

Is Inhibition Dependent on Working Memory Capacity?

Jena Kunimune, Melissa E. Moss, Ulrich Mayr

Cognitive Dynamics Lab, University of Oregon



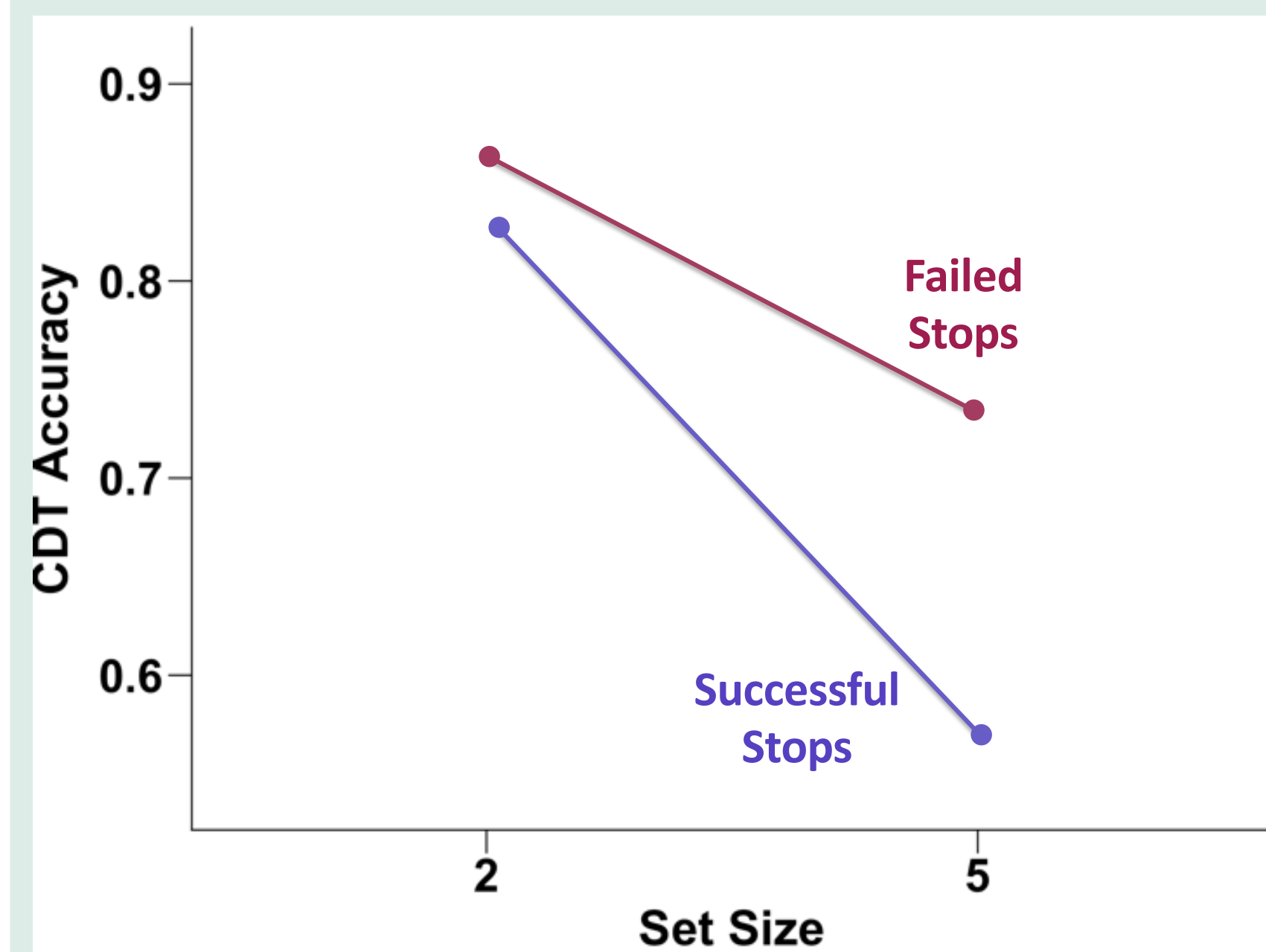
Background

- The current theory suggests that task relevant information must be maintained in **working memory (WM)** in order to effectively implement **inhibitory control (IC)**.¹
- Earlier work took an individual differences approach, yielding stable correlations between the two factors.^{2,3}
- Few studies have experimentally tested whether the two processes are functionally related.

