

# Cognition at Special Forces Boot Camp: Does High-Intensity Physical Exercise Affect Memorisation?

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## Introduction

There is conflicting evidence regarding the effect of acute physical exercise on people's ability to memorise declarative information. Some studies have found that exercising before learning improves memorisation (e.g., Winter et al., 2007), while others have found an adverse effect (e.g., Hötting et al., 2016).



Korps Commandotroepen

Special forces operators need to maintain peak physical and cognitive performance.

How does a speed march during boot camp affect their ability to memorise information?

## The data

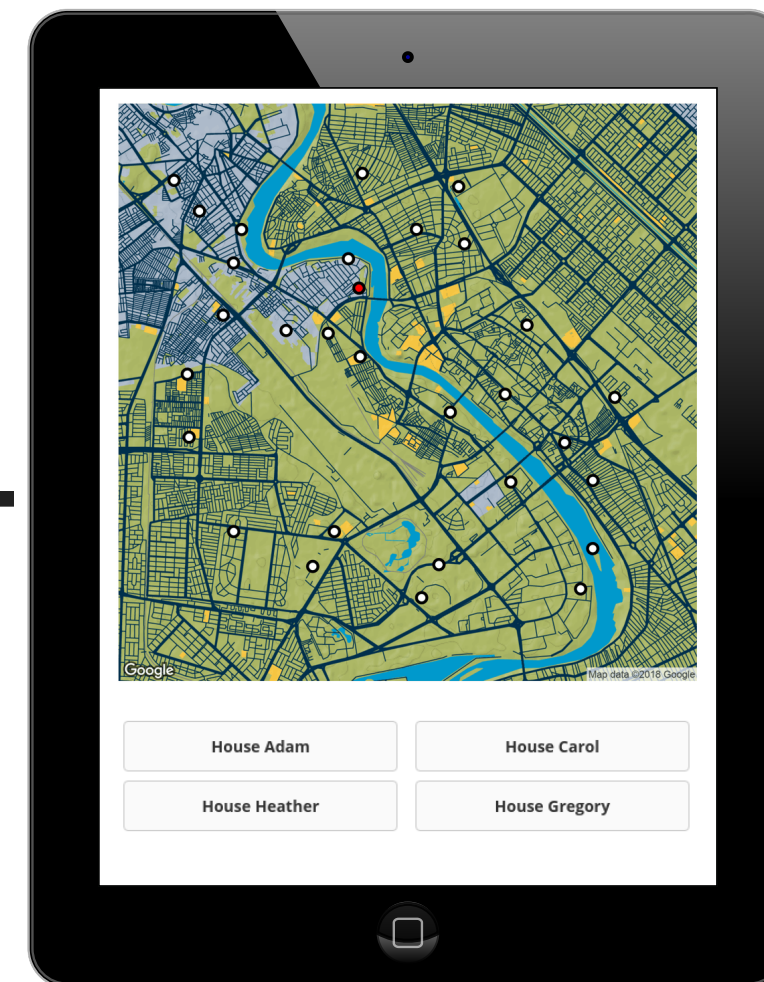
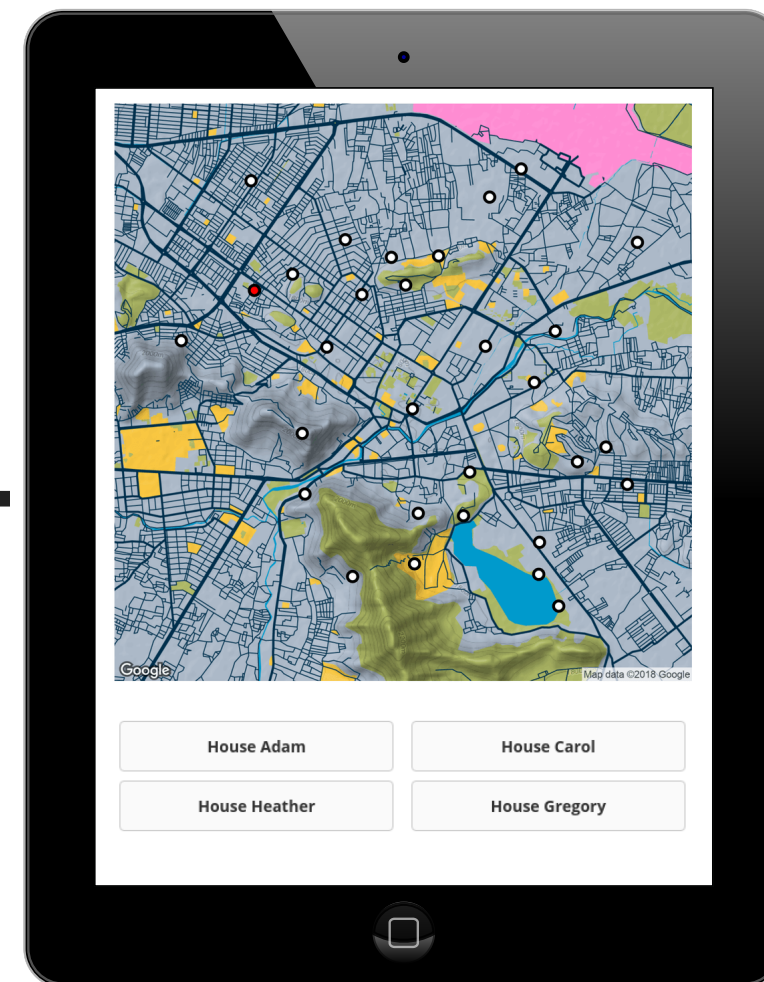
**Participants:** 70 recruits for Commando Corps (Dutch special forces) in their first week of commando training.

