

Novel neuropsychological assessment of visual working memory

S. Böing¹, A.F. Ten Brink¹, A. J. Hoogerbrugge¹, T.C.W. Nijboer^{1,2}, & S. Van der Stigchel¹

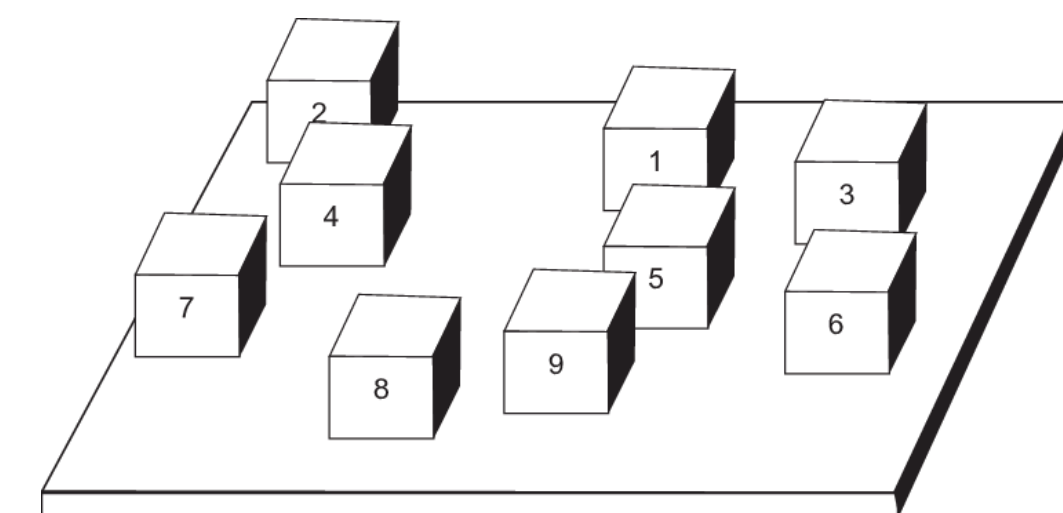
¹ Department of Experimental Psychology, Helmholtz Institute, Utrecht University, Utrecht, the Netherlands

² Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat Rehabilitation, Utrecht, the Netherlands

Introduction

Acquired brain injury often results in (working) memory complaints

- Traditional neuropsychological assessment (e.g. Corsi Block Tapping) relies on assessment of *maximum capacity*^{1,2}

