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Games and Brains

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Abstract

The present article argues that recent claims made by studies in the cognitive neurosciences regarding a beneficial effect of violent action games, including ego-shooters, on human attention and other cognitive abilities have to be critically questioned. Are there other forms of attention than those these studies focused on? Are improvements of certain cognitive abilities the only relevant effects of violent action games? Or do procedural rhetoric, narrative frames, and affective as well as persuasive design of these applications necessitate a widened, interdisciplinary framework that might open for less assertive and clear-cut, yet more troublesome findings?

Introduction: Setting the scene

In her TED talk *Your Brain in Video Games*, cognitive researcher Daphne Bavelier (2012) engages the potential effects of "fast-paced videogames" on players' mental capacities.[1] Drawing on experiments she conducted with the game *Call of Duty: Black Ops* that, according to her, had been played for an accumulated number of 600 million hours (or 68.000 years) only one month after its release by Activision in 2010, she poses the adequate question of how this immense use of time and resources can successfully be leveraged for a beneficial cause comparable to engaging in "linear algebra" or "reading Shakespeare". She then sets out to present her results that, not entirely surprisingly, indicate that playing action games for a moderate time-span each day improves eyesight, increases the ability to simultaneously focus on a number of moving objects on a screen, to multitask several actions, and to mentally rotate complex geometrical objects.

Through neuro-scientific imaging techniques, she connects these findings to the architecture of the human brain and shows that action games stimulate crucial areas such as the parietal cortex responsible for orientation of attention, the frontal lobe that sustains attention, and the anterior cingulate that allocates and regulates attention and dissolves conflicting perceptual input. Her results, she argues, should not be misappropriated to justify forms of excessive use of computer games, so-

called "binging", but should serve as the basis for attempts to bring together brain scientists and game developers and producers to develop better applications for education, rehabilitation, and training that combine the positive effects identified by Bavelier and her colleagues with game mechanics and story-lines that are engaging and motivating.

Even though I, in the following, will point out some weaknesses in her presentation, I am not in fundamental disagreement with her findings. One could, in fact, add studies that have shown improved hand-eye coordination as an additional, experimentally proven, beneficial effect of playing action games. Nevertheless, in identifying some underlying assumptions and rhetorical simplifications that colour her argument, I intend to point to the necessity of not only bringing together brain scientists and game developers to create engaging applications for education and training, but also of including scholars from the humanities and social sciences who have conducted important studies that fill crucial knowledge gaps and that therefore enable a more comprehensive understanding of the various ways through which the increasingly ubiquitous use of computer games impacts upon both individuals and groups in contemporary culture and society.

Game effects: Identifying weaknesses

The first problem I take up is probably the consequence of the limited time frame allocated to TED-talks that necessitates a certain degree of simplification for the cause of improved dissemination and therefore often disallows for presentations of complicating variables that might somewhat relativize the presented results. Fundamental problems such as methodological choices that might to a certain extent pre-dispose or compromise the achieved results can seldom be sufficiently elaborated within this frame. Their proper treatment, however, would be of great significance to the public debates that often emerge in the wake of TED-talks and similar presentations. The undercommunication of such key issues might unnecessarily polarize public discourse and promise easy and quick fixes to complicated and ambivalent problems.

When presenting a study that had experimentally proven the increased ability of players to mentally rotate geometrical objects, Bavelier briefly explains the methodology behind the findings. First, a group of non-players had been put to the task of mentally rotating geometrical objects. Then their degree of success was measured, before this group was exposed to 10 hours of action game play distributed over 2 weeks. After that period a similar post-test measured possible changes in this cognitive ability. According to Bavelier, the results were markedly better after two weeks of play. However, she fails to present results of a test group

of subjects who had been tested twice over the same period without playing games in the meantime. This, however, would have been necessary to exclude the, not entirely improbable, possibility that the mere awareness of the nature of the test to be conducted, rather than the two weeks of gameplay, might be responsible for the improvement of this ability.

Secondly, when perceived from the vantage points of important directions within the social science and humanities, Bavelier's presentation employs a rather reductive notion of attention. The amplification and modulation of attention and affect through game mechanics, design features, and narrative devices are emergent research themes in the study of games and new media (Ash 2012, 2013; Faucher 2014; Hayles 2007, 2012). However, rather than focusing on the effects of certain applications such as action games on specific cognitive abilities of individuals (such as the ability to mentally rotate objects), these studies embed the identified techniques of attention management in the socio-technological apparatuses and cultural contexts of contemporary cognitive capitalism (Ash 2012, 2013; Andrejevic 2011; Faucher 2014; Rogers 2014). In doing this, they employ a wider understanding of attention that is grounded in the ability of individuals to consciously select among and filter the various stimuli and subliminal emotional and affective triggers they are exposed to in increasingly ubiquitous digital environments including digital games.

