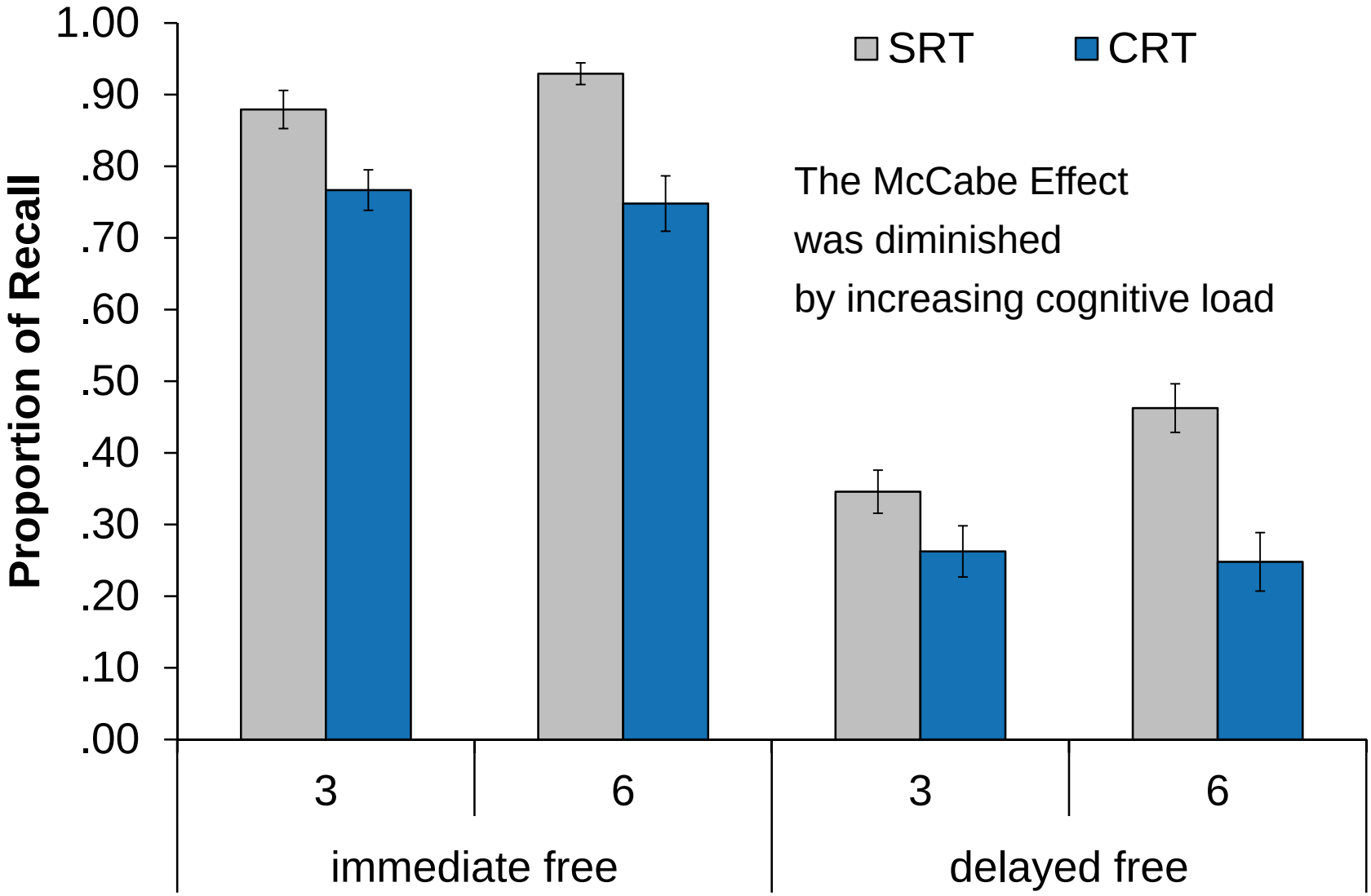
MATERIALS AND PROCEDURE

4 blocks of 8 trials, 4 memoranda per trial (4-7 letters, 2 syllables)