**Task:** learn safehouse names on a map, before and after a high-intensity loaded speed march.

Learning session  
8 min

Speed march  
40 min

Learning session  
8 min



## More information

Get the code and data: [osf.io/q3zan](https://osf.io/q3zan)

Get in touch:

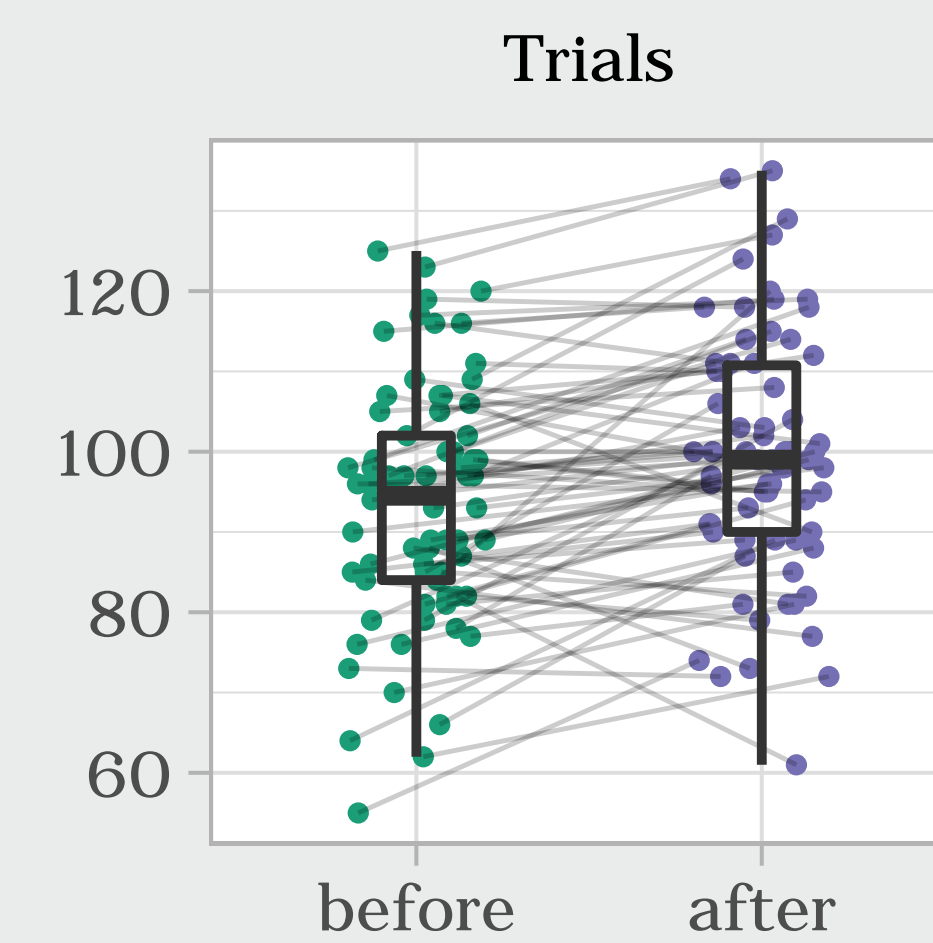
✉ [m.a.van.der.velde@rug.nl](mailto:m.a.van.der.velde@rug.nl)

