

# A novel method to induce mental fatigue

Eleanor K Hassan, Andrew M Jones, Gavin Buckingham

Sport and Health Sciences, University of Exeter

E.Hassan@exeter.ac.uk @EleanorHassan



## Introduction

- We all experience mental fatigue, yet know little about it
- It is important to understand the origins, nature, and effects of mental fatigue
- Mental fatigue is an ill-defined concept<sup>1</sup>
- Current literature relies on self-report measures to determine whether participants are mentally fatigued, and fails to consider performance in the fatiguing task
- Aim: develop a method that causes subjective increase in feelings of fatigue as well as reduced task performance

## Sample

- 45 healthy adults aged 18-65 with no known cognitive or uncorrected visual impairments completed the full set of procedures (26 withdrawals/exclusions)

## Hypotheses

- Completing a two-hour cognitive test battery will cause an increase in subjective feelings of mental fatigue
- Completing a two-hour cognitive test battery will cause a decline in performance on a cognitive task

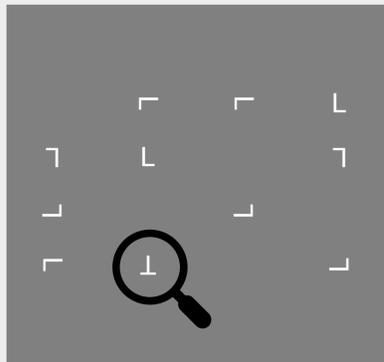
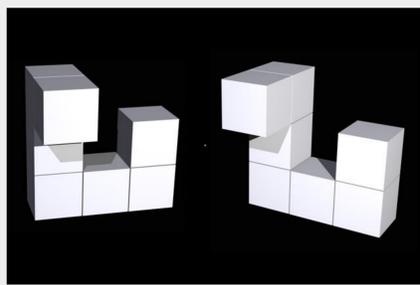
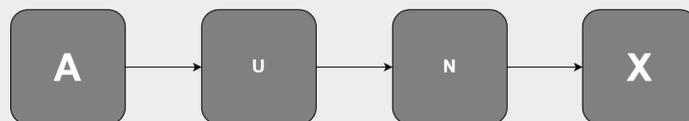
## Dependent Variables

- Subjective measure of fatigue: Brunel Mood Scale (BRUMS) fatigue subscale<sup>6</sup>
  - Score range from 0-16 where 16 is extremely fatigued
- Objective measure of fatigue: Balanced Integration Score<sup>7</sup> calculated using AX-CPT outcomes
  - Standardised integrated measure of response time and accuracy
  - Higher number = better performance, and zero = average

## Procedures

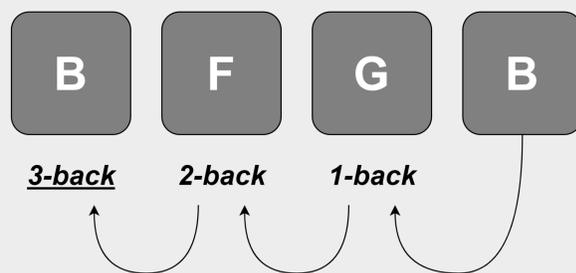
Battery of four computerized cognitive tasks

- 1) A-X Continuous Performance Test<sup>2</sup>
  - Probe – distractor – distractor – cue
  - Press 'k' if probe A and cue X, 'd' if not
  - Recorded response time and key presses
- 2) N-Back Task<sup>3</sup> (3-back)
- 3) Visual Search Task<sup>4</sup>
- 4) Mental Rotation Task<sup>5</sup>



Two sessions on the computer at home:

- 1) Training session (< 45 minutes)
  - Practiced each task for 5 minutes
- 2) Testing session (~ 2 hours)
  - 10 minutes per task x 3 repeats
  - AX-CPT first and last
  - Brunel Mood Scale at beginning and end
  - Questionnaire immediately following session (optional)

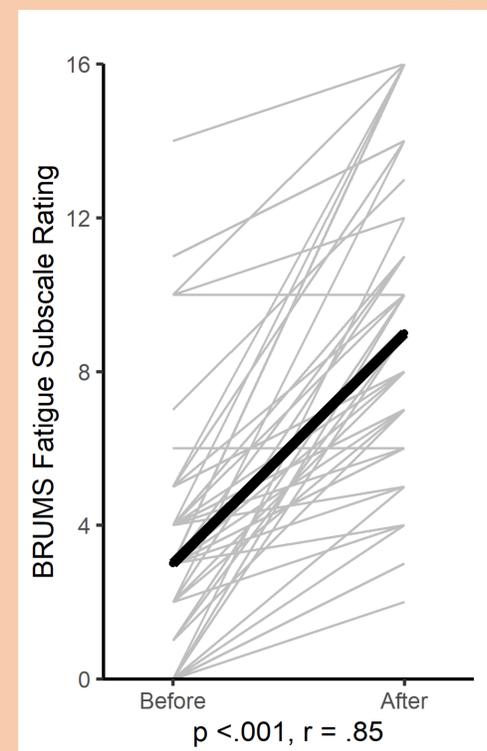


## Conclusions

- Our method is suitable for inducing mental fatigue
- Our subjective fatigue findings are similar to other literature
- The effect of the mental fatigue battery on task performance was significant but very small. Mental fatigue may be difficult to reliably detect in smaller samples
- Mental fatigue affects everyone but is particularly important for older adults or populations who work in highly demanding environments (healthcare, military, engineering)
- Mental fatigue is complex
- We would benefit from a more coherent definition and understanding of mental fatigue so that we can reliably study its possible effects
- Further work: explore effects of age and break duration, qualitative analyses of questionnaire responses, replicate findings

## Results

### Increase in subjective fatigue



### Decrease in AX-CPT task performance