Delayed free recall after each block



EXPERIMENT 2: RESULTS



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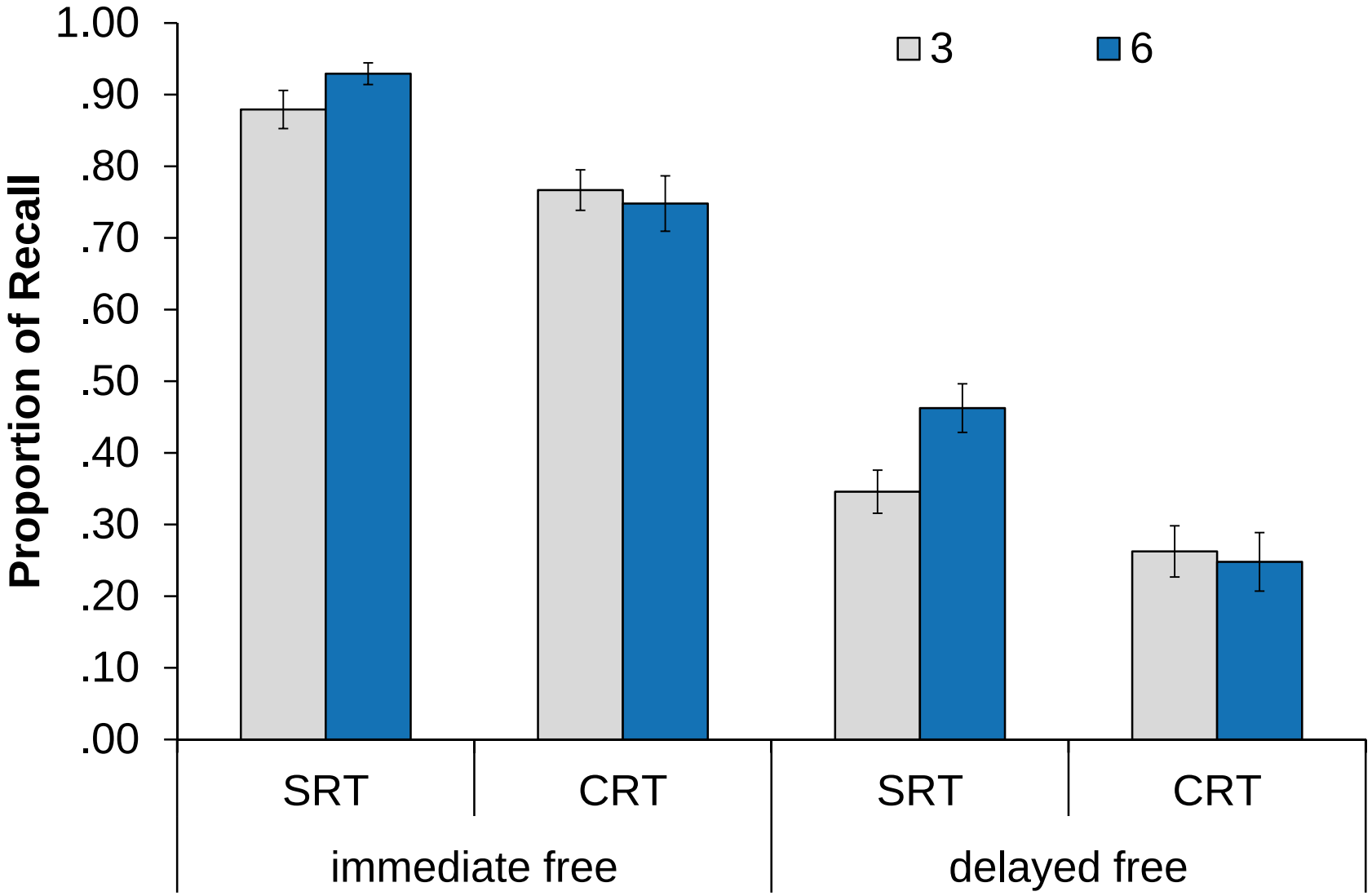
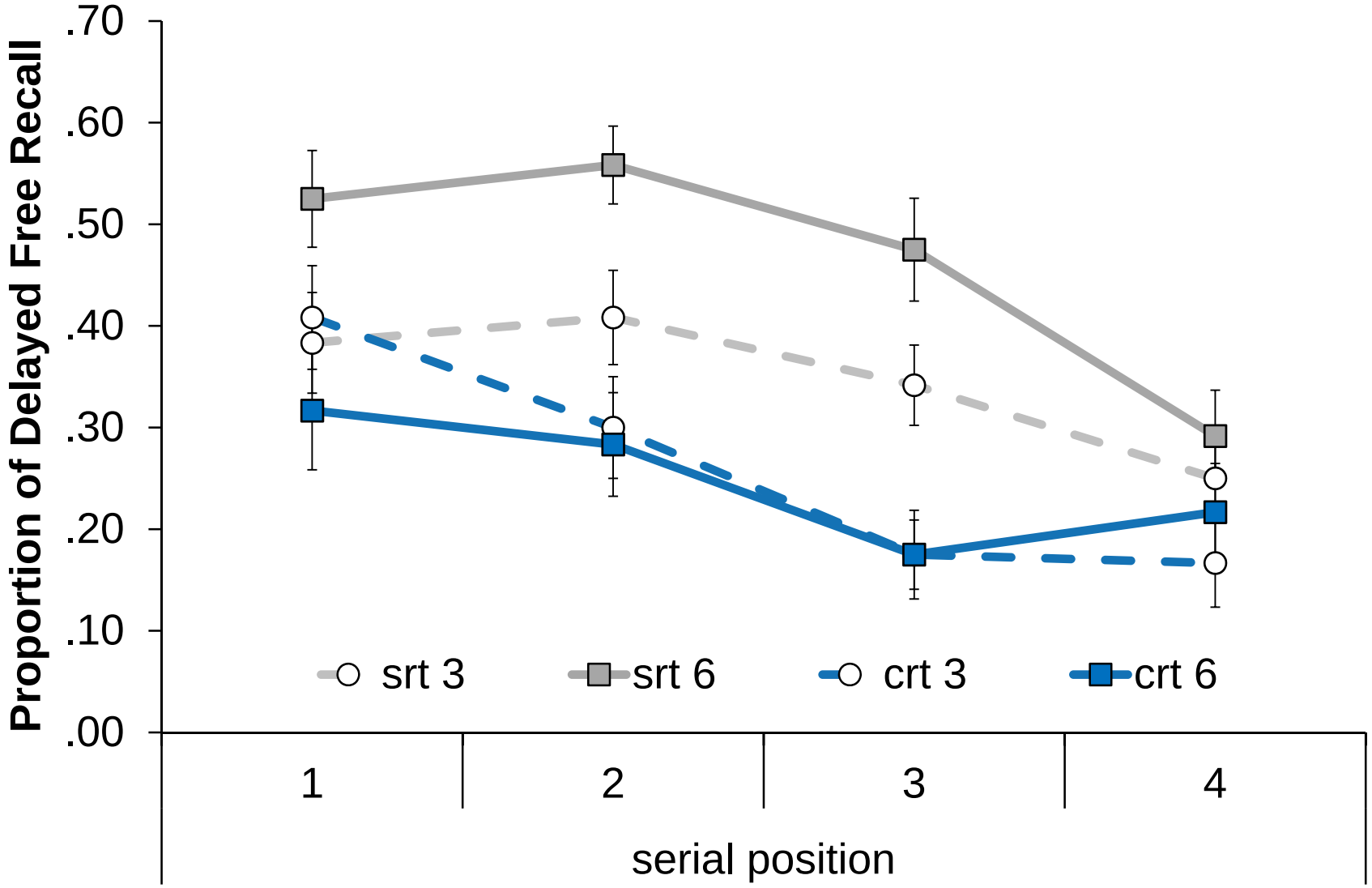


EXPERIMENT 2: RESULTS



EXPERIMENT 2: SUMMARY

- Cognitive Load x Refreshing Opportunities Interaction
  - The McCabe Effect was diminished by increasing cognitive load

CONCLUSIONS

- When using stringent methods, two methods of manipulating attentional refreshing interacted

- Attentional refreshing supports ongoing maintenance in WM as well as long-term retention in EM

THANK YOU!

Questions?

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