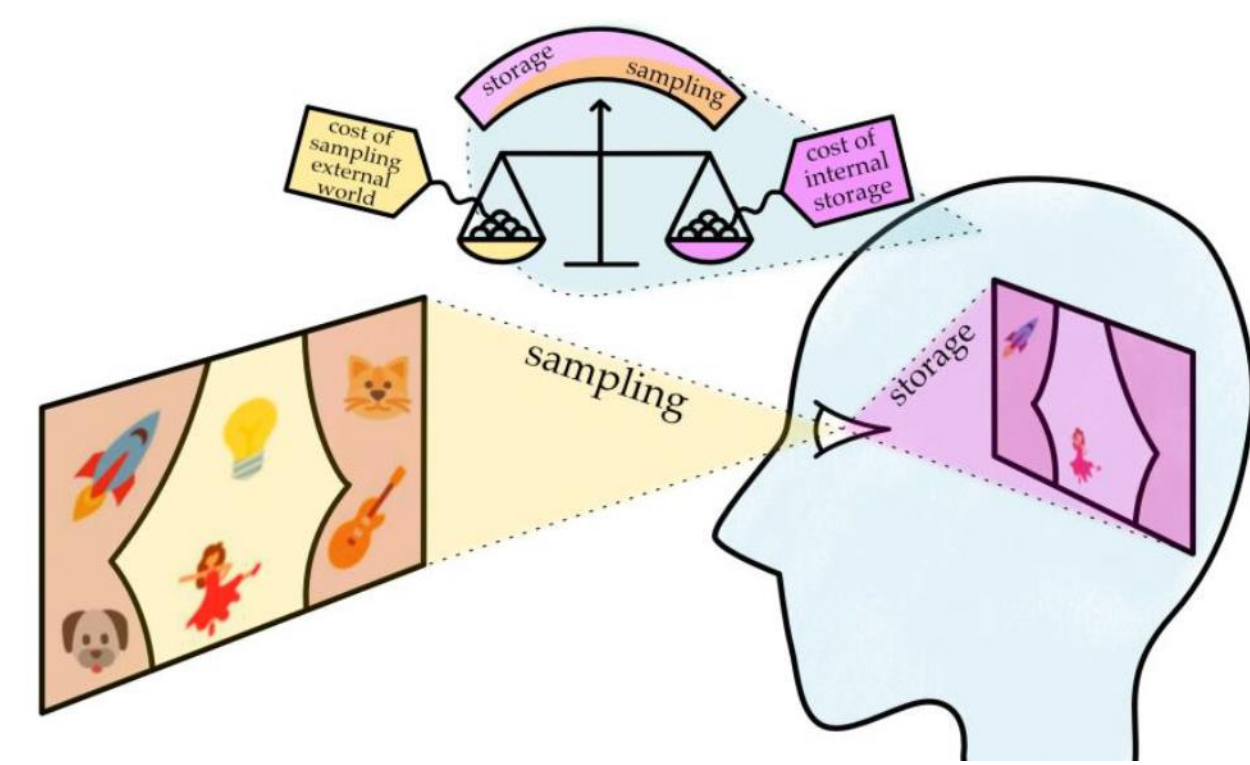


However:

Traditional neuropsychological assessment ignores the **availability of information in real world settings**³

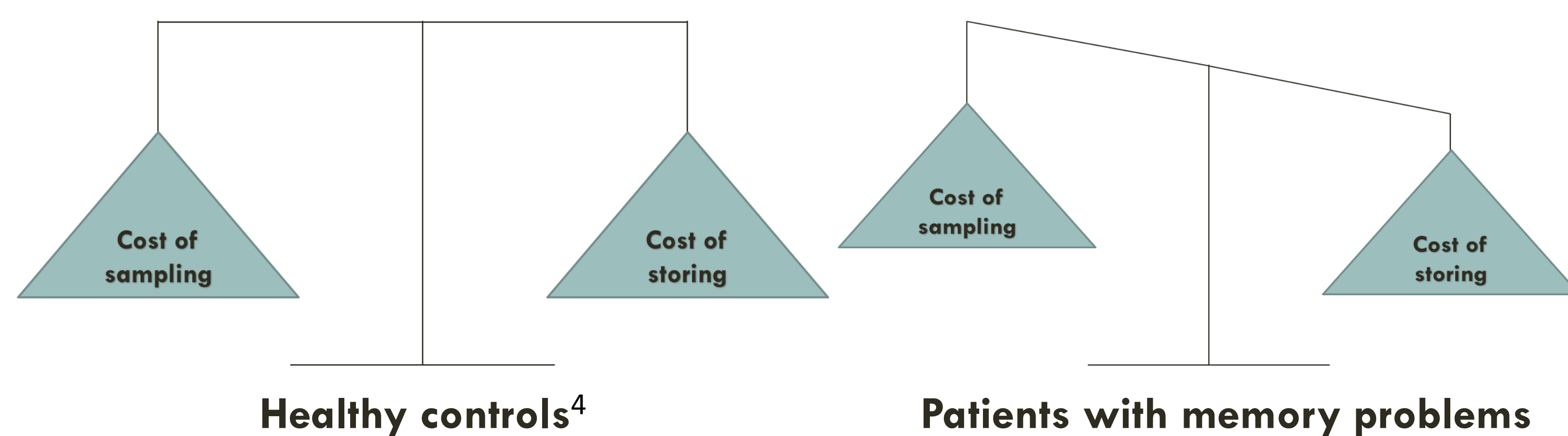
- Memory usage can be circumvented by sampling from the environment
- Does the maximum capacity tell us about real-world memory usage?
- How often do we rely on the world as an external memory source?

Does a trade-off exist between storing and sampling information?



