CAMBRIDGE COGNITION

Comparing the Classic Paired Associates Learning Task with a new Smartphone-Based Version of the Task

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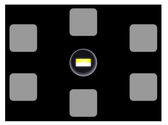
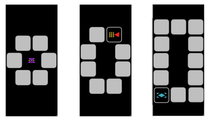
Background

The Paired Associates Learning (PAL) task is widely recognized for its utility in identifying memory capabilities deficiencies. Our study provides a comparative analysis between the established web-based version and a novel smartphone version of the PAL task.

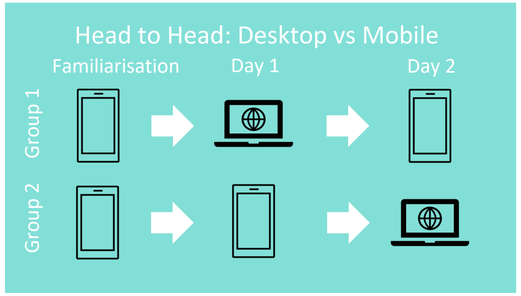


Standard layout example (tablets, laptops, desktops)



4-, 8-, and 12-box problem layouts adapted for smartphones

Method

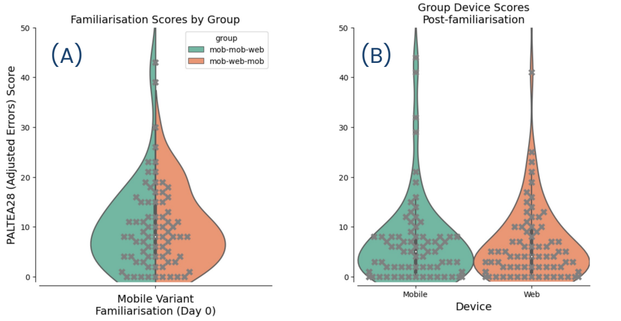


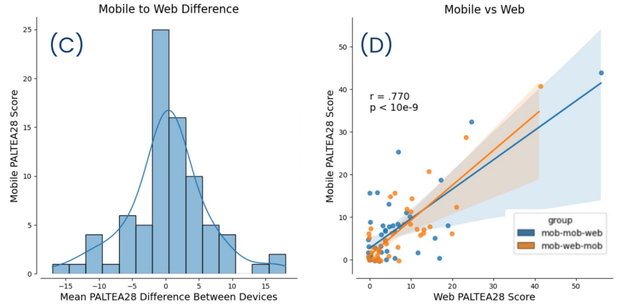
Sample: 76 participants (43 male, 33 female) aged 50+ (M=56.3, SD=5.46) were recruited via Prolific online platform.

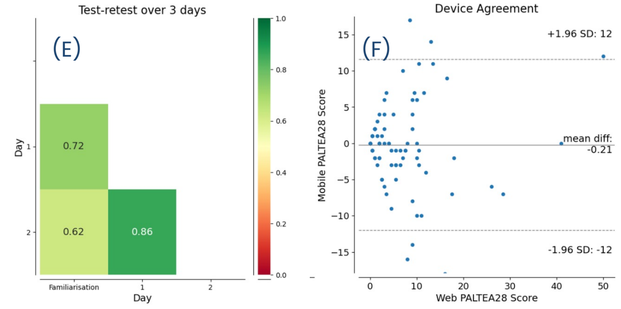
Procedure: Over a three-day period, participants were introduced to the smartphone version of the PAL task, followed by randomized exposure to either the web-based or smartphone task on Day Two, and the alternative on Day Three. Participants also completed a questionnaire each day after the task.

Analysis: Test-retest reliability was evaluated between the familiarisation session and Day Two, and then between Day Two and Day Three. We also analysed the degree of bias and performance improvement across days.

Results



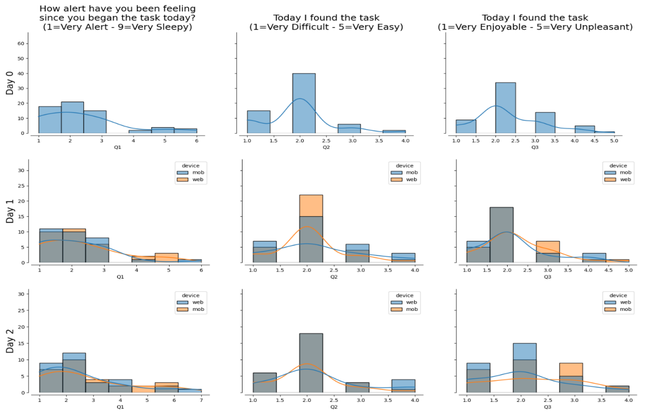




Score distributions: As shown by the device violin-plots (A&B), the distributions of the scores between the devices was remarkably even. The histogram (C) shows that differences in scores between devices is normally distributed around a mean close to zero, indicating minimal discrepancy between the platforms.

Test-Retest Reliability Over Time and Between Devices: The scatterplot (D) and heatmap (E) show the robust test-retest reliability of participants' PALTEA28 scores across the three-day study period. The analysis showed a strong correlation between Familiarisation (Day 0) and Day 1 scores (Pearson's r = .72), and an even stronger correlation from Day 1 to Day 2 (Pearson's r = .86), even when all participants transitioned from one platform to another.

Bias Analysis: A Bland-Altman plot was employed (F) to detect systematic bias rendering the task more challenging on one platform than the other. There was excellent alignment between devices, a marginal difference of only 0.21 PALTEA28 points.



Plots show participants' daily responses to post-task questionnaire administered each day.
Columns show individual questions, rows represent days of the study.

Enjoyment and acceptability:

From their first encounter with the mobile PAL on Familiarisation Day 0, participants overwhelmingly agreed that the instructions were easy to follow, rating the task as either 'enjoyable' or 'very enjoyable'. The data also suggest that participants engaged with the tasks during periods of self-reported alertness and minimal distractions, further reinforcing the usability and acceptance of the smartphone version of PAL.

Conclusion

Reliability: The smartphone adaptation of PAL demonstrates good to very good test-retest reliability. This is true whether the user transitions from mobile to web or vice versa, pointing to the tool's consistency across platforms.

Minimal Bias Between Platforms: There was minimal bias between mobile and web versions of the task. This suggests that the difficulty level of the task remains consistent, regardless of platform, enhancing the task's flexibility and accessibility.

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