Increase of Spatial Awareness Caused by Video Games

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Abstract

The mainstream media would have the general population believe that the video game enthusiasts who might spend several hours a week playing video games are not making best use of their time. The author of this paper disagrees with that argument and has researched the possible benefits that extensive video game usage may have on the players. The author has investigated several articles which involve experimenting on how video games could affect the test subject's spatial awareness. The experiments concluded that there is a definite and provable increase in the user's spatial awareness when exposed to video games for an extended period of time. One of the investigated papers showed how video games (Super Monkey Ball 2, Star Wars Racer Revenge and Silent Scope) increased the accuracy and speed of surgeons performing laparoscopic surgery. Some of the experiments also showed that there was a gender difference in spatial skills both before and after extensive video game exposure. The gender difference observed was greatest before the video game usage, with males being considerably better but after playing video games the females improved significantly, whereas males only showed marginal improvement. The papers investigated also proved that video games could be used as an effective tool to teach spatial skills to young children, adults and elderly people.

Introduction

The mainstream popularity of video games has increased ever since the commercial release of the 'Spacewar' arcade machine in 1971[1]. Even though originally unsuccessful it must have sparked an interest in video games in the public eye as the following year games company Atari released 'Pong'[1], which was a huge success with versions of the game still being player to this day. Forty years later the video games industry has grown exponentially with the entire video games industry generating $10.5 billion in 2009[2]. In America sixty eight per cent of households play video games[3] in some form, whether it is on PC, console (Playstation, Xbox, Wii, etc) or mobile devices. The average age of these gamers is thirty five with forty per cent being female[3].

The increase in popularity of video games can be attributed to the diversity of the platforms on which video games are available. With the advancement of computing technology within mobile devices, the original purpose being to provide a portable method of communication, can now support a wide variety of video games.

With the increase of internet usage and bandwidth world-wide, allowing more people to have access to more diverse video games spanning many genres and topics. Co-operative and competitive video games have become popular with the internet usage increase giving more players an incentive to join friends and family members by

playing video games. Also as the popularity of e-sports increases, the number of people playing online competitive games also increases. 'League of Legends', a free-to-play Multiplayer Online Battle Arena (MOBA) game, is one such game. It attracts over thirty-two million active monthly players[4].

In this paper the author will investigate how video games affect the user's spatial awareness and ability to perform spatial tasks. Also the author intends to gather evidence to disprove claims that playing video games is detrimental to the user's mental capacity.

Literature Review and Discussion

According to the Cambridge Dictionary "spatial" can be defined as "relating to the position, area and size of things"[5] and "awareness" can be defined as "knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience"[6] . Therefore one can conclude that spatial awareness is one's ability to observe and understand the relationships between objects, spaces and areas. Over the development process of video games many different genres have evolved. With reference to Arsenault (2009)[7], the more popular genres in current gaming media include First-Person Shooters (FPS); Third-person shooters; Real-time Strategy (RTS); Multiplayer Online Battle Arena (MOBA); Role-Playing Games (RPG) and Massive Multiplayer Online games (MMO). Most games can easily be associated with one genre but there are some games that provoke arguments amongst enthusiasts over which genre they belong to. There are instances where games go as far as to warrant inclusion in more than one genre, occasionally even spanning several. It is important to note that genres and which genre a game belongs to is mostly subjective.

With the variety of current genres there is also a vast range in the skills required to play the games effectively. For example FPS games require a different skill-set to puzzle games. The former requires fast reactions and knowledge of levels and enemy movement patterns. Whereas the latter can require the player to recognise patterns, solve problems or match colours. As stated before games are not always as simple as they would first appear. A FPS may include some puzzles or a puzzle game may include some shooting. Problems arise when trying to place these games into specific genres. Even the differences in gaming platforms (PC, Consoles, Mobile devices) create different problems and require different skills to participate fully in the game.

With reference to the experiments performed by Rosser et al. (2007)[8] it can be concluded that the skills gained from playing video games can be applied to real world applications. "Surgeons who had played video games in the past for more than 3h/wk made 37% fewer errors, were 27% faster, and scored 42% better overall than surgeons who never played video games. Current video game players made 32% fewer errors, were 24% faster, and scored 26% better overall than their nonplayer colleagues". Based on the experiments performed in this study it can be concluded that playing video games increases ability to accurately perform laparoscopic surgery. The evidence presented in the suggests that having a history of video game experience increases one's ability to perform surgery and a recent video game session will increase that ability even further.