Hypothesis

Hypothesis: eye-movement behavior reveals a trade-off between storing and sampling information, and differs between patients and controls



Aims

AIM 1: To investigate whether and how a trade-off between sampling and storing information differs between patients and healthy controls

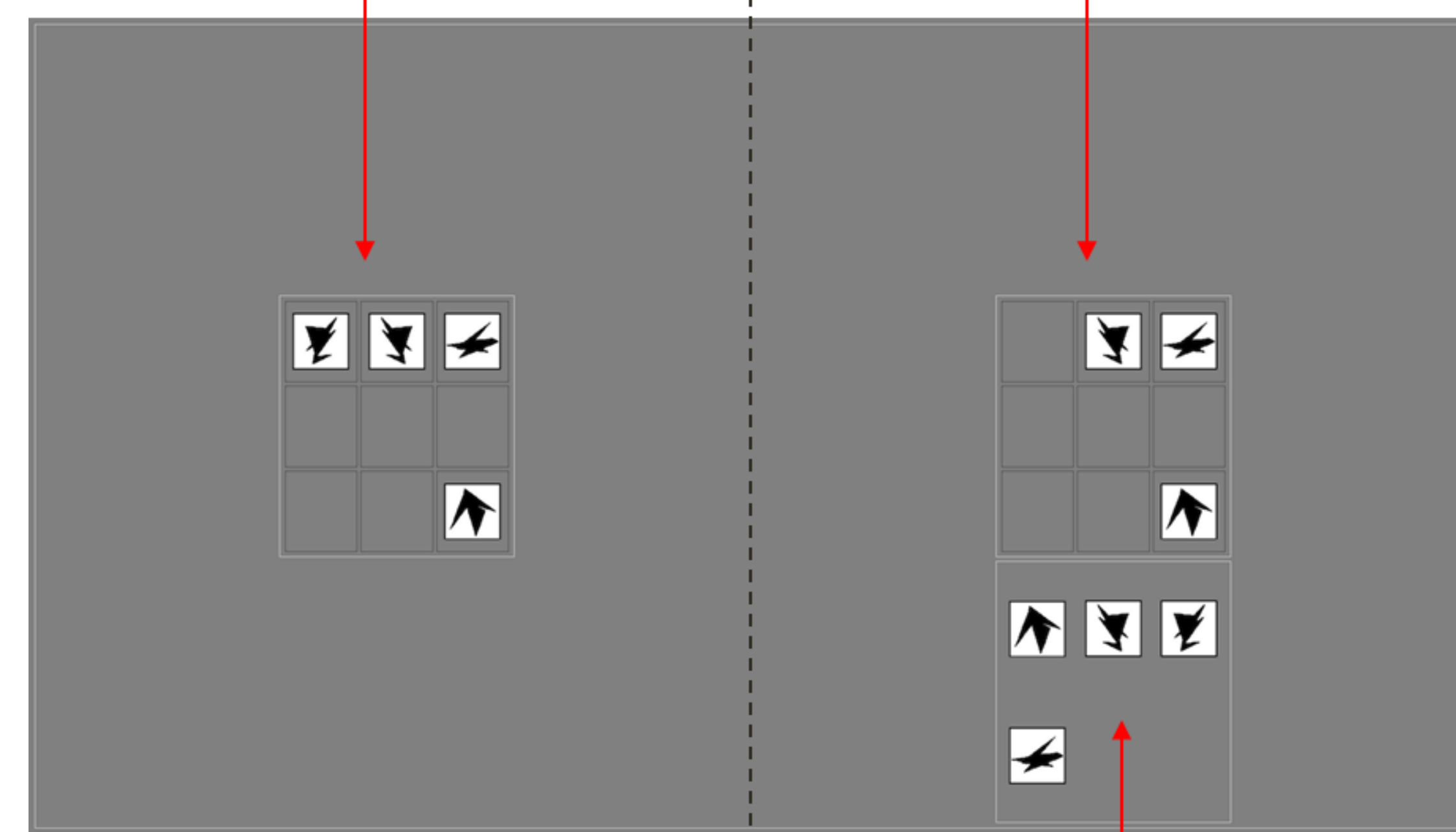
AIM 2: To study the relationship between traditional memory assessment and eye-movement behaviour

Methods

Experimental task

Example 'puzzle'

