NEUROANATOMY

Decision-Making and Reaction Times: Why you should be playing video games too

When comparing people who play action video games (AVGPs) to those who play non-action video games (NAVGPs), there was an increase reaction time in AVGPs as well as an enhanced ability to make decisions and prioritize.

Briana Mason

Cognition tends to increase in people who play action video games because they have practice in diverting attention and reacting to changing stimuli. The study looked at the difference between action and non-action video game players to see if there was a difference in ability to process information. It was found that those who played more action video games such as *Call of Duty* were better equipped to prioritize stimuli and process information more effectively than to someone who plays *Candy Crush* in their free time. Increasing cognition by playing video games may be able to help people who are struggling with mental processing, and for individuals to increase their reactivity for professions that require quick reflexes such as sports, medicine and law enforcement[1,2,3].

Some theories on video games describe the gain to be only pertinent to that in which the game itself is played. Other theories suggest there may be other real world applications, and that women may see even more benefit than men[4,5]. Action video games accelerate stimuli and processing that is not seen in most ordinary life and pushes the mind[6]. Action games exercise navigating complicated settings with abrupt events that requires gamers to track multiple objects, allocate their resources and manage their perceptual abilities in aiming with fast reaction times[7]. In being able to experience something that is not really happening to the gamer, the gamer must use their anterior N1 component, measured in this experiment, in what is called a “modality shift”[8].

The study took four people who play action video games and three people who do not play action video games but play other video games instead. To qualify for playing action video games, the participants had to play an average of nine hours a week for two years. They had participants look at a screen with a left and right visual field and played an arrow on either half for 1500 msec. The participant’s eyes were monitored for horizontal eye movements while probes were placed on their scalp, which was hooked up to an EEG that monitored their brain waves.

The study found that most individuals either split their attention as to be able to switch between looking between both sides of the visual field or that participants chose to look at one side really well and hardly respond to the opposite side of the visual field. An interesting finding was that there was no differences in the striate, a brain region that processes position. This is unusual because typically when processing arrows, the orientation is important but both gamers and non-action gamers had the same capabilities within this study. Along with a lack of differences in the striatum, there was no difference in the visual cortices or their ability to discriminate between objects. There was a correlation between N1, the area that helps gamers shift into the game as

well as dividing attention, and the use of the opposite side of the brain. P300 (P3) was also tested and is important for how someone reacts to a stimulus, whether it is there or not, and in the study the larger the P3 response was, the more accurate the gamer was at detecting the arrows. Posterior P1 was also monitored, an area that helps in attention, and there was a significant difference between those who were divided, unattended and focused but that did not correlate with gamers and non-gamers[9].

Significant differences were found in the action gamer's abilities were found in their heightened perception and ability to hold attention. They were also better at dividing their attention to be able to process more information and not miss queues on the opposite side of the visual field. In addition to this, the action gamers were also better at allocating importance to certain stimuli, to be able to tell when a certain stimulus is noteworthy and valuable to process. The participants also had an increased contralateral processing, which means that when the information gets processed, the action gamers had a higher ability to process what they were seeing. The effects lasted after game play but were not reported for how long. The study could have been obscured, however, if the non-gamers found the task too difficult while the gamers found it too easy.

Playing action video games for an average of 9 hours a week over a course of two years may have the ability to significantly increase attention flexibility. People who play action video games can better divide their attention and prioritize in high stress situations. They also have an increase in perceptual abilities due to navigating a screen in which they must perceive a three-dimensional world in a two-dimensional capacity, which has applications in the future of surgery where using cameras are becoming more integrated to lessen the chances of infection.

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