🐦 @mavdvelde

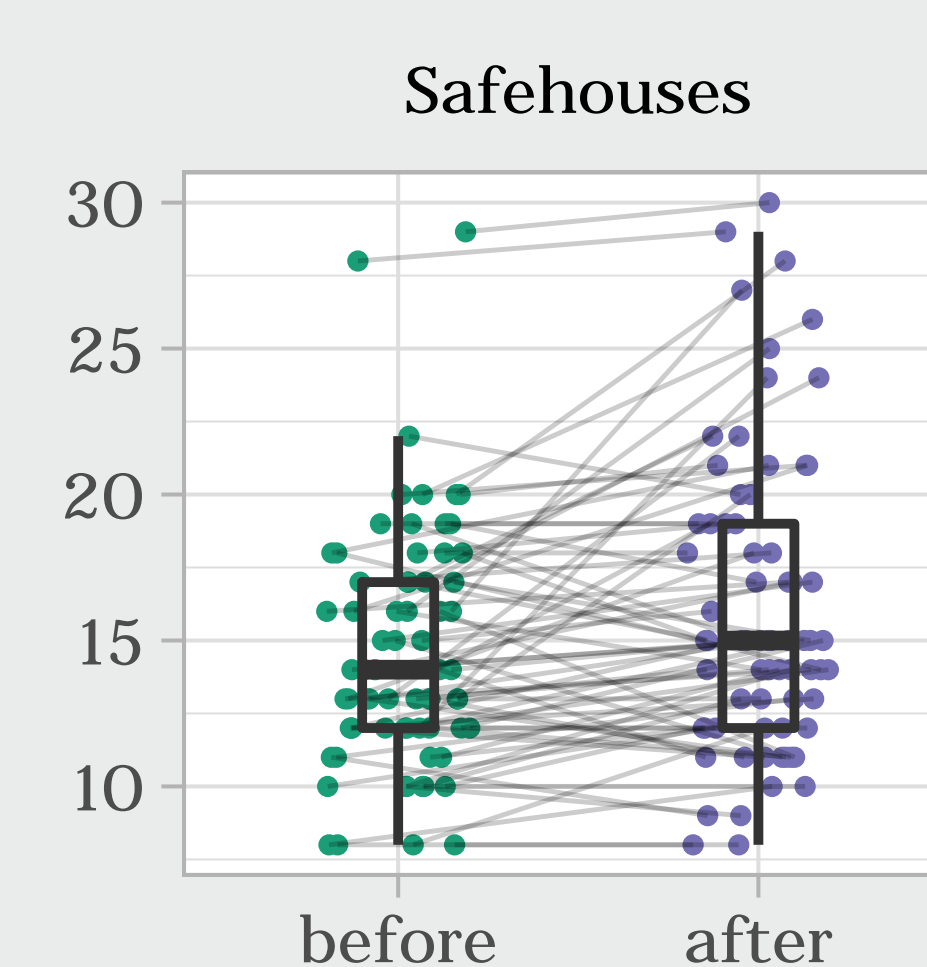


## Behavioural results

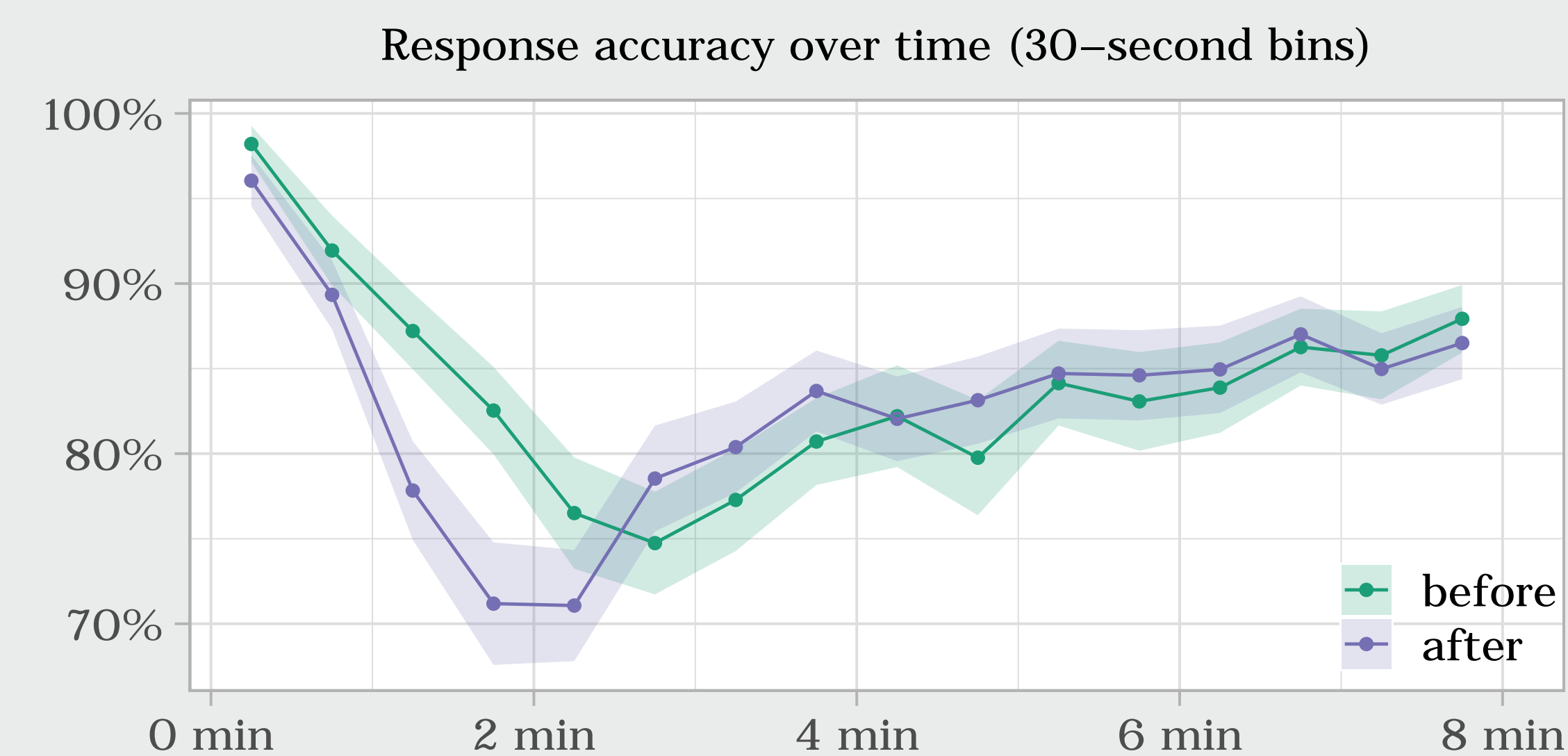
After the speed march, the **number of completed trials** increased slightly (+6).



