



Do Video Games Have an Influence on Cognitive Performance?

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Introduction

- **Researchers have long debated whether or not playing video-games has an influence on our cognitive abilities.** ^{1, 2}
- **To seek an understanding of relationships between playing Video-Games and Cognitive Abilities, data was collected and compared from Response-Selection tasks and self-reported measures.** ³

Method

Participants:

Seventy-five undergraduate students (26 men, 49 women, $M_{age} = 18.69$ years, age range: 18 - 25 years) from California State University, Long Beach participated in the study. The students participated in order to fulfill a Psychology course requirement.

Self-Reported Measures:

[Q5]Average gaming hours per week over last year, [Q4]Hours slept last night, [Q1]How alert during tasks, [Q3]How tiring were the tasks,.

Tasks (Area of Cognitive Ability Measured):

- Simon Task (Spatial Bias)

Red or Green square appeared on the Left or Right - prompting L or R response

- Stroop Task (Inhibition)

Color-word or characters appeared in a different font color – requiring a font color response

- Anti-Saccade Task (Inhibition)

Extremely quick letter-mask appearance, prompting letter response

- Stop-Signal Task (Inhibition)

Variation of go/no-go task – measuring the ability to stop a response in motion

- N-back Task (Working Memory)

Compared currently shown letter and letter shown “N” numbers back in a series

- Raven’s Matrices (Working Memory)

Series of 3x3 matrices with a pattern of mixed shapes and lines – answer in the missing piece

- [AX] Continuous Performance Task (Working Memory, Inhibition)

Primed response to an “X” after an “A” – a different response for other letter pairs

- Trails Task (Working Memory)

Ordered-responses emphasizing speed – connect-the-dots numerically and/or alphabetically

References

- ¹Unsworth, N., Redick, T. S., Mcmillan, B. D., Hambrick, D. Z., Kane, M. J., & Engle, R. W. (2015). Is Playing Video Games Related to Cognitive Abilities? *Psychological Science*, 26(6), 759-774. doi:10.1177/0956797615570367
- ²McDermott, A. F., Bavelier, D., & Green, C. S. (2014). Memory abilities in action video game players. *Computers in Human Behavior*, 34, 69–78.
- ³Miles, J.D. (In Preparation)

Data

Table 1. Differences Between Non-Gamers and Gamers from Cognitive Measures.

Task	Baseline (N = 75)	Non-Gamers (n = 48)	Gamers (n = 27)	t(73)	p
Simon [Location] (ms)	21.91(53.35)	18.52(58.87)	27.94(42.15)	-.73	.47
Simon [Words] (ms)	28.22(47.36)	32.99(50.44)	19.72(40.82)	1.17	.25
Anti-Saccade (%)	14.69(14.54)	15.17(15.61)	13.85(12.65)	.37	.71
Stop-Signal (%)	22.05(19.73)	22.25(20.07)	21.70(19.50)	.11	.91
N-Back (%)	74.72(23.16)	75.88(23.13)	72.67(23.49)	-.57	.57
Raven's (18 Total)	9.01(2.29)	8.65(2.22)	9.67(2.32)	-1.88	.06
Stroop (ms)	163.86(161.46)	173.87(133.20)	146.05(203.99)	t(38.73) = .67	.48
AX-100 (ms)	59.58(105.02)	48.11(103.59)	79.98(106.38)	-1.27	.21
AX-1000 (ms)	-23.00(128.12)	-25.69(119.96)	-18.24(143.77)	-.24	.81
Trails (ms)	26963.74(11164.34)	26666.68(11583.65)	27491.86(10570.77)	-.31	.76

Table 2. Zero-Order Correlations Between the Cognitive Measures and Experience for Type of Video-Games

Task	Shooter	Action	Real-Time Strategy	Puzzle	Role-Playing	Music
Simon [Location]	-.18	-.10	.08	-.16	.01	.03
Simon [Words]	.02	-.01	.05	-.22	-.08	-.12
Anti-Saccade	-.02	.01	-.08	-.04	.06	.16
Stop-Signal	-.08	-.07	.06	-.09	.02	-.05
N-Back	.16	-.05	.11	-.01	-.10	.04
Raven's	.09	.12	.15	.24*	.16	-.04
Stroop	-.03	-.01	.03	-.21	-.18	-.08
AX-100ms	-.14	-.05	-.01	-.05	-.10	.11
AX-1000ms	-.16	-.14	-.06	-.05	-.15	.04
Trails Δ	-.07	-.08	-.07	-.12	-.03	-.14

Note: *p < .05.

Table 3. Zero-Order Correlations for Pertinent Performance Measures

Question	Participant Answers (N = 75)	Weekly Gaming (hours)	Sleep Last Night (hours)	Alertness [1 - 6]	Tiredness [1 - 6]
Gaming Hours (per week)	4.91(13.06)	-	-	-	-
Sleep Last Night (hours)	6.81(2.01)	-.25*	-	-	-
Alertness [1 - 6]	5.27(1.12)	-.22	.36**	-	-
Tiredness [1 - 6]	3.32(1.52)	.16	.06	-.31**	-

Note: *p < .05 (2-tailed). **p < .01 (2-tailed). [1 Least - 6 Most].

Summary

Preliminary analysis shows a nearly non-significant relationship between Video-Games and Cognitive Measures

However:

- There are statistically significant correlations between Gaming hours, Sleep, Alertness, and Tiredness.
- These relationships indicate that as more Video-Games are played, the less an individual sleeps
- Lack of sleep decreases Alertness and increases Tiredness
- Any benefit from gaming may be masked by the lower amount of sleep and alertness related to increased game playing

Any findings may be applicable to further research in:

- Simulators (e.g., Education/Training, Avionics, Automotive, Military/Law Enforcement, or Construction)
- Human Factors, User-experience design (UX), or Human-computer interfaces (HCI).