THE EFFECT OF COGNITIVE LOAD AND TASK FOCALITY ON PROSPECTIVE MEMORY PERFORMANCE

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ABBREVIATIONS:

PM: Prospective memory   **ONG:** Ongoing task

EBPM: Event-based prospective memory   **RT:** Reaction time

SCWT: Stroop colour and word test   **ANCOVA:** Analysis of covariance

ANOVA: Analysis of variance

Background

- **Prospective memory (PM)** refers to the ability to remember and to execute intended actions in the future and is an essential function of memory.

- **The Multiprocess Framework** suggests that in some, but not all, instances executive resources need to be allocated to facilitate the retrieval of PM intentions. (Einstein et al., 2005)

- **Focality** refers to how closely a PM task relates to an ongoing task. A common finding of PM research is that "PM accuracy is greater using focal, rather than non-focal, cues" (Anderson & McDaniel, 2019, p. 2197).

- **Cognitive load** is the burden of infomation that is processed using workigng memory. It has been found that high-load conditions require a greater allocation of executive resources to facilitate strategic monitoring of PM targets (Vicentin et al., 2025).

- **Cantarella et al., (2023)** investigated the effect of load and focality on PM performance but were unable to separate the two when manipulating variables.

Aims

1. **Address limitations** of previous research.
2. **Investigate** whether **load** and **focality** affect participants' **retrieval strategy** in event-based PM (EBPM) tasks

Methodology

Participants: 58 adults were recruited through social media.

How: 10 minute program designed using PsychoPy.

Stroop Colour and Word Test (SCWT): (Figure 1)
(Stroop, 1925)
Administered to contorl for the potential confounding variable of processing speed (West & Craik, 2001).

Figure 1. SCWT Example

EBPM task: (Figure 2)
5 practice trials followed by 40 experiment trials.

Ongoing (ONG) task where participants had to detect a specific letter by pressing the left or right button corresponding to the side of the screen which the letter was on.

PM Target:
Simultaneously they had to remember to press the cross in the centre of the screen when a different specific letter or specific coloured letter was shown (depending on which condition they were in) (Figure 3).

Figure 2. EBPM Example

Participants were **counterbalanced acroos four conditions:**
- Low-load focal target (LF)
- Low-load non-focal target (LN)
- High-load focal target (HF)
- High-load non-focal target (HN)

Figure 3. Group Specific Task Instructions for EBPM task

Analysis:
Between subject effects 2x2x1 **ANCOVA** to investigate reaction times (RT) for both ONG and PM targets.
Between suject effects 2x2 **ANOVA** to investigate accuracy for PM targets (measured using *d'*) and accuracy for the ONG task (% accuracy).
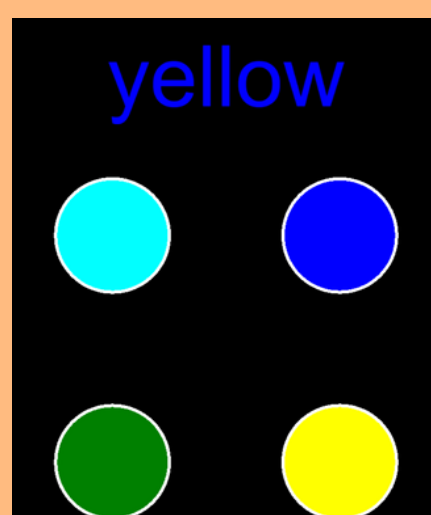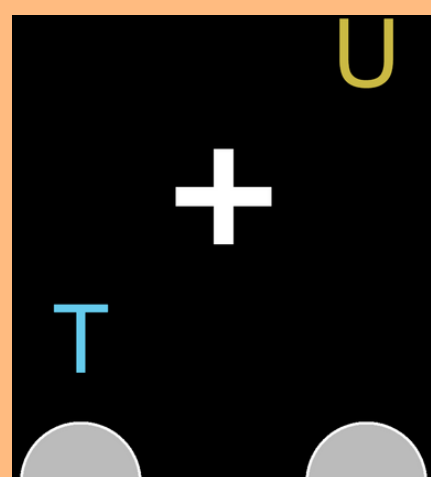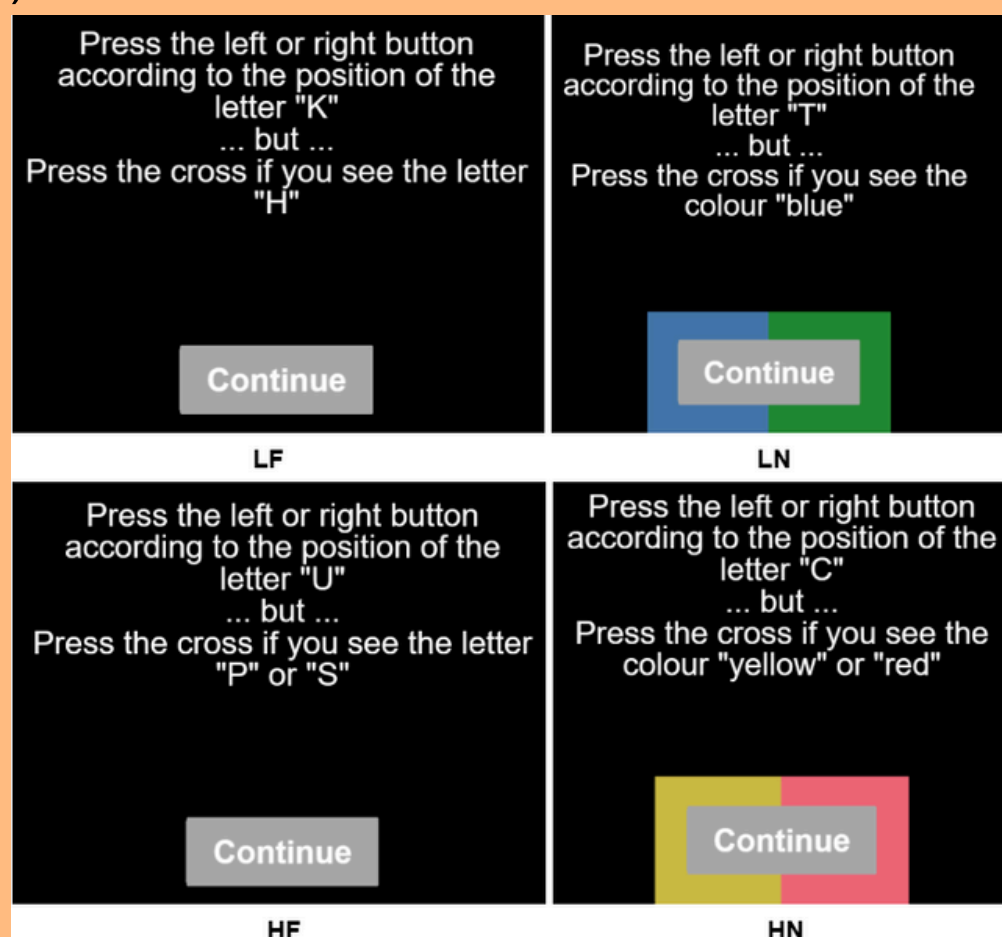**T-tests** to investigate effect of the interaction between factors