Hypothesis

The set size effect on WM performance will be most pronounced after inhibition is successfully employed.

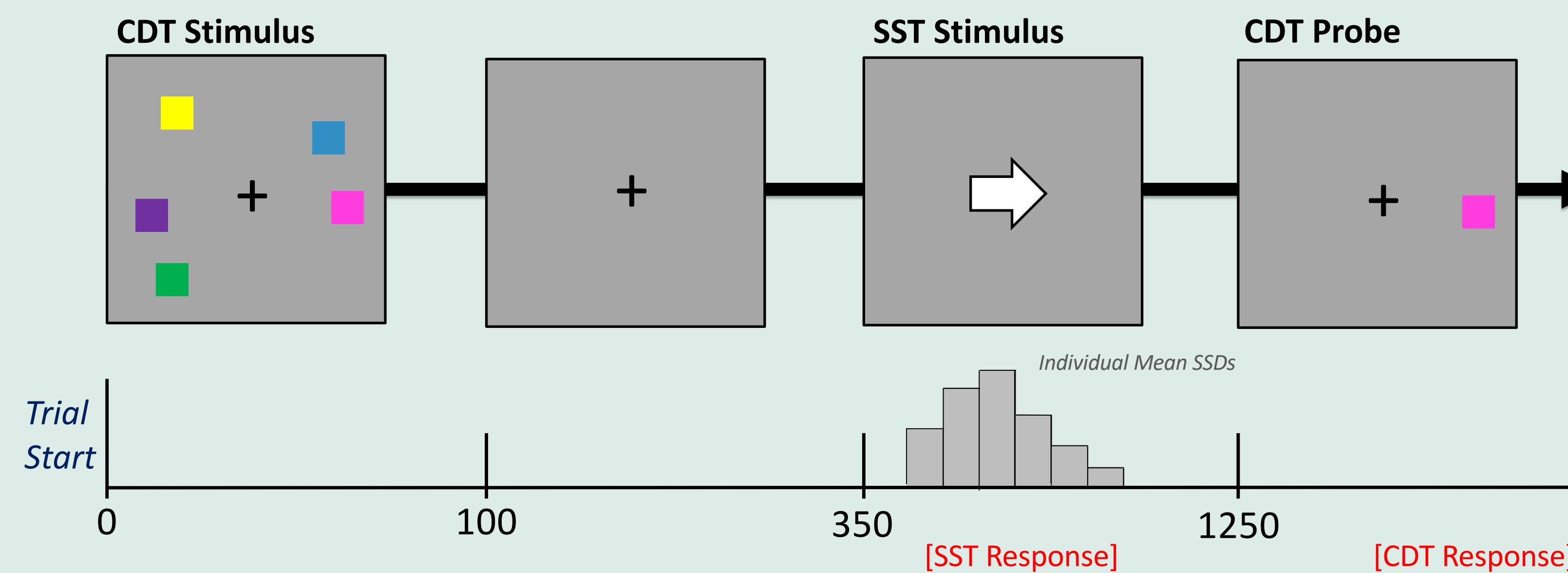
Predicted Results:



References

- Kane, M. J., & Engle, R. W. (2003). Working-memory capacity and the control of attention: the contributions of goal neglect, response competition, and task set to Stroop interference. *Journal of Experimental Psychology: General*, 132(1), 47.
- Unsworth, N., & Engle, R. W. (2007). The nature of individual differences in working memory capacity: active maintenance in primary memory and controlled search from secondary memory. *Psychological Review*, 114(1), 104.
- Engle, R. W., Tuholski, S. W., Laughlin, J. E., & Conway, A. R. (1999). Working memory, short-term memory, and general fluid intelligence: a latent-variable approach. *Journal of Experimental Psychology: General*, 128(3), 309.