Achtman et al. (2008)[9] can be quoted saying “One possible training regimen that has shown generalizable enhancements in terms of visual attention and more basic visual processing is playing action video games”. The experiments performed by Achtman et al. (2009)[9] show that males with experience playing action video games will in general be able to perform a visual search task faster than a male without that experience. This evidence further proves the statement that playing video games improves spatial awareness.

Where the previous experiments focused mainly on adult subjects Dye et al. (2009) observed younger children as test subjects and produced similar results “Analysis of raw RT data revealed that VGPs responded more quickly than NVGPs, but did not make more errors”[10]. These experiments showed the reaction time of children is increased with video game experience similarly to adults.

Green et al. (2003)[11] experiments further prove that video games improves spatial awareness “The three experiments described so far indicated that video-game playing enhances the capacity of visual attention and its spatial distribution”. The experiments performed by Green et al. (2003)[11] present evidence to suggest playing video games increases allocation of spatial attention over a visual field.

The experiments performed by Feng et al. (2007)[12] highlight a gender difference in spatial awareness “Playing an action video game can differentially enhance males’ and females’ performance on spatial tasks: Females showed larger improvements than males, such that prior gender differences were virtually eliminated (UFOV task) or reduced (MRT)”. Before the experiments were carried out the male test group performed the tests better than the female test group. Whereas after extensive video game play the female test group improved significantly more than the male test group but the male test group still performed slightly better.

Stanton et al. (1996)[13] performed test in which they exposed younger children to a virtual reality environment to aid spatial awareness “The results show that on several criteria, childrens’ performance on spatial tasks improves with repeated experience of virtual environments”. These experiments showed that the test subjects spatial awareness did improve but required exposure to the 3D virtual reality environment several time to take effect. Although the increased spatial awareness did not translate to a real-world test it still showed an increase in cognitive ability caused by the VR environment.

Where the previous studies focussed on young adults and younger children, Foreman et al. (2005)[14] used elderly people in their experiments “However, analysis of the judgments of level (belowvs. same, for upper, and above vs. same, for lower floor pointing locations) showed that although the two control groups scored at chance level (students = 50.0%, older people = 50.7%), the two experimental groups performed substantially above chance (students = 75.7%, older people = 60.4%)”. Using both students and elderly test subjects the experiments performed showed that the both groups improved but the younger students improved more than the elderly group.

Cockburn et al. (2002)[15] performed experiments in both 2D and 3D environments “Results show that our subjects’ ability to quickly locate web page images deteriorated as their freedom to use the third dimension increased. Their subjective responses also indicated that they found the 3D interfaces more cluttered and less

efficient". These experiments showed that the test subjects using a 2D interface performed better than the test subjects using a 3D interface. The test subjects reported that they preferred the 2D interface. The test subjects reported the 3D interface was too cluttered and difficult to use.

Conclusion

Contrary to what the media would have you believe video games may be more beneficial to the human ability to learn, adapt and improve spatial awareness than was originally thought. The evidence gathered in this paper shows that spending extensive periods of time playing video games can increase one's spatial awareness.

The experiments explore various games and their effects on various activities. One such real-world application for this research is for surgeons performing laparoscopic surgery. The experiments showed that surgeons that had extensive experience with video games performed the surgeries much better than the surgeons with little to no experience with video games.

The experiments investigated in this paper also suggest that extensive time spent playing video games can be beneficial to children. The evidence would suggest that video games can be used as a teaching tool for spatial skills. The evidence shows that younger children benefit more from video than older children and adults.

Experiments that focussed on action video games also showed an increase in reaction time in all age groups. Some of the experiments also show a large difference in males and females spatial awareness. In tests involving males and females with very little to no video game experience showed that males had much better spatial skill than females. After being exposed to video games both males and females spatial awareness increased but females improved considerably more than males.

One experiment investigated also showed that elderly people can also benefit from exposure to video games. A group of elderly people and young students were subjected to the same spatial awareness test before and after playing a video game. While the student's spatial awareness after playing the video game improved more than the elderly group, the elderly group still showed significant improvement.

Overall it can be concluded that video games are beneficial to the development of children's spatial skills as well as increasing the spatial awareness of adults.

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