

Understanding the Impact of Game Genre on Cognitive Skill Development

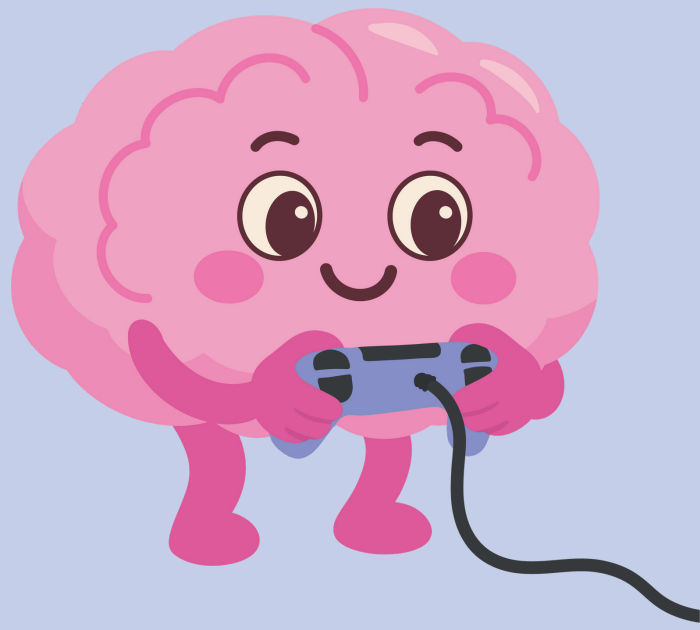
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01 Introduction

Games can offer vastly different experiences based on their genre, such as Racing vs. RPGs, this places varying cognitive demands on a player and may influence skill development.

Previous research shows gaming can improve a variety of skills and yield positive behavioural and stress-related outcomes [1]. Video game Players often outperform Non-players in cognitive tests [2]. Some studies suggest that the combination of a player’s emotions, the gameplay, and the similarity between game mechanics and cognitive tasks may contribute to these benefits [3,4].



02 Research Questions

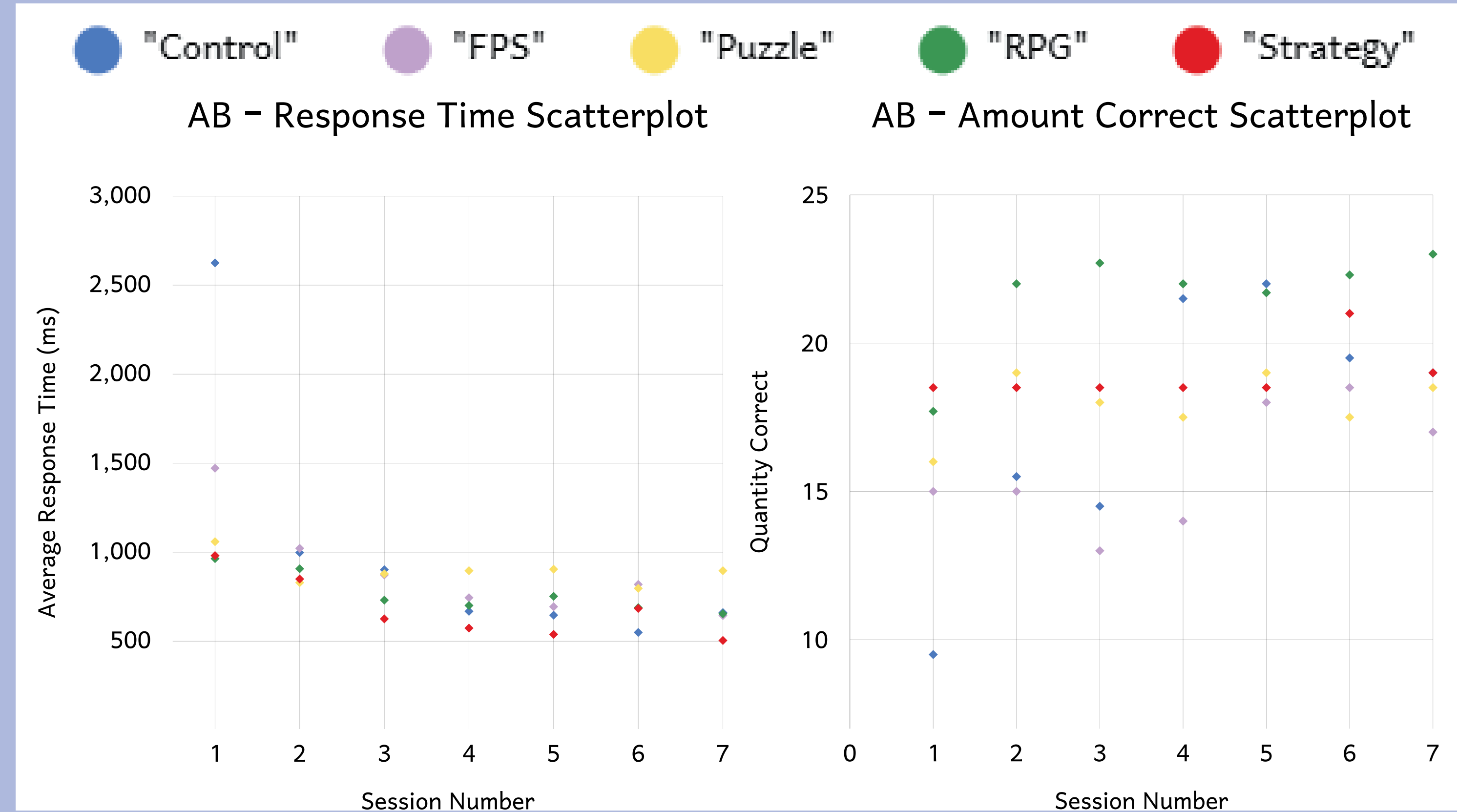
This study aimed to evaluate whether game genre affects the mental skills of cognitive flexibility, attention, and memory, expanding on previous research by analysing four distinct genres and focusing on three real-world transferable skills.