Method



Subjects (N = 48) completed a combined change detection/stop signal task

Working Memory Maintenance: change detection task (CDT)

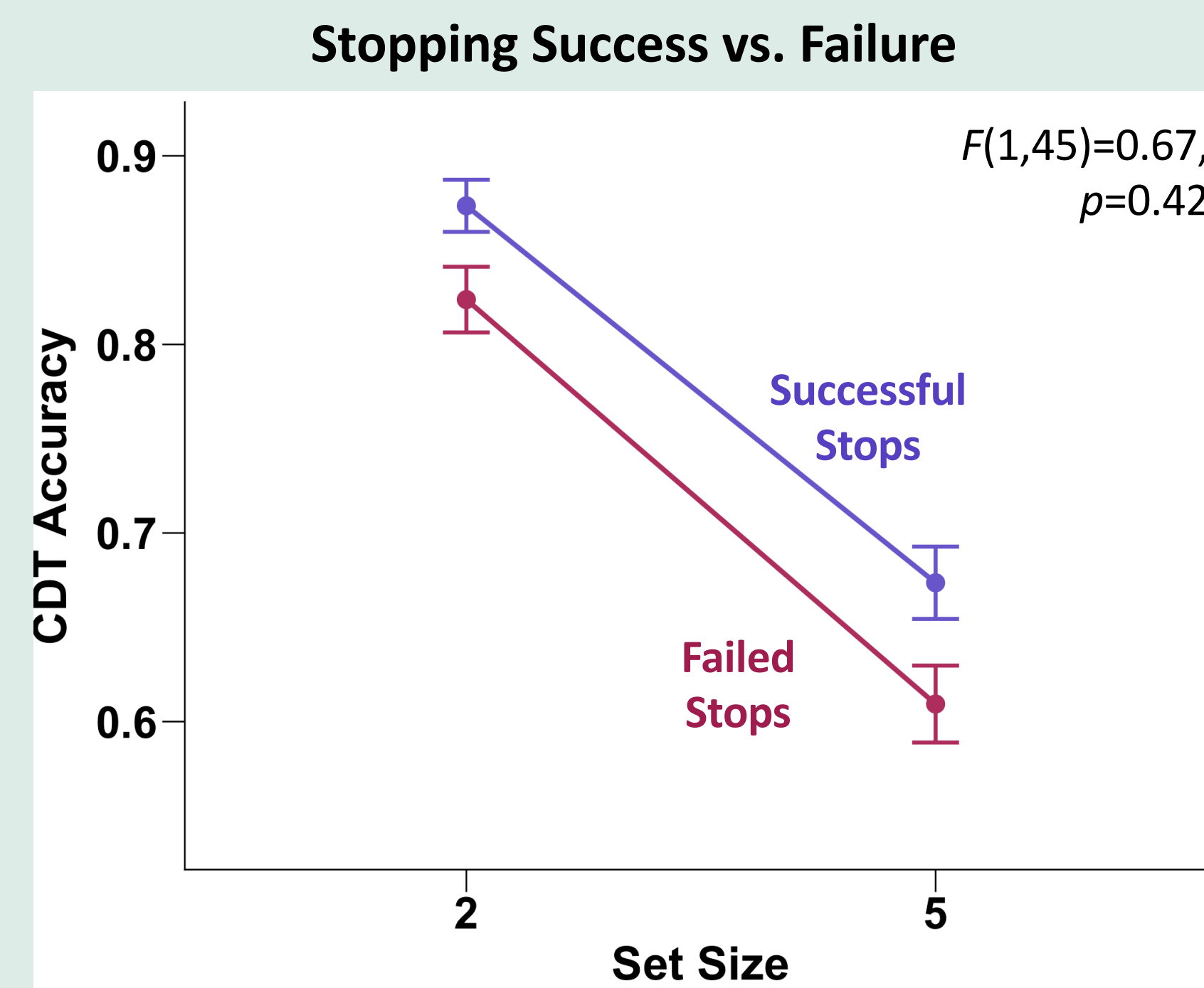
- WM load manipulated through set size (2 vs. 5 squares)

Inhibitory Control: stop signal task (SST)