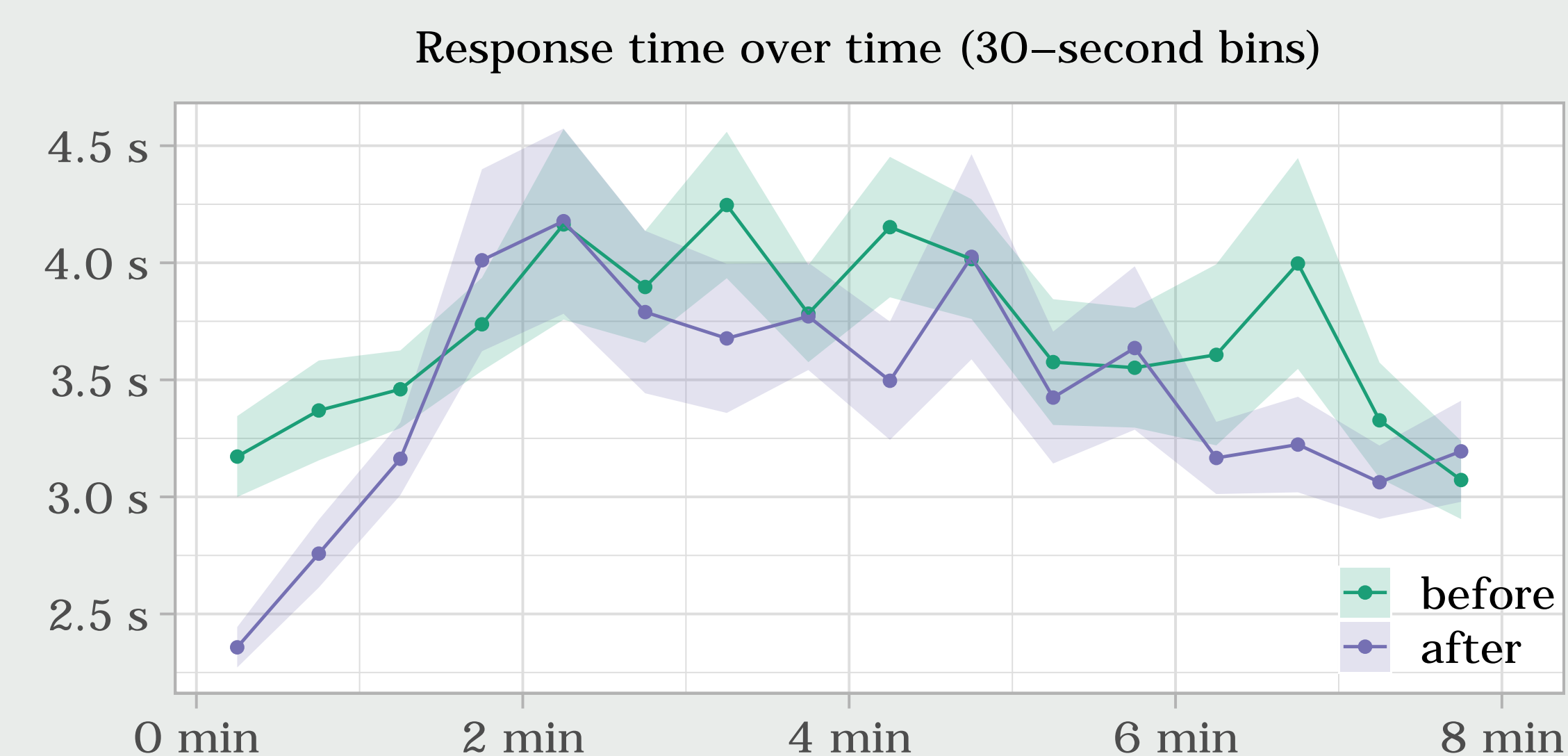
Participants also saw a slightly larger **number of unique safehouses** (+1.5).



Over the whole session, **response accuracy** was the same, but accuracy did drop in the first few minutes after the speed march.

