

Effects of Video Games on Immediate and Delayed Memory

Alexander Larson, Sandra Gates, William Lutz, Katie Pope, and Aubyn Fulton



Abstract

Previous research has been conflicted on video games, with some finding video games beneficial and others finding them detrimental to memory. The current study examined the effects of different distraction mediums on immediate and delayed memory. Participants studied two pictures, then engaged in 15 minutes of either video-game playing or a reading. Participants took an immediate memory test over one of the pictures, and twenty-four hours later they returned to take a memory test over both pictures. Results showed that game-playing participants performed significantly worse on the immediate memory test than those who read, while game-playing significantly improved performance on the delayed memory test. The retrieval effort hypothesis seems to provide a useful framework through which to interpret our results.

Numerous studies have suggested that detrimental effects accompany video game playing. Video game use has been negatively correlated with academic performance on both SAT scores and college GPA (Anand, 2007). Burgess and colleagues (2012) reported that male college students played video games for more than seven hours a week, which was also negatively correlated with their GPA's. Skoric, Teo, and Neo (2009) found that children who exhibited higher levels of video game playing scored lower on standardized tests in English, Mathematics, and Science. High arousing media such as films and video games can impair information processing, and therefore be detrimental to short term academic performance (Maas, Klopffer, & Lohaus, 2011). These studies support a valid concern for the potentially negative consequences of video game playing on academic performance.

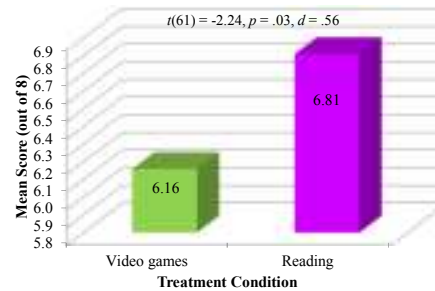
On the other hand, there are also studies that support the claim that video game playing may actually have beneficial effects on cognitive skills. Ferguson, Cruz, and Rueda (2008) found that video game playing was positively correlated with accuracy in visual memory, for both men and women. Bartlett et al. (2009) found that cognitive performance on both visual and auditory tasks improved after gaming. Video gaming has been shown to increase spatial attention and rotation ability, and decrease the gender gap usually associated with spatial ability (Feng, Spence, & Pratt, 2007; Schmidt & Vandewater, 2008). Green & Bavelier (2003) reported experimental evidence that action-video-game playing experience significantly improved fluid intelligence and related executive skills.

Pyc & Rawson (2009) reported empirical support for the retrieval effort hypothesis, implied by the desirable difficulty framework. They found that as conditions for learning became more difficult, ultimate memory scores improved. This suggests that students who play video games after studying but before practice retrievals should do better on later, formal memory tests.

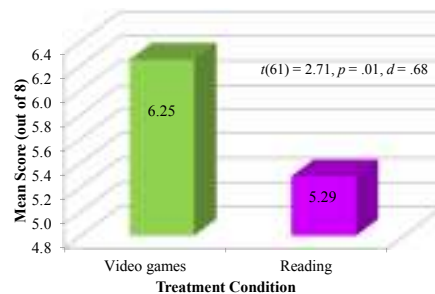
Hypotheses

1. Participants who played video games immediately after studying images would perform worse on an immediate memory test than participants who read a short story after studying the images.
2. Participants who played video games immediately after studying images would perform better on a delayed memory test than participants who read a short story after studying the images.

Effect of Treatment on Immediate Test Scores



Effect of Treatment on Delayed New Test Scores



Participants

- Sixty-four undergraduates (38 women and 26 men) from a small liberal arts college in Northern California
- Participants were between the ages of 18 and 30
- 30% Asian, 25% Hispanic, 20% White, 14% Black, 8% other and 3% Multiracial

Materials

- Images of a park and city (Sullivan)
- Two 8-item memory tests
- The video game "Plants vs. Zombies"
- The short story "The Eclipse" (Cooper)

Procedure

Participants were randomly assigned to one of two conditions (game playing or reading). In Phase 1 participants studied the two pictures for two and a half minutes each. In Phase 2 participants were instructed to either read (control condition) or play the video game (experimental condition) for 15 minutes. In Phase 3 participants completed an immediate memory test over the first picture they studied, and were instructed to return 24 hours later. In Phase 4 participants first completed a delayed memory test over the picture they were not tested on the previous day. Participants were then retested over the picture they had been tested on the previous day. Participants were then thanked, and debriefed electronically within three weeks of the data collection.

Results & Discussion

Thirty-eight percent of our sample reported playing video games frequently (the group we labeled as "gamers"). There was no difference in the length of gaming sessions, with gamers reporting an average session length of 1.04 hours compared to .99 hours for non-gamers. Gamers reported playing significantly more hours per week than non-gamers. Our results showed that neither gender nor number of hours spent game playing per week significantly predicted delayed memory scores. This suggests that men are not affected by video games more than women, despite some popular opinions, and that spending large quantities of time playing video games does not seem to affect delayed memory scores one way or the other.

The retrieval effort hypothesis seems to provide a useful framework through which to interpret our seemingly surprising results. Increasing the difficulty of learning conditions and requiring greater cognitive effort in the retrieval process results in better retrieval. The video game may have provided an effective distraction, which may have increased the amount of cognitive effort used in retrieval. Because of this effort, participants scored higher on the delayed test.