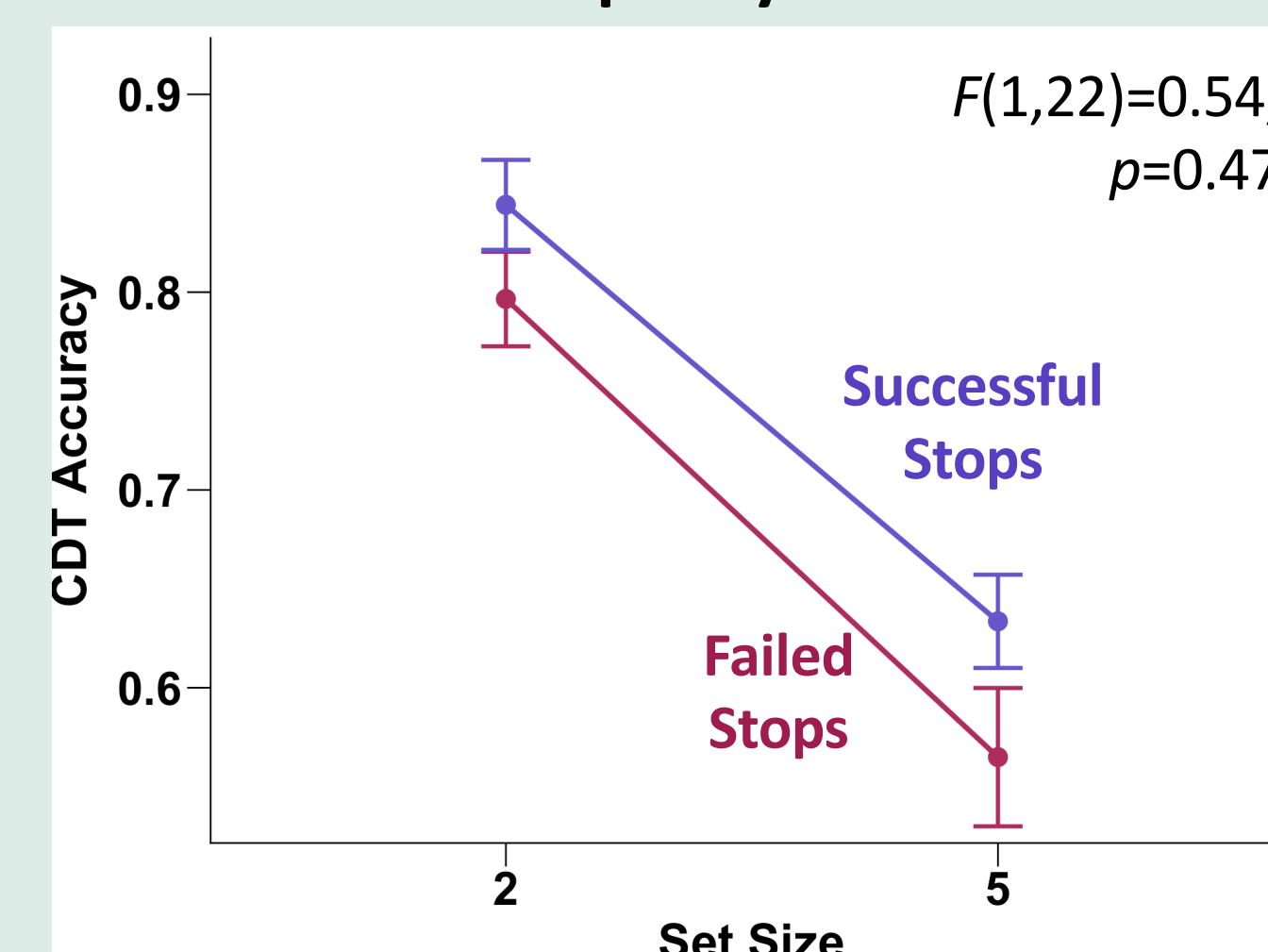
- Stop signal (beep) during arrow task on 25% of trials (signal trials)
- Adaptive procedure used to determine length of stop signal delay (SSD)
- Participants instructed to ignore stop signal in 25% of blocks (all-go blocks)