Empty grid



Eye-tracker

Puzzle pieces to be dragged with mouse

Baseline (low cost): example puzzle always visible

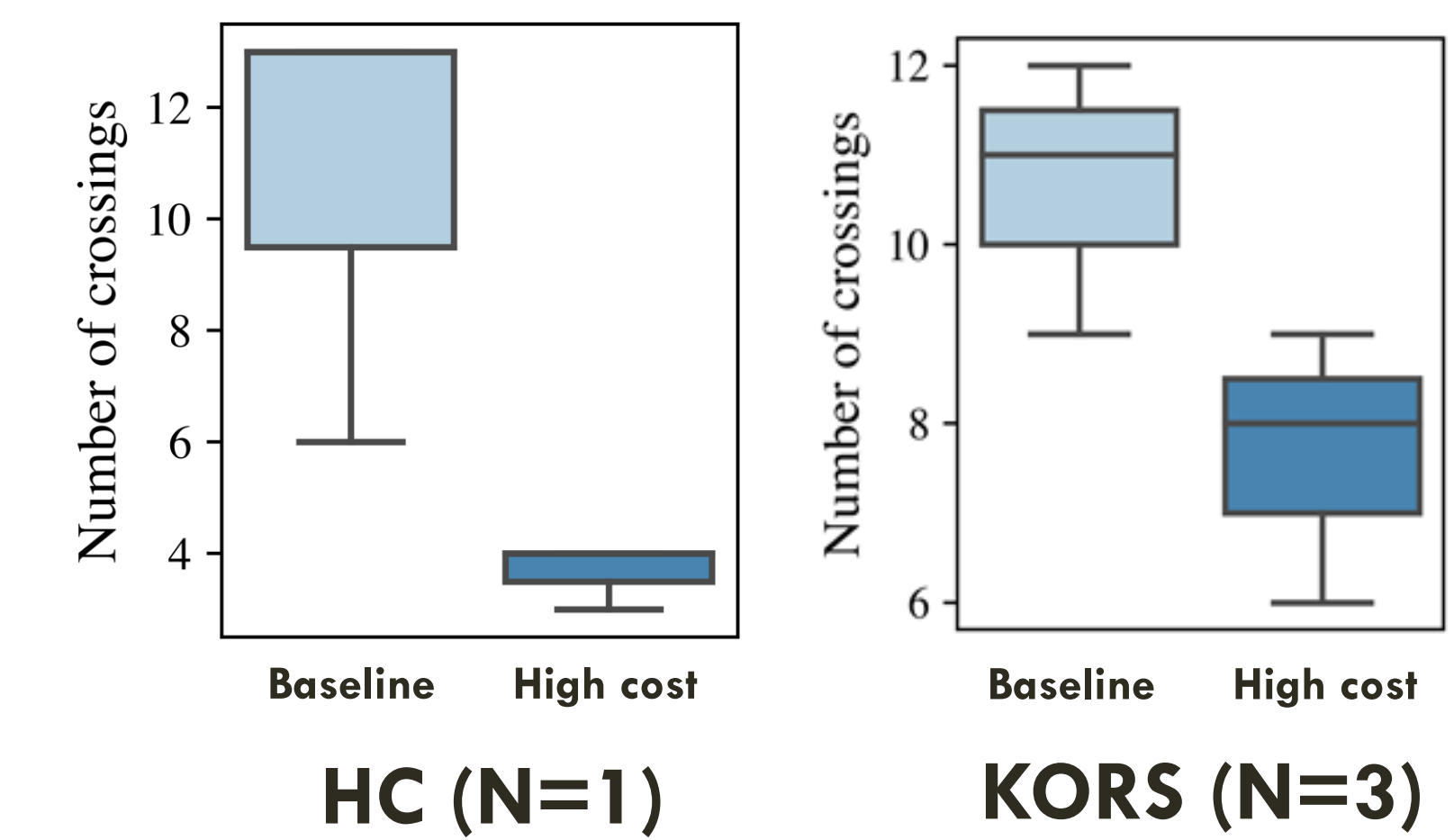
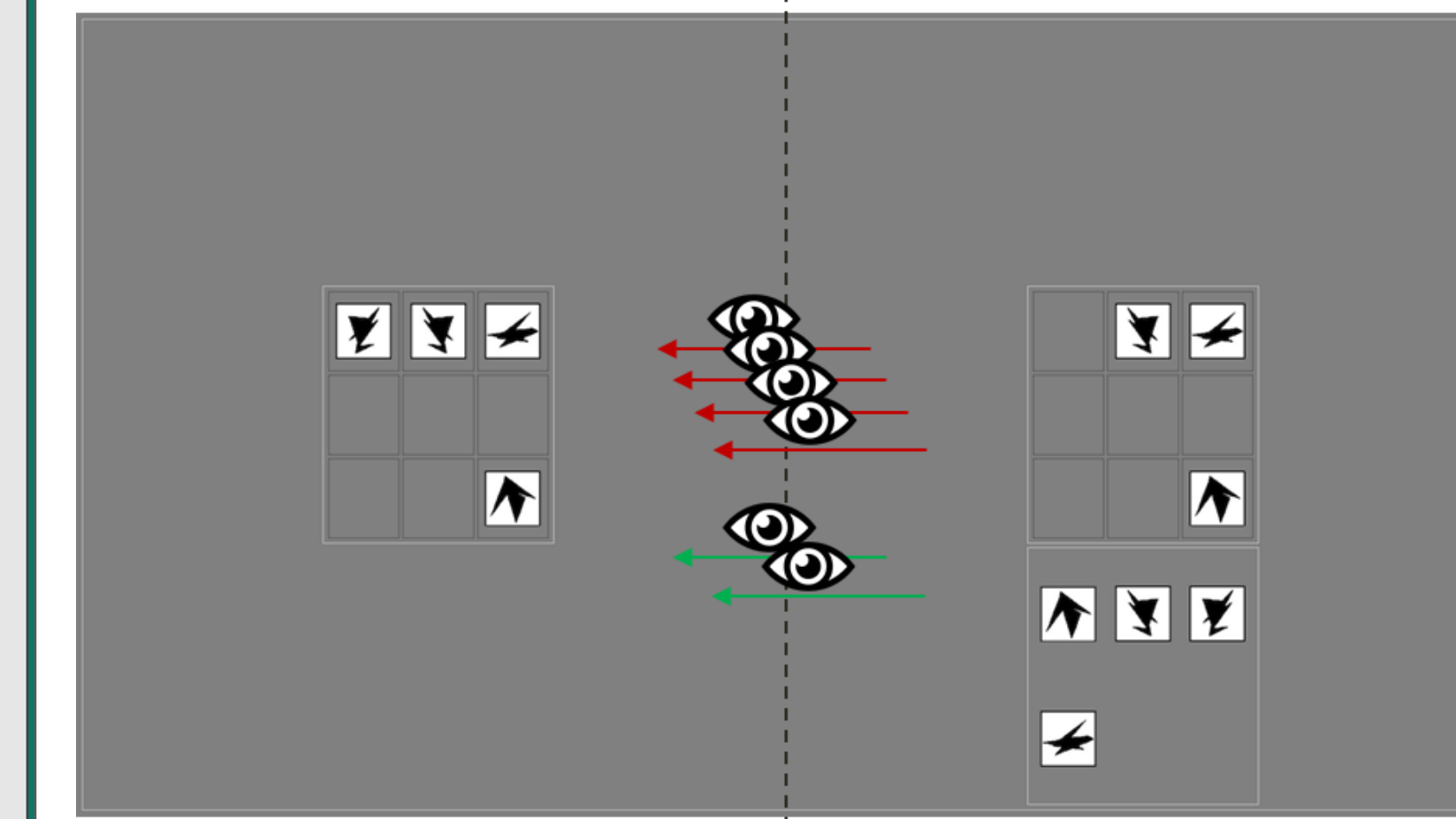
Manipulation (high cost): wait for example to be visible – gaze-contingent

