

Mini Review

Cyberpsychology: Video games as a perspective for cognitive training

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Abstract

The current advances in preventive research on neurodegenerative diseases affecting memory suggests greater efficacy of treatments; In the face of cognitive deficits and associated early symptoms such as memory loss and dementia of the Alzheimer or Parkinson type, or medium- and long-term memory impairment caused by genetic or environmental disorders. As a result, early identification of patients at risk and better approaches to preserve their cognitive performance is a major global health issue. Cerebral training through cognitive IQ tests and video games with a more or less realistic personalized simulation environment; Has become a promising avenue that neuroscientists have been exploring for some years. This brief communication is a mini review simplified of the recent scientific advances, on the surprising effects on the brain of a cognitive training by means of interactive simulations or video games.

Introduction

The current advances in preventive research on neurodegenerative diseases affecting memory suggests greater efficacy of treatments; In the face of cognitive deficits and associated early symptoms such as memory loss and dementia of the Alzheimer or Parkinson type, or medium – and long-term memory impairment caused by genetic or environmental disorders. As a result, early identification of patients at risk and better approaches to preserve their cognitive performance is a major global health issue. Cerebral training through cognitive IQ tests and video games with a more or less realistic personalized simulation environment; Has become a promising avenue that neuroscientists have been exploring for some years. This brief communication is a mini review simplified of the recent scientific advances, on the surprising effects on the brain of a cognitive training by means of interactive simulations or video games.

Action video games are the most effective

Scientists have long questioned the best cognitive test, which can best adapt to the different clientele encountered in consultation, education or clinics. The answer to this question is reported in some recent publications that highlight the use by mental health professionals or cognitive disorders of various techniques to assess memory disorders already diagnosed in patients, or improve and slow down. The development or onset of these symptoms in healthy individuals. These tools range from cognitive assessment tests such as the McNair score, or multitasking tests performed under MRI. Regardless of the category of tools used, the key is to be able to effectively detect, evaluate and monitor the monitoring of the cognitive performance of our patients [1-4]. Video games prove to be more and more adapted for this brain training, despite their lack of evaluative specificity for any cerebral parameter. Contrary to what one could imagine, games of reflection such as the game of the lady, the game of chess or the tests of logic; Are not the ones that stimulate our brain the most. In

fact, according to recent studies including participants of ages ranging from 8 to 65 years and various disciplines ranging from psychology to neurology; Action games are the most beneficial for the brain, whether online, on the phone or on the console. The visual environment is enriched with special effects and kinematics continuously stimulating the visual system and attention, forcing the subject to make quick and precise decisions. Modern action video games (those published since the mid-2000s, such as CALL OF DUTY, METAL GEAR SOLID and FIFA) have evolved following the performance of consoles and computers and require active learning (decision-making for example) [5-9]. This is more effective than passive learning, for the maintenance and development of cognitive functions [10,11]. Scientific studies highlight the much more lasting and significant positive effects: playing action video games would increase the ability to make quick decisions and ignore distractions, in that would even improve the creativity of children. Despite popular belief, it is now demonstrated that the effect of video games violent or not, is extremely weak on the behaviour of regular players; even if the latter show an aggressive immediately after playing [12,13].

Intensive practice maintains a healthy cognitive function

According to a recent study, 73% of Americans aged 8–29 in North America play an average of 4 hours per week through their smartphones or computers. Players trained in action-based video

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games more easily follow a target in a complex environment, and their ability to concentrate increases considerably depending on the type of game. They develop a greater capacity for attention: A target or solve a puzzle in English while reading a subtitle in another language; And are less distracted by other objects near themselves with sound stimulation. They react faster, and they are also quicker to refocus their attention to the search for a new target in the virtual environment and develop reflexes above the average of the people. This has recently been associated with a significant increase in cognitive capacity for attention and memory, with a correlation between regular gaming practice and a change in the functioning of the hippocampus [6,10]. Those who play action games develop their vision, apprehending a greater number of objects at a glance. Their visual attention is better distributed in space [9]. They also get better results in acuity tests. These beneficial results are more interesting as video games are more geographically and financially accessible than a family physician in countries like Canada. They would be a possible preventive tool against visual and memory disorders with a possible reduction of consultations related to these disorders, if a regulation made some screening or prevention tools [14,15].

Multi-sensory rehabilitation perspective

There is an interesting potential for re-education in video games. Their educational potential also seems under-exploited. Introducing more complex, more exciting, more structured scenarios should increase their brain impact. Video games can potentially be used as therapy for patients with mental disorders causing a reduction or alteration of certain parts of the brain. The virtual environments of video games force the player to simultaneously use almost all cognitive functions. This leads to an increase in information processing capacities in the youngest (between 8 and 30 years), and a slowing of the cognitive decline [11,14,16-18]. These disorders include schizophrenia, post-traumatic stress disorder and Alzheimer's. Studies clearly show the rehabilitation of working memory, an increase in overall executive memory, as well as learning in people initially affected by an increase in gray matter in the brain [19]. The research also looks at the applications of video games in the correction of pathologies associated with the nervous systems. Several rapidly developing neuromuscular pathologies could benefit. For example, ataxia, which is a neuromuscular disorder characterized by a lack of coordination of the voluntary movements, is not caused by a muscular deficit but rather by an attack of the nervous system. This coordination disorder is partially corrected by visual control, and as neuroplasticity is greatly influenced by surrounding visual stimuli; It is therefore possible to improve coordination and treatment of visual and affective information in patients with advanced ataxia [7,20,21]. In conclusion, well outside of its distractive aspect and its recreational reputation; The practice of video games proves to be a promising therapy for cognitive pathologies. One can envisage a control of the symptomatic evolution of the cognitive disorders, as well as an early or palliative treatment of the associated pathologies already diagnosed.

Conclusion

The addiction for video games and entertainment should serve cognition and Cyberpsychology. It is possible to adjust the basic practice of entertainment assigned to video games, and to turn it in a supplementary tool for cognitive training. The usage above are a just a part of applications and interesting assignment of video games. Many projects currently ongoing in engineering and biomedicine, will certainly exhibit a lot of other benefits.

Conflict of interests:

Each the authors mentioned above, has no conflicts of interests, financial or otherwise with the present study

Author contributorship:

Faustin Armel Etindele Sosso and Sana raouafi contributed equally in the present research. Both work for conception and design of the study, experiments, analysis, and writing of the final version of manuscript.

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