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Impact of Habitual Action Video Gaming Upon the Development of
Perceptual and Cognitive Skills

For the past several years, my colleague Daphne Bavelier and I have been studying the impact of playing video games on the cognitive development of school-aged children. In particular, we have focused upon the effects of playing action video games. These games, as we define them, are typically first-person perspective ‘shooter’ games that require a video game player (VGP) to attend to a rapid changing visual display, that contains a variety of targets and distractors (‘enemies’ and ‘friendlies’) to which the player must make some kind of response. Such games place large demands upon the visual system. The component of visual processing that we have focused upon is selective visual attention. Broadly speaking, this is the ability to select visual information that is task-relevant, while ignoring that which is task-irrelevant. A seminal paper by Green and Bavelier demonstrated that such aspects of visual attention are enhanced in adults who habitually play action video games, and that the effects could be induced by training non-video game players (NVGPs) on such games. Indeed, there is now ample evidence that playing action video games has a causal role in enhancing visual acuity, the spatial distribution of attention, the time required to recover attentional resources, the ability to track multiple moving objects, rapid enumeration of objects on a visual display, and other aspects of visual selective attention. We have also started to look at the effects of action video gaming on reaction times in forced-choice decision tasks in adults. This was inspired by the observation that VGPs respond more rapidly than NVGPs without a concomitant decrease in decision

accuracy, and that there exists a strong linear relationship between the RTs obtained from the two groups across a wide range of visual perceptual paradigms.

The action video games that have been shown to influence visual perception and visual attention are typically ‘shooter’ games that carry a M for Mature rating from the ESRB. As such, these games are considered unsuitable for young children, although children as young as 7 years of age can be found playing them on a regular basis. It is also the case that boys are much more likely to play these games than girls. These factors will present a challenge for studies wishing to address the effects of habitual action video game playing on the perceptual and cognitive skills of young children. Firstly, in opportunistic samples (where expert and novice action gamers are compared) there will be gender and age imbalances that may confound firm conclusions being drawn from the data. This stems from the paucity of very young children who play these games, as well as an overwhelming bias towards boys rather than girls in such samples. In the last few years of research we have found only two 7-10 year old females who habitually play action video games in the large, suburban school district from which we draw our samples. Secondly, if one is to follow up by conducting training studies in order to demonstrate causality, then there are ethical objections to providing young children with access to first-person ‘shooter’ action games. In addition, it will be important to carefully examine the socio-economic status of children who engage in action video game play. In particular, socioeconomic status is likely to play a role in the availability of the consoles used to play games, as well as in the amount of time for which parents permit their child to play these games.

Careful and rigorous design will hopefully allow us to overcome some of these methodological problems. If we can, then there are important questions that need to be addressed. In particular, it will be vital to consider the impact of habitual video game play on

immature perceptual and cognitive systems. Some such systems are well-established early in childhood, whereas others – with perhaps executive function being the most salient – continue to develop into adulthood. While studies of the effects of video gaming on adults are informative, they do not necessarily generalize to juvenile participants. Whether playing action video games provides a ‘boost’ to the development of perceptual and cognitive skills or if it has a deleterious impact upon ‘normal’ development is an empirical question, an answer to which is necessitated by the increasing prevalence of action video game usage amongst today’s youth,