Results

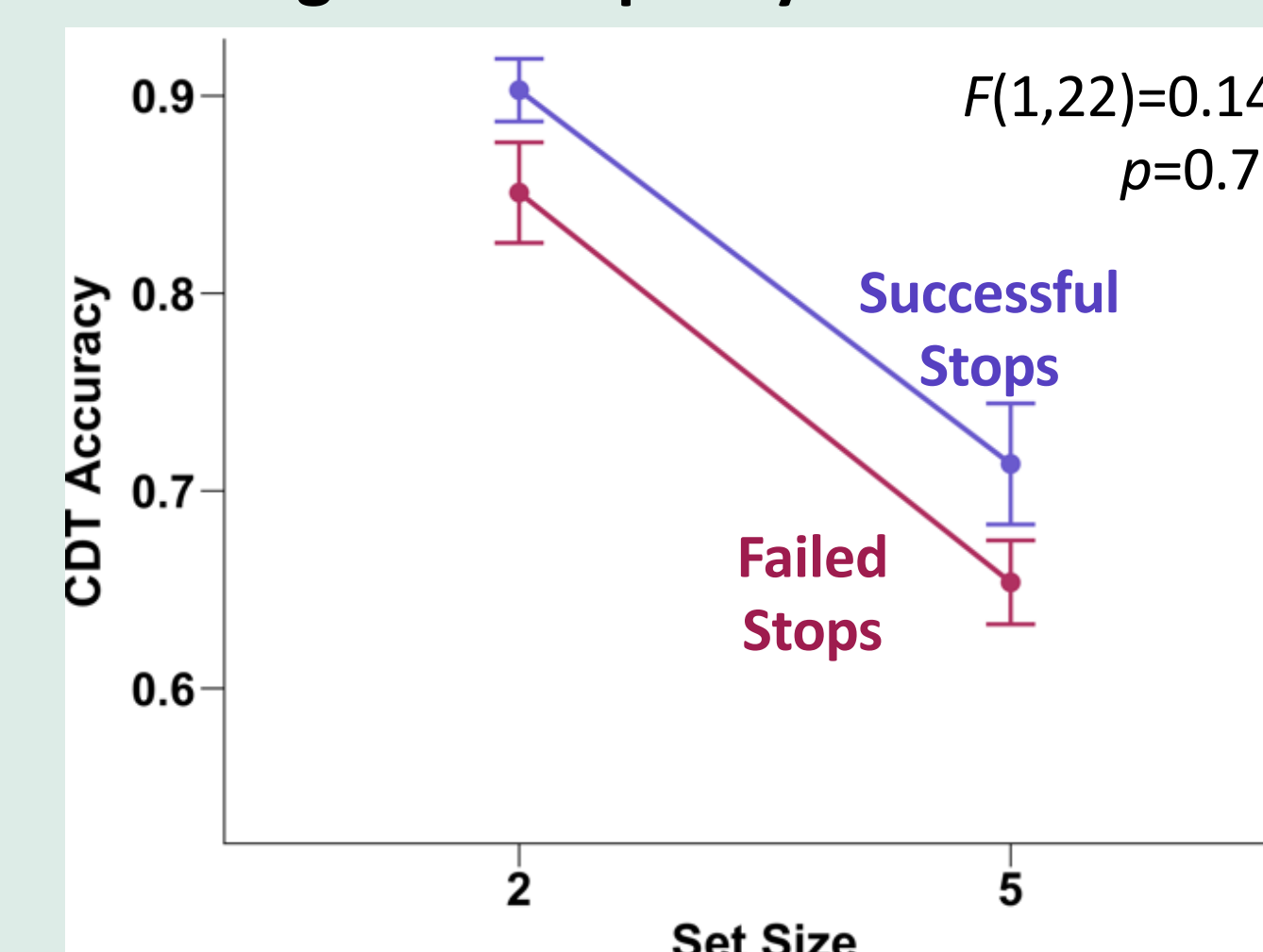
- Successful stopping resulted in *higher* CDT accuracy compared to failed stopping
- This effect was not influenced by WM load