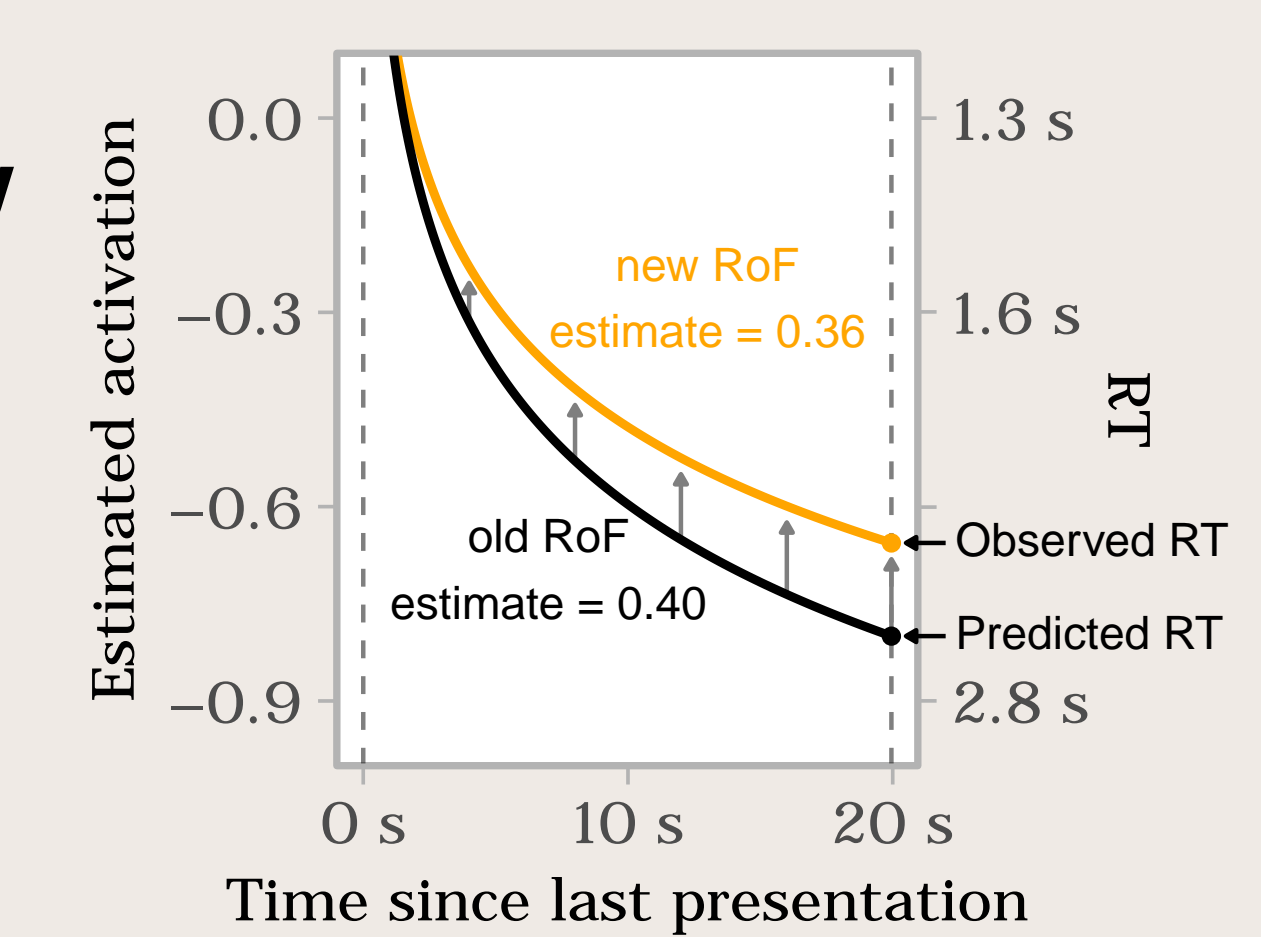


Participants' **response times** (correct trials only) decreased by about 350 ms, mainly because of faster responses at the start.



