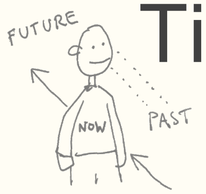


Time Perception and Related Cognitive Abilities in Adults with Attention Deficit/Hyperactivity Disorder (ADHD) Traits

UNIVERSITY of York · Exam Number: Y3842538

Background

- The ADHD population may experience impaired time perception (e.g. Toplak et al., 2003); however, many related studies focused on ADHD children but neglect the research of adults.
- Difficulties on attention, working memory (WM) or inhibition in the ADHD population may be responsible for their dysfunctional time perception, as aforementioned abilities may be severed as crucial components during time perception (Barkley, 1997; Grondin, 2010).
- The complexity of visual stimuli in time tasks may also influence participants' time perception, evidenced by several time studies suggested that when visual stimuli (animations) yielded more variations, shorter duration estimations were made (e.g. Liverence & Scholl, 2012).

Aims of the current study:

1. To explore whether adults with attention deficits (AD) would have more imprecise performance in time task.
2. To investigate whether more complex visual stimuli in the time task would lead participants to underestimate durations.
3. To explore whether adults with AD would have poorer performance on WM and inhibition tasks, and whether those abilities would correlate with their time perception performance.

※ Participants' IQ level was also monitored in this study.

Method (1/2)

Participants:

	Low-AC (*N*=8)	High-AC (*N*=6)
Age (years)	21.63(2.13)	23.17(3.76)
Gender (male: female)	0:8	2:4
Linguistics (English: Chinese)	7:1	4:2

- Low-AC = attention deficits group; High-AC = high attention capacity group.
- The Conners' Adult ADHD Rating Scales (CAARS) was adopted to screen participants' attention.

Method (2/2)

Procedure

- Participants were required to complete the following tasks:

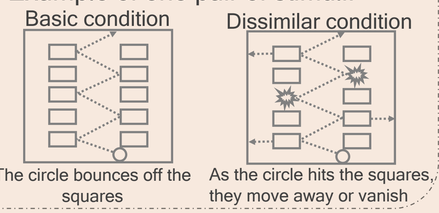
Time Reproduction Task (Time perception assessment) → Symmetry-span task (Visuospatial WM assessment) → Stop-it task (Inhibition assessment) → Matrix reasoning test (Non-verbal IQ assessment)

※ The time reproduction task mainly requires participants to separately reproduce stimuli's durations by pressing buttons after watching each stimulus.

Stimuli in the time reproduction task

- Containing 28 pairs of visual stimuli.
- Each pair:
  - had identical clock durations (3, 4, 5, 6, 7, 8, 9s)
  - differed in the complexity conditions (basic or dissimilar conditions)

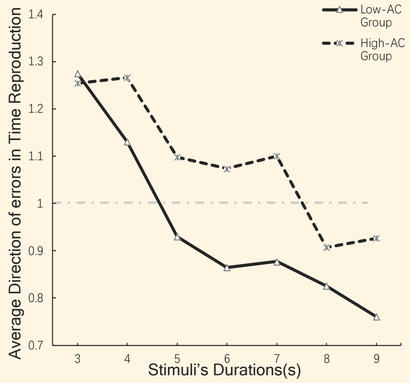
※ Example of one pair of stimuli:



Result

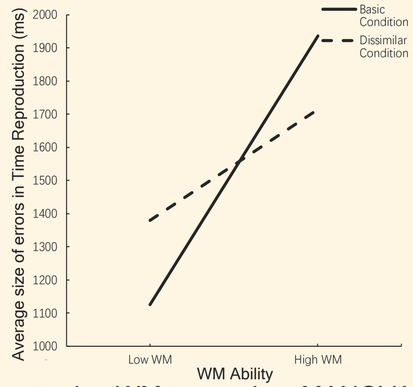
- Data from time task were mainly analyzed by the three-way MANOVA (2 groups × 7 durations × 2 complexity conditions); independent *t*-test and correlation were mainly adopted to analyze data from WM, inhibition and IQ tests.

a)



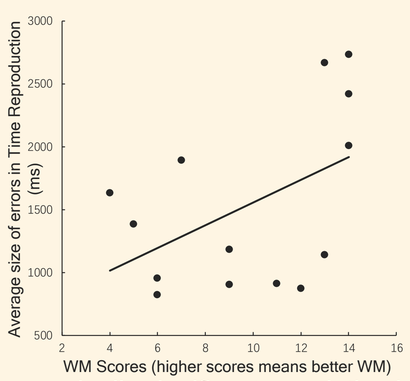
- Interaction of group × duration (non-significant, $F_{3.35,\ 40.21} = 1.95$, $p = .131$) on the direction of errors in the time reproduction suggested that the Low-AC group tended to more underestimate durations.
- Direction of errors = reproduced duration / actual duration; >1 means overestimation, <1 means underestimation.

b)



- By entering WM scores into MANOVA, a significant interaction of complexity × WM ($F_{1,\ 10} = 8.06$, $p = .018$) on participants' size of errors in the time reproduction was detected.
- Size of errors = |reproduced duration - actual duration|; larger value means large error size.

c)



- Only one marginally significant correlation between WM and participants' size of errors in the time reproduction was detected ($r = .48$, $p = .084$).

※ Non-remarkable differences were found between two groups and two complexity conditions in the time reproduction, as well as between two groups in WM, inhibition and non-verbal IQ tests.

Discussion

- Although the low-AC group seemed to more underestimate durations, this study failed to find significant difference between two groups and between two complexity conditions in the time reproduction. This failure may be because the relatively short stimuli's durations and small difference between two conditions may negatively influence the statistical power of this small sample size study.
- Among other cognitive assessments (non-significant between group differences were found), this study detected that the WM potentially plays an important role in the processing of temporal information; however, based on the current data, it is difficult to form a comprehensive explanation for its effects.
- Several limitations were existed in this study, such as the small sample size and the solo use of the self-report CAARS. Future studies are recommended to verify this study's results by improving these limitations. The effects of WM on time perception are also worthy of further investigation.

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