Neuropsychological tasks

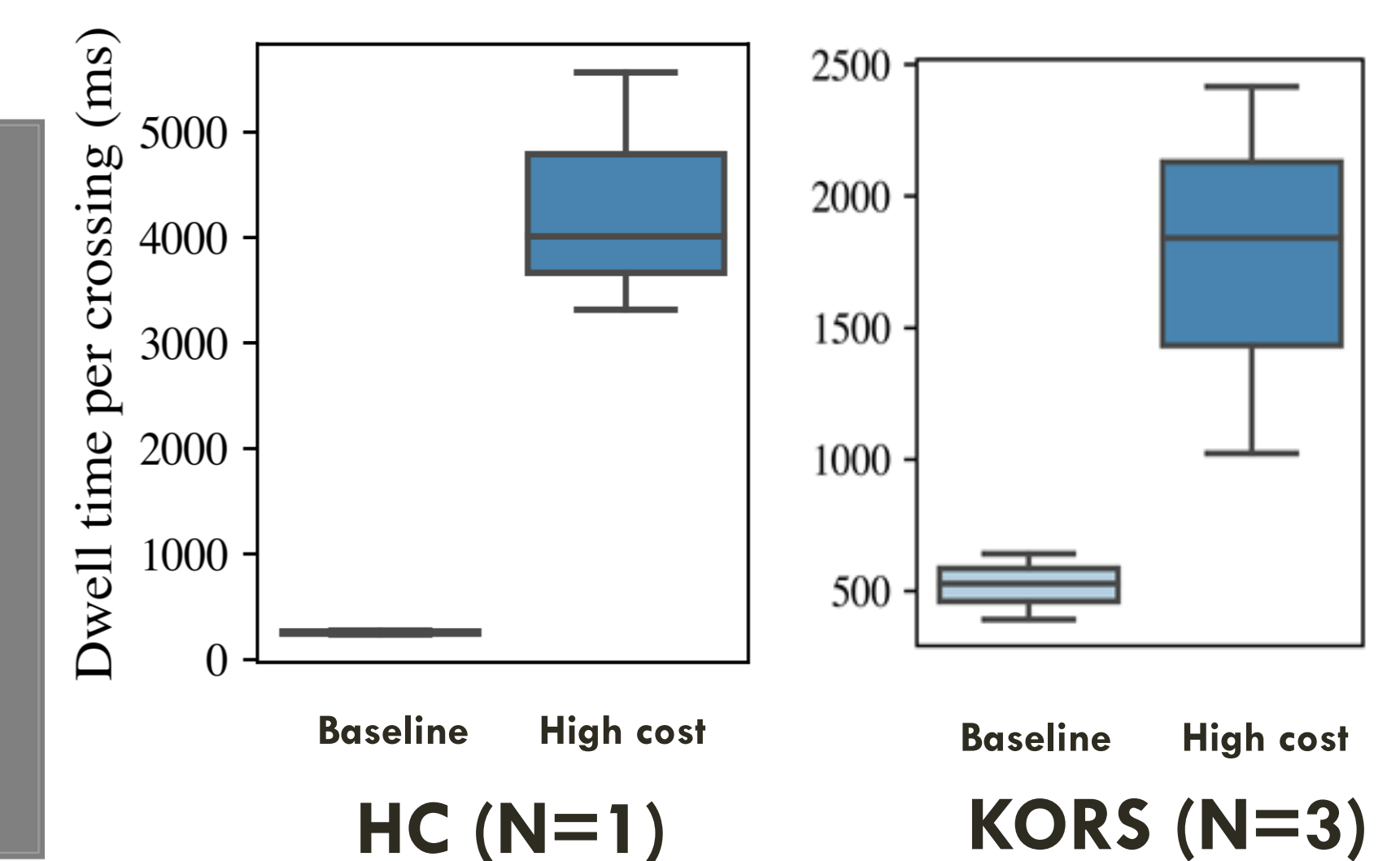
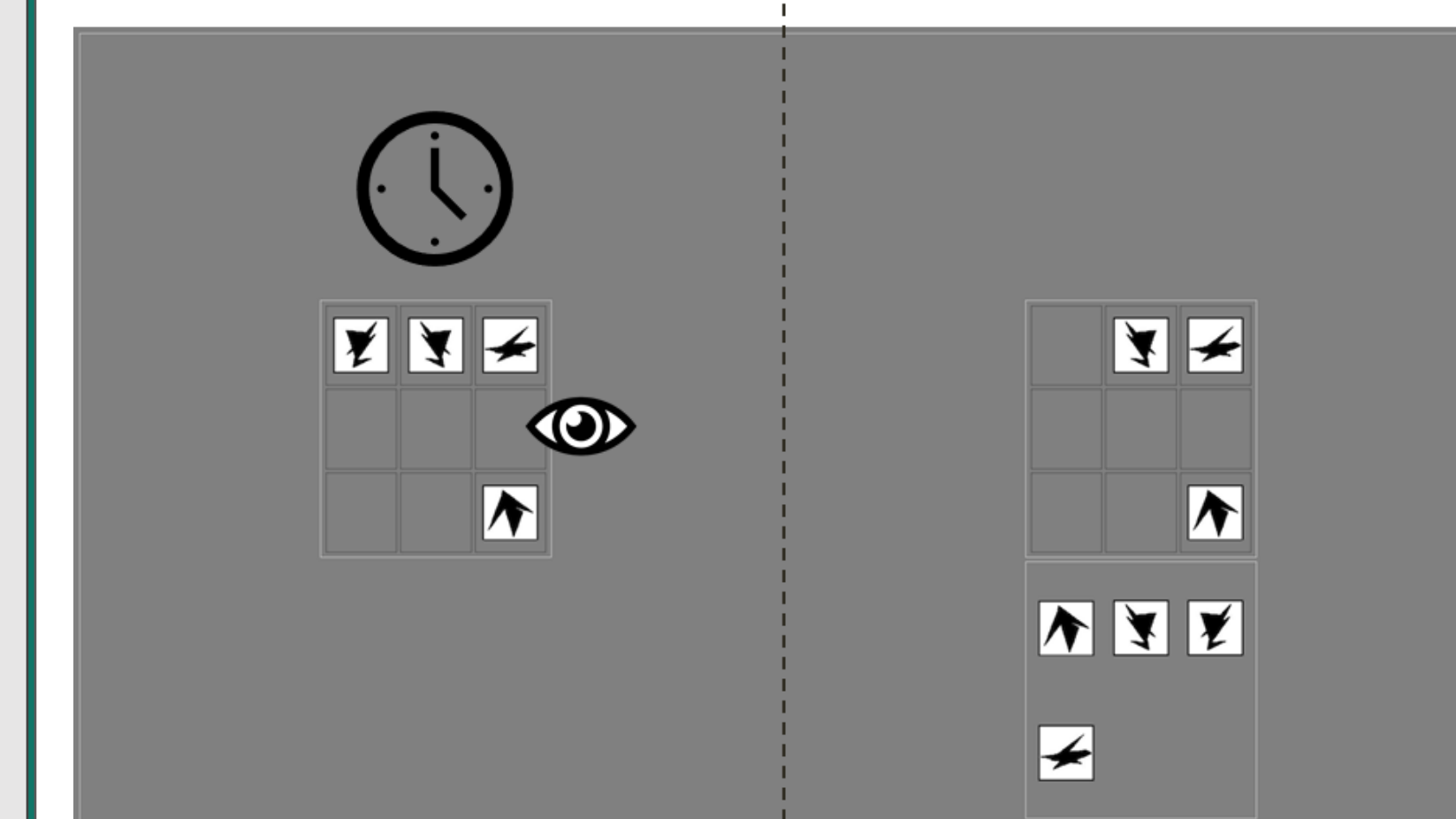
- Location Learning Task
- RAVLT (15-words)
- Corsi Block-Tapping Task
- WAIS-IV Digit Span forward + backward