Results

PM targets:

Load
- **Low-load** conditions displayed **faster RTs** than those in **high-load** conditions.
- **High-load** conditions had **lower accuracy** (*d'*) than **low-load**.

Focality
- PM target recognition was **faster** in **focal** conditions than **non-focal**.
- **Focal** conditions had **higher *d'*** scores than **non-focal** conditions.

ONG task:

Load
- Participants in **high-load** conditions displayed **slower RTs** than those in **low-load** conditions.
- The diffecence in the ONG task **accuracy** was **not significant** between conditions of load.

Focality
- Those in **focal** conditions had faster **RTs** than participants in **non-focal conditions**.
- **Focal** groups had higher ONG task accuracy than **non-focal**.

Interaction of Load and Focality:

- The interaction was **significant** for participant' **signal detection accuracy (*d'*)** on **PM targets** (Figure 4).

- There was a **weak effect** on **accuracy** in the **ONG task** (Figure 5).

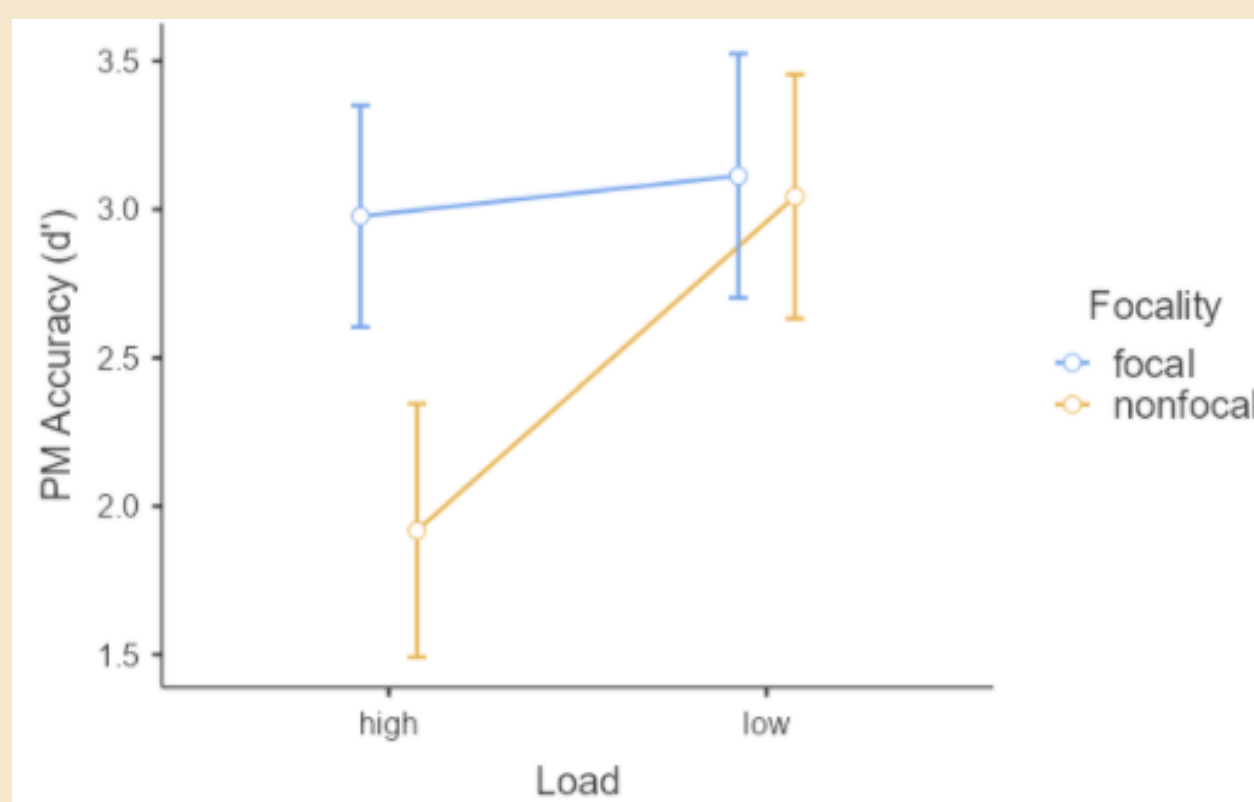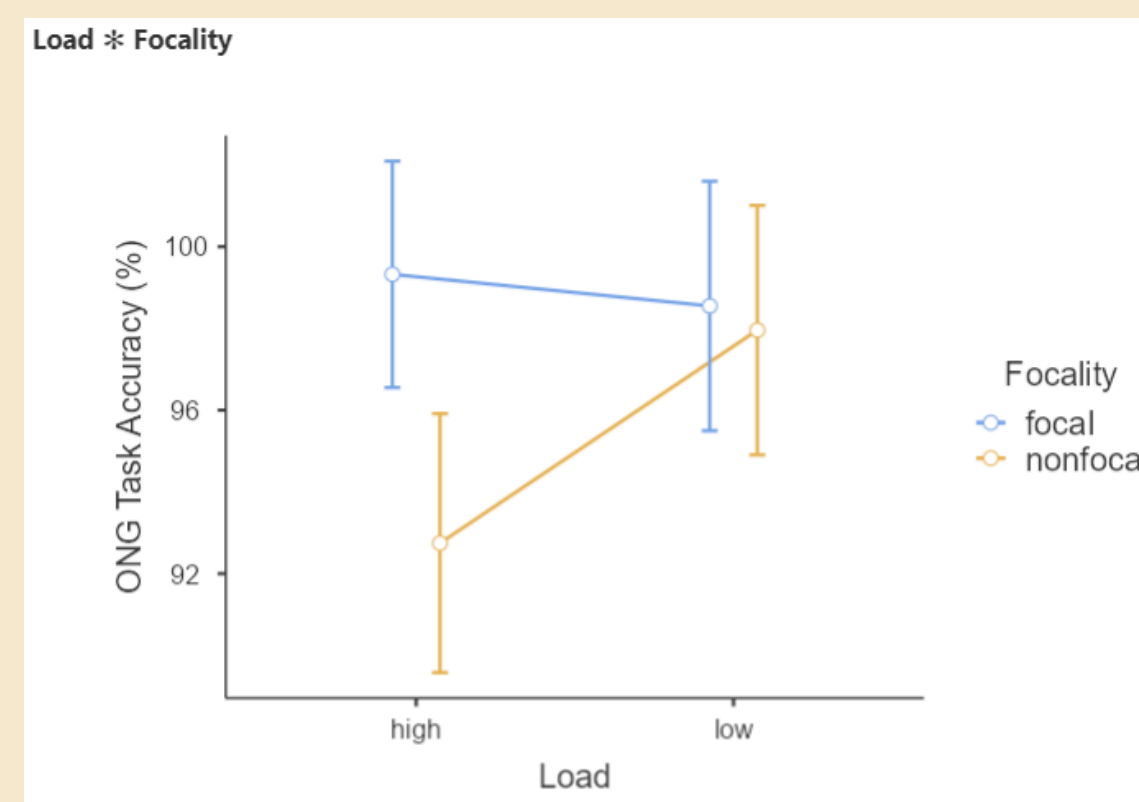*Figure 4.* The Effect of the Interaction Between Load and Focality on PM Accuracy (d')

Figure 5. The Effect of the Interaction Between Load and Focality on ONG task accuracy (%)

Confounding variable: Processing Speed

Scores on the **SCWT** were **significant,** but only for **RT** in the **ONG task**.

Conclusion

- **PM retrieval operates via different processes** when exposed to varying complexity of tasks.

- PM intentions require **specific monitoring** when exposed to **greater task complexivity**.

- Future research should consider the **effect of individual differences in processing speed** when analysing the cost to **ONG tasks** when participants are required to perform PM intentions.

- The findings could aid the **development** of understanding and consideration for the **importance of focality** in humans' abiloty to **perform PM intentions**.

References

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