- RQ1: Does the genre of game played significantly affect performance in cognitive flexibility, attention and memory testing outcomes?
- RQ2: Are certain genres better at enhancing specific cognitive skills than others?
- RQ3: Does emotional engagement during gameplay moderate these outcomes?

04 Results

The metrics used were Average response time (ms), Number of correct responses, and Corsi span, as they best reflect improvements in task speed and accuracy.

Figure 2 shows that Strategy and RPG players had the fastest response times on the attentional blink (AB) task throughout the study, with RPG players achieving the highest accuracy as shown in Figure 3. These findings suggest that Strategy and RPG genres may enhance rapid information processing.



Figures 2 & 3 – Scatterplots showing average response time (ms) and number of correct responses per genre for the Attentional Blink task.

On the Corsi task, Strategy players scored highest (7.21), indicating a greater memory span than other genres. In the Task Switching (TS) test, FPS and Strategy players recorded the fastest response times, suggesting enhanced cognitive flexibility and processing speed. Puzzle players were slower to switch tasks and respond, but achieved the highest accuracy, which may reflect a more cautious approach to this task.

Overall, Strategy and RPG players show stronger, more balanced performance across all cognitive measures. This strongly supports RQ2, demonstrating that specific genres are more effective at improving particular skills. The control group performed worst in three assessments and ranked second lowest in the others, indicating minimal cognitive stimulation and weaker overall results throughout.

03 Methodology

The games played were [5]: Fallout 2 (RPG), Portal 2 (Puzzle), XCOM 2 (Strategy) and Call of Duty: Black Ops II (FPS), and Solitaire (Control).

Each week, eleven participants completed the cognitive tests on the PsyToolkit platform [6,7]. During the core weeks, participants played their preferred genre for an hour, completed the tests, and then filled in the Game Experience Questionnaire (GEQ) [8]. Figure 1 shows the weekly procedure used throughout the study.

Sessions	Cognitive Tasks	Gameplay & GEQ
Week 1	Yes, Attentional Blink, Corsi Block Tapping, Task Switching	None
Week 2 – 6	Yes, Attentional Blink, Corsi Block Tapping, Task Switching	Yes (1 Hour)
Week 7	Yes, Attentional Blink, Corsi Block Tapping, Task Switching	None

Figure 1 – A table showing which activities took place each session.

05 Discussion

Figure 4 presents a Kruskal-Wallis test assessing whether differences in results are statistically significant ($p < 0.05$). This non-parametric test was used due to the non-normal data, likely caused by the small sample size. The test highlighted significant p values across all assessments, indicating that performance differed between at least one genre and the others. This supports RQ1, demonstrating that game genre significantly affects cognitive performance in the target areas.

To examine the relationship between emotional engagement and cognitive performance, each participant’s “best” and “worst” GEQ responses were compared against the metrics using a one-way ANOVA. No significant differences were found, indicating that variations in emotional engagement did not meaningfully influence task performance. Therefore, while engagement may affect enjoyment, it does not lead to notable improvements in cognitive outcomes, and RQ3 was not supported.

Metrics	X ²	df	p
AB – Average Response Time (ms)	11.4	4	0.022
AB – Amount Correct	15.6	4	0.004
Corsi – Highest Score	11.0	4	0.02
TS – Average Response Time (ms)	19.7	4	< .001
TS – Amount Correct	11.4	4	0.022

Figure 4 – A table showing the results of the Kruskal-Wallis.

06 Conclusion

Results consistently showed that game genre significantly influenced cognitive outcomes, supporting RQ1 and RQ2. This aligns with existing literature suggesting that performance gains depend on gameplay and its alignment with cognitive demands rather than improvements being a general benefit of gaming [2,3]. In contrast, RQ3 was not supported, as emotional engagement, assessed by the GEQ, did not significantly affect cognitive performance.

As the study only included a small sample (2 per group), the reliability and generalisability of the findings is limited and may also have reduced the ability to detect more subtle effects. In addition, only one game per genre was used due to financial and practical constraints, meaning results may reflect specific game mechanics rather than the genre as a whole.

As the first study to directly compare four genres, this research provides exploratory evidence that cognitive benefits from gaming are genre and mechanic dependent, supporting and extending existing literature [2,3]. The findings also highlight the potential for designing games for targeted skill development, similar to serious games, that aim to strengthen specific cognitive abilities. This skill development could in turn support cognitive and behavioural rehabilitation in individuals who struggle to develop these skills or who have experienced trauma, consistent with prior evidence of positive stress-related outcomes [1].

07 References

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