

Action games expand the brain's cognitive abilities

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The human brain is malleable—it learns and adapts. Numerous research studies have focused on the impact of action video games on the brain by measuring cognitive abilities, such as perception, attention and reaction time. An international team of psychologists, led by the University of Geneva (UNIGE), Switzerland, has assembled data from the last fifteen years to quantify how action video games impact cognition. The research has resulted in two meta-analyses, published in the journal *Psychological Bulletin*, which reveal a significant improvement in the cognitive abilities of gamers.

Psychologists have been studying the impact of [video](#) games on the brain ever since the late 80s, when Pacman and arcade games first took roots. The present study focuses on one specific video game genre, action video (war or shooter) games that have long been considered as mind-numbing. Do they influence the [cognitive skills](#) of players?

"We decided to assemble all the relevant data from 2000 to 2015 in an attempt to answer this question, as it was the only way to have a proper overview of the real impact of [action video games](#)", explains Daphné Bavelier, professor in the Psychology Section at UNIGE's Faculty of Psychology and Educational Sciences (FPSE). Psychologists from UNIGE and the universities of Columbia, Santa Barbara and Wisconsin dissected the published literature (articles, theses and conference abstracts) over the course of a year. In addition, they contacted over sixty professors, asking them for any unpublished data that might throw light on the role of action video games. Two meta-analyses emerged

from the research.

Profile of action gamers

A total of 8,970 individuals between the ages of 6 and 40, including action gamers and non-gamers, took a number of psychometric tests in studies conducted by laboratories across the world with the aim of evaluating their [cognitive abilities](#). The assessments included spatial attention (e.g. quickly detecting a dog in a herd of animals) as well as assessing their skills at managing multiple tasks simultaneously and changing their plans according to pre-determined rules. It was found that the cognition of gamers was better by one-half of a [standard deviation](#) compared to non-gamers.

However, this first meta-analysis failed to answer a crucial question. "We needed to think about what the typical gamer profile is," points out Benoit Bediou, researcher in the FPSE Psychology Section. "Do they play action-type video games because they already have certain cognitive skills that make them good players; Or, on the contrary, are their high cognitive abilities actually developed by playing games?"

Training your brain by playing action video games

The psychologists proceeded to analyze intervention studies as part of the second meta-analysis. 2,883 people (men and women) who played for a maximum of one hour a week were first tested for their cognitive abilities and then randomly divided into two groups: one played action games (war or shooter games), the other played control games (SIMS, Puzzle, Tetris). Both groups played for at least 8 hours over a week and up to 50 hours over 12 weeks. At the end of the training, participants underwent cognitive testing to measure any changes in their cognitive abilities. "The aim was to find out whether the effects of action gaming

on the brain are causal," continues Bavelier, adding: "That's why these intervention studies always compare and contrast a group that is obliged to play an action game with one obliged to play a video control game, where the mechanics are very different. This active control group ensures that the effects resulting from playing action games really do result from the nature of this kind of game. In other words, they are not due to being part of a group that is asked to undertake an engrossing task or that is the centre of scientific attention (placebo effect)."

The results were beyond dispute: individuals playing action videos increased their cognition more than those playing the control games with the difference in cognitive abilities between these two training groups being of one-third of a standard deviation. "The research, which was carried out over several years all over the world, proves the real effects of action video games on the brain and paves the way for using action video games to expand cognitive abilities," argues Bediou.

Despite the good news for avid gamers, it is worth highlighting that these beneficial effects were observed in studies that asked individuals to space their [game](#) play out over a period of many weeks to months rather than to engage in a large amount of gaming in a single sitting. As is true in any learning activity, short bouts of repeated practice is much preferred over binging!

The two meta-analyses, which covered fifteen years of research, underline the importance of sharing data between different laboratories in order to validate results on an international level without suffering from biases specific to each experiment and working group. Moreover, these meta-analyses help to further improve our understanding of the brain's plasticity and potentially create games specifically designed to develop attention or spatial cognition.

Provided by University of Geneva

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