

The effects of a moderate dose of alcohol on prospective memory: A pilot study

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INTRODUCTION

Alcohol impairments on Prospective Memory (PM) mechanisms are not fully understood, and evidence for the efficacy of memory strategies to reverse this impairment during acute alcohol intoxication remains mixed. The present study seeks to answer the following:

- Effect of alcohol on PM:** Replicate findings of previous studies¹ that show evidence for PM impairments during acute alcohol intoxication.
- Effects of Implementation Intentions (II) on PM:** Investigate efficacy of II memory strategy² to bolster PM performance during acute alcohol intoxication.

MEASURES

INTELLIGENCE

Spot the Word Test³ (STWT) was used to gauge intellectual functioning.

EXECUTIVE FUNCTION

A verbal fluency test was used for executive function.

RETROSPECTIVE MEMORY

Immediate and delayed story recall of the Rivermead Behavioural Memory Test⁴ (RBMT) was used to measure episodic memory in the verbal domain.

PROSPECTIVE MEMORY

Virtual Week⁵ (VW) is a computerized board game where the player moves a game piece around a path, and one cycle indicates passage of a day.

- A virtual clock in the center displays the game time of day.
- All participants played the game for 4 rounds or virtual days.
 - Only the last 2 rounds were played with the II memory strategy
- Participants are assigned tasks they must remember to “perform” (indicate by pressing a button and choosing from a dropdown) at certain times or events.

OUTCOMES

- Regular PM Tasks:** At the beginning of the game, participants were assigned 4 tasks to be performed during the entire game:
 - 2 *time-based* (e.g. use asthma inhaler at 11AM and 9PM)
 - 2 *event-based* (e.g. take antibiotics with breakfast)
- Irregular PM Tasks:** At the beginning (2) AND in the middle (2) of each round, participants were assigned 4 total additional tasks:
 - 2 *time-based* (e.g. go to a doctor's appointment at 4PM)
 - 2 *event-based* (e.g. buy pens when going to the store)

PHYSIOLOGICAL

A breathalyser was used to estimate blood alcohol level (BAC) at 10 minutes following the drink administration procedure and every 30 minutes thereafter.

- Leitz et al. 2009, *Psychopharmacology*, **205**, 379-387.
- Paraskevaides et al. 2010, *Psychopharmacology*, **208**, 301-8.
- Gollwitzer et al. 1997, *J Pers Soc Psychol*, **73**, 186-199.
- Baddelie et al. 1993, *Br J Clin Psychol*, **32**, 55-65.
- Wilson et al. 2003, London. *Pearson Assessment*.
- Rendell et al. 2000, *Appl Cogn Psychol*, **14**, S43-S62.

PROCEDURE

Recruitment

Screening: N = 57

- Potential participants were screened for alcohol misuse behaviors, use of psychotropic medication, and mental and physical health

Informed Consent: N = 22

- Information about the experiment was reviewed with subjects
- Subjects were given a chance to ask questions
- Written informed consent was collected

Baseline BAC

Pre-drink Neuropsychological Measures

- Immediate story recall
- Phonemic Verbal Fluency
- Spot-the-word

Alcohol Condition:
n = 9

Control Condition:
n = 11

Alcohol Drink Administration

- 10 drinks of 50mL
- 0.6g ethanol/kg body weight, tonic water with 2 drops tabasco sauce per cup

Placebo Drink Administration

- 10 drinks of 50mL
- Tonic water with 2 drops tabasco sauce per cup

Ten Minute Break

BAC 1

Post-drink Testing Phase I

- Immediate story recall
- Phonemic Verbal Fluency
- FES task (concurrent study): 1 practice trial, 3 experimental trials
- Delayed story recall

Top Up 1
0.1g/kg

BAC 2

Top Up 2
0.1g/kg

BAC 3

Post-drink Testing Phase II

- VW Trial Day
- VW days 1+2
- Implementation Intentions Strategy
- VW days 3+4

Top Up 3
0.1g/kg

BAC 4

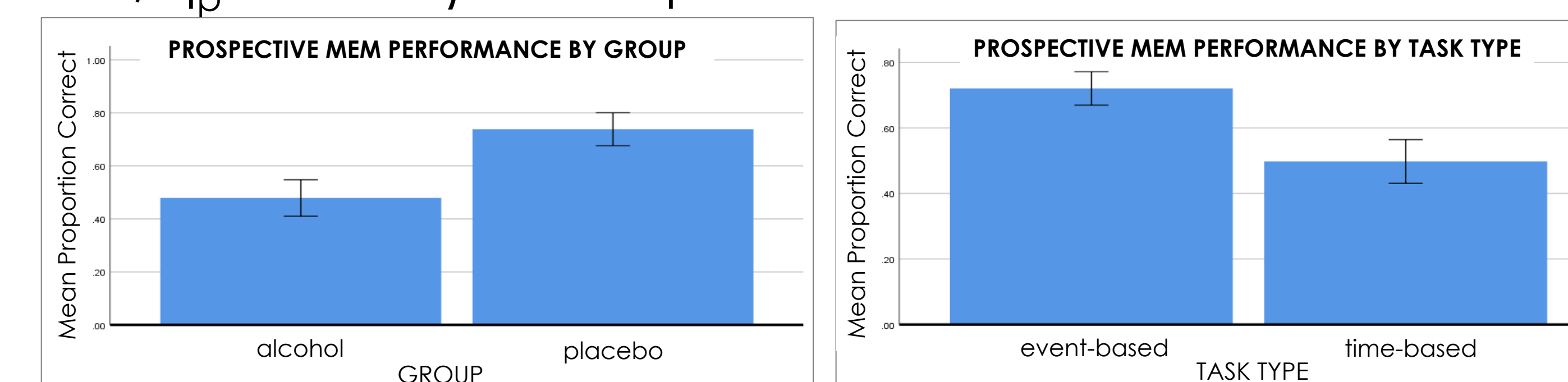
Payment and guess on condition

RESULTS

BASELINE MEASURES No baseline differences in memory ($t(18) = -0.044$, $p = 0.965$) and intelligence ($U = 52.500$, $p = 0.824$) were found between groups.