Preliminary data: patients with Korsakov's syndrome

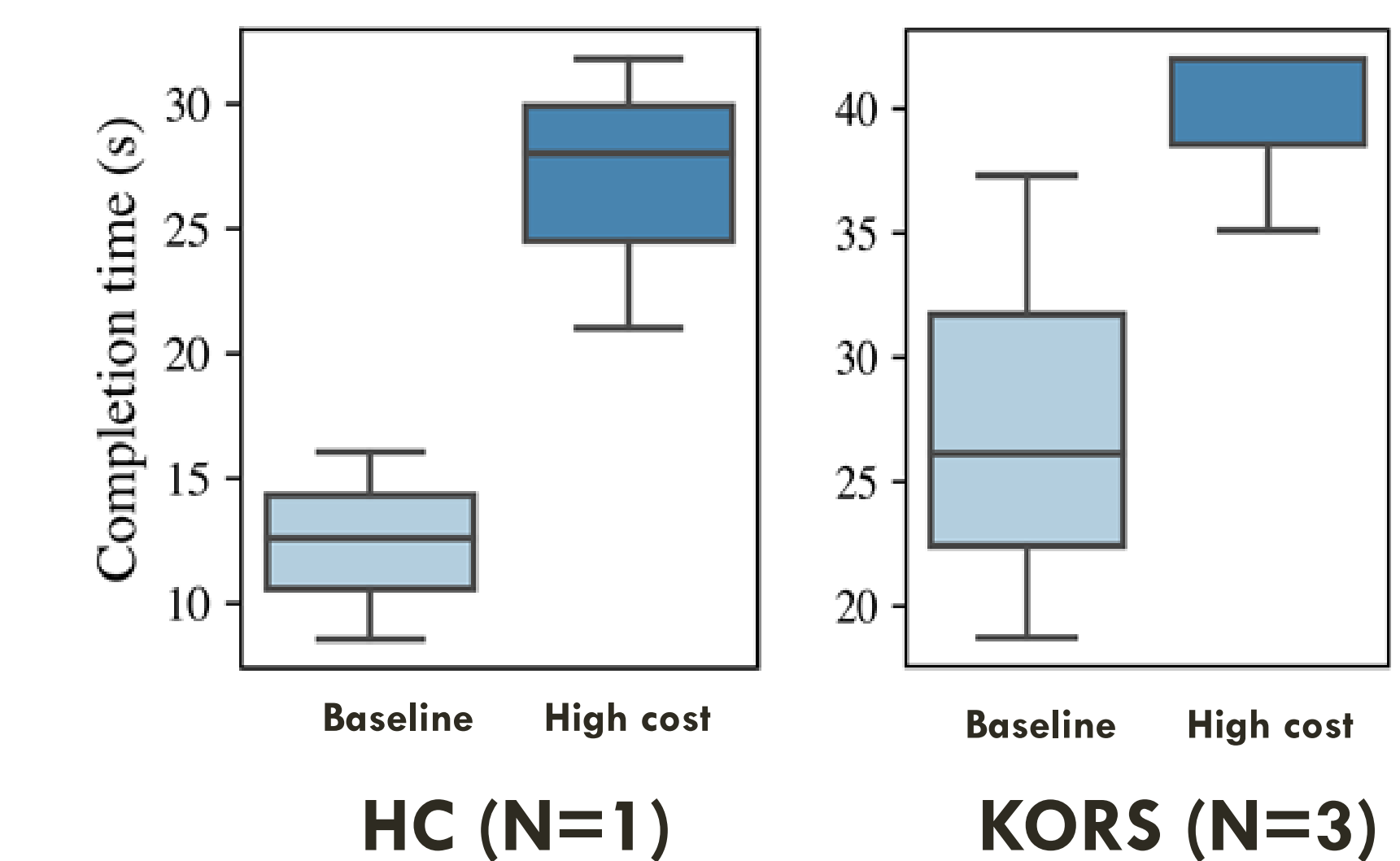
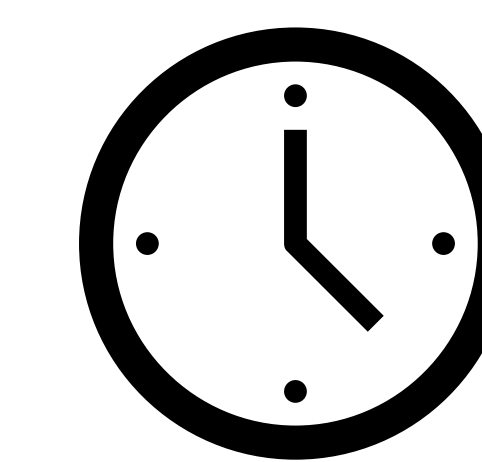
Sampling (crossing)



Dwell time: time spent at example puzzle



Puzzle completion time



HC= Healthy control; KORS = Patient with Korsakov's syndrome

References

- ¹Kessels, R. P., Van Zandvoort, M. J., Postma, A., Kappelle, L. J., & De Haan, E. H. (2000). The Corsi block-tapping task: standardization and normative data. *Applied neuropsychology*, 7(4), 252-258.
- ²Luck, S. J., & Vogel, E. K. (2013). Visual working memory capacity: from psychophysics and neurobiology to individual differences. *Trends in cognitive sciences*, 17(8), 391-400.
- ³Van der Stigchel, S. (2020). An embodied account of visual working memory. *Visual Cognition*, 28(5-8), 414-419.
- ⁴Somai, R. S., Schut, M. J., & Van der Stigchel, S. (2020). Evidence for the world as an external memory: A trade-off between internal and external visual memory storage. *cortex*, 122, 108-114.