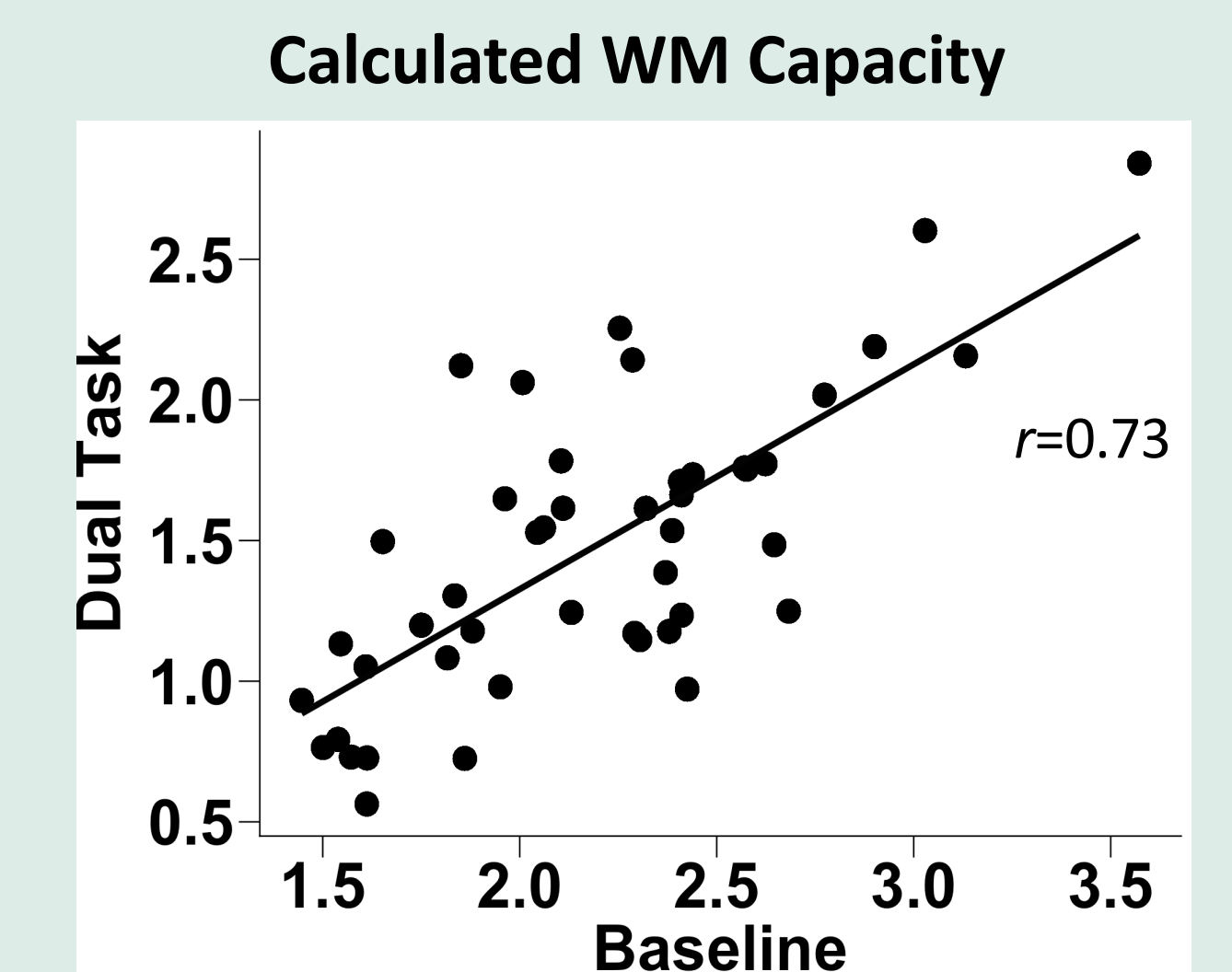
Low WM Capacity Individuals



High WM Capacity Individuals



Correlation of WM Measures



- Strong correlation between WM capacity calculated in baseline and in dual task

Conclusions

- We found no evidence of a functional relationship between working memory maintenance and inhibitory control.
- In ongoing work, we are assessing the overlapping role of attention in these two processes.