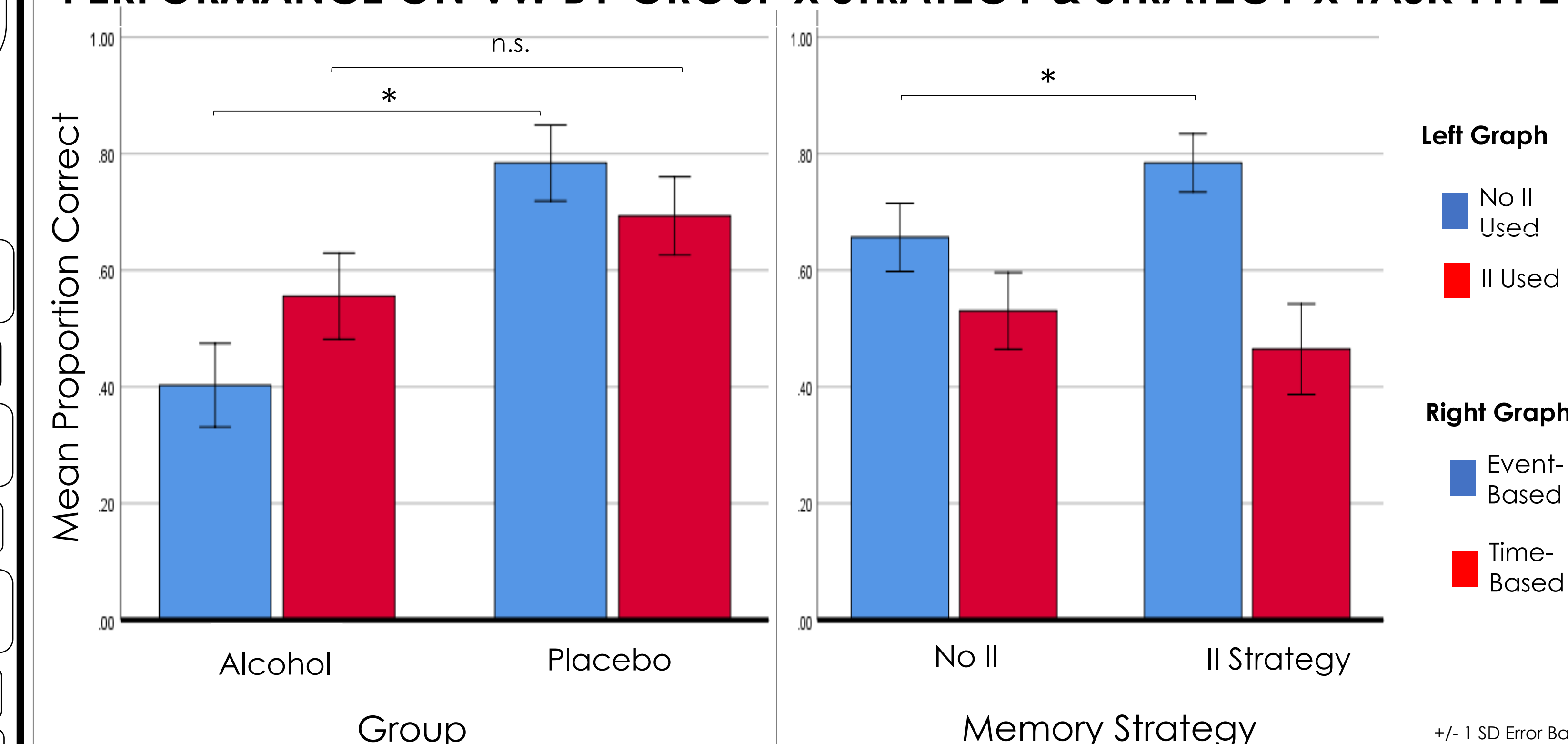
- A significant change in verbal fluency was found between groups before and after drink administration ($t(18) = 2.122$, $p = 0.048$).

PROSPECTIVE MEMORY There was a significant main effect of group ($F(1,18) = 7.849$, $p = 0.012$, $\eta_p^2 = 0.304$) and task type ($F(1,18) = 9.018$, $p = 0.008$, $\eta_p^2 = 0.334$) on PM performance.



- There was a significant interaction of memory strategy and group ($F(1,18) = 13.157$, $p = 0.002$, $\eta_p^2 = 0.422$), and memory strategy and task type ($F(1,18) = 8.606$, $p = 0.009$, $\eta_p^2 = 0.323$). In the alcohol group, there was a significant improvement of scores while using II ($M = 0.556$, $SE = 0.074$) compared to not using II ($M = 0.403$, $SE = 0.072$; $M_{diff} = 0.153$, $p = 0.007$), while no significant difference in the placebo group was found.

PERFORMANCE ON VW BY GROUP x STRATEGY & STRATEGY x TASK TYPE



CONCLUSION

- The alcohol group showed significant impairments in event- and time-based PM tasks from the placebo group. Applying the II strategy improved alcohol group performance for event-based tasks to be comparable to the placebo group.
- This provides initial promising support for IIs as an efficacious strategy to overcome PM deficits in alcohol users, and for an automatic PM pathway that is less impaired by acute alcohol use.
- Future studies should aim to replicate this effect in a larger sample, as well as investigate whether this effect holds true in chronic alcohol users.