## Model-based results

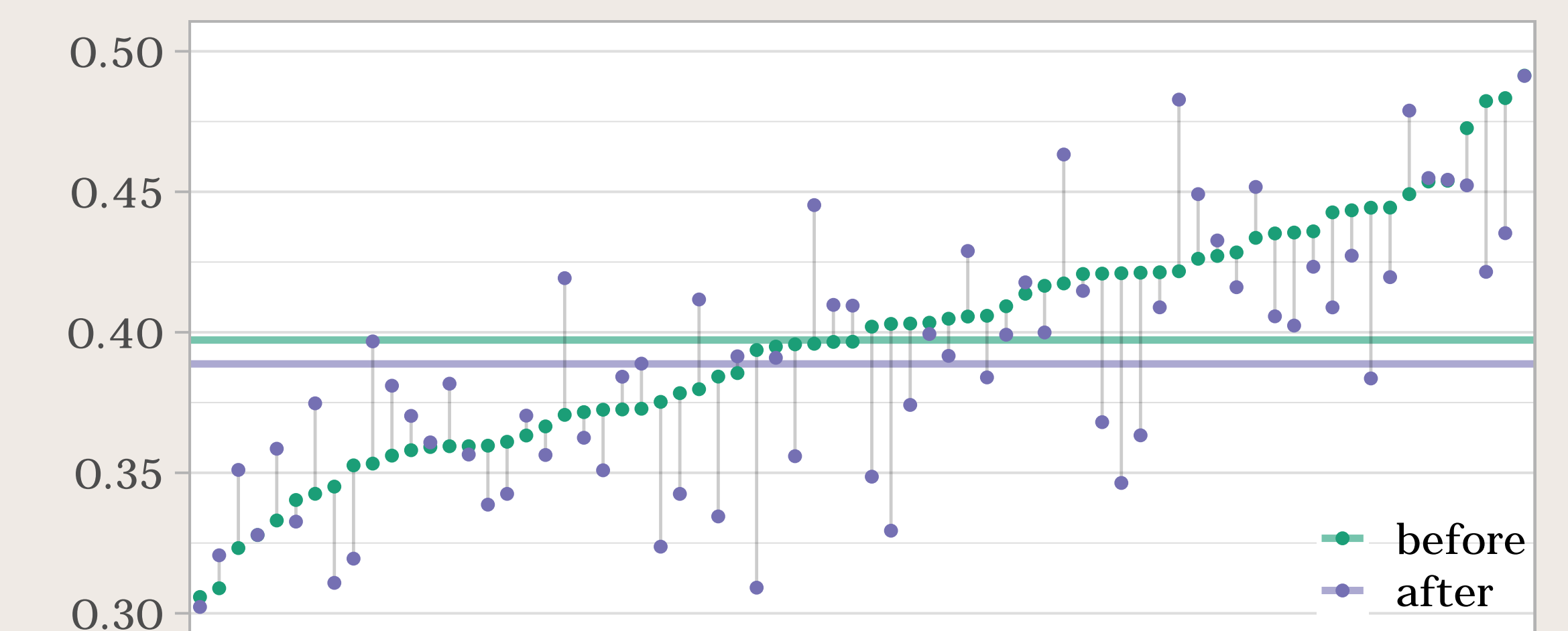
By fitting a **computational model of declarative memory** (based on ACT-R) to the observed response times and accuracies, we inferred the **rate of forgetting** (RoF) of each fact, for every participant.



Rate of forgetting provides a continuous measure of one's ability to memorise: the lower it is, the faster and more accurately information is retrieved.

Participants' average **rate of forgetting** decreased slightly after the speed march (−2.5%).

Rate of forgetting change by participant



Individual differences between participants were stable ( $r = 0.73$ ).

## Summary & Conclusions

- The memory performance of special forces recruits did indeed change after a physically intense speed march.
- On the whole, participants performed slightly better on a memorisation task, completing more trials and seeing more unique items.
- Participants appear to have made a speed-accuracy shift in the first few minutes of the post-march session.
- Model-based analysis of the data indicates that participants' rate of forgetting was slightly lower after the speed march than before.