In a series of studies, Katherine N. Hayles (2007) has shown that pervasive information and communication technologies and ubiquitously networked wearable devices substantially increase individuals' exposure to distraction and systematically privilege a form of hyper attention that has a low threshold for boredom, demands constant gratification, and entails an enhanced ability to quickly scan large amounts of information in a superficial manner. Avoiding an apocalyptic position, she highlights the various advantages this type of attention affords and shows that it is not a new form born with digital technologies. However, she also points to the fact that the current systematic promotion of this kind of attention entails long-term effects that do not only include improvements such as the ones highlighted by Bavelier, but that also come at a cost.

According to Hayles, one of these costs is the increased loss of deep attention – the capacity to deeply engage in one particular issue with a high tolerance of boredom and a sustained ability to withstand distraction and negotiate complicated, ambivalent, and even contradictory positions. The fundamental, often historically inflected type of knowledge that is produced through such deep attention is traditionally within the purview of the humanities and constitutes an elementary component of the contemporary sciences attempting to provide a comprehensive account of the human condition. The potential costs of increased hyper attention should, as such, not be underestimated, but made the subject of critical interdisciplinary research and development projects.

In an era of informationalised capitalism, attention has become a primary resource for commodification and exploitation (Andrejevic 2011, 2013; Fuchs 2012; Rogers 2014). From news companies that finance their activities through pay-per click advertisements, to the increased monetization of user information and behavior through applications such as Facebook or Google, the necessity of economic and political interests to garner and sustain human attention is growing rapidly. As such, the most fundamental question for research on computer games is not necessarily only how can we effectively leverage the time spent while playing for a beneficial purpose, but also how can we improve the ability to withstand the constant urge to engage in applications such as for example *Nintendogs* that are affectively designed precisely for the economically motivated purpose to capture and hold our attention on a particular website or image and to create implicit connections between certain objects, names, or brands and specific positive emotions. Also the rapidly increasing time costs of engaging in play, acknowledged by Bavelier as the practice of binging, should engage critical interest. Maybe spending 40 hours reading a book might, indeed, be a better idea than playing an action game? Which brings me over to my third point that relates to Sudoku, Shakespeare, and *Call of Duty: Black Ops.*

Probably due to rhetorical reasons, at one point in her talk, Bavelier equates the practice of reading Shakespeare with solving a Sudoku sheet and playing *Call of Duty: Black Ops*. We should not be concerned when our kids engage in these activities, she implies, because they have a beneficial effect on certain cognitive and perceptual abilities, and this way, cannot be presented as a mere waste of time. As argued above, I do not doubt her findings, but find her approach rather reductive nevertheless.

What her position disregards entirely is the pressing question of content. To provide a TED talk-style rhetorical example, when seen from Bavelier's perspective, we would read Shakespeare not for the sake of the story told and the fundamental ethical, moral, and historical issues that are negotiated in his plays, but for the sake of improving our eyes' ability to quickly process black-and-white contrasts or, in an 'extended' understanding of reading, to improve our vocabulary and grammar. And, I have to reiterate, there is no doubt that such beneficial impacts are factual, but do we read because of them? Are they the only consequence of reading Shakespeare?

From Bavelier's point of view, it would be the same whether one reads Shakespeare, a car manual, or an old-fashioned phone book. But of course it is not. In a similar manner it is not the same to spend hundreds of hours repeating the monotone tasks required by an application such as *Nintendogs*; or killing your way through various historically inspired game maps to fulfill various tasks including the (assumed) assassination of Fidel Castro as in *Call of Duty: Black Ops*; or engaged in cooperative and nonviolent problem solving practices in a complex first-person perspective

environment such as the one in *Portal II*. Even though actual players and player communities will negotiate the meaning potentials vested in these games' formal structures, procedural systems, game mechanics, and narrative contents differently depending upon their various interests and contexts of reception, a certain framing function of these formal devices cannot be neglected (Bogost 2007, Ash 2012).

The procedural and narrative rhetorics of the games mentioned above expose players to, and engage them in, fundamentally different value-systems and normative environments, and necessitate entirely different problem-solving strategies. They also invite players to temporarily adopt radically different discursive positions and enable a testing of these in simulated virtual environments. I am not an acolyte of a media-panic school of thought that often seems to perceive players or spectators as powerless slaves of an all-mighty ideological machinery. However, as for instance Bogost (2007) and Schrape (2014) argue from their respective vantage points, the equally frequently adopted position that players or spectators regardless their age and background have somehow magically acquired all the skills necessary to successfully deflect any intended persuasive message or subliminal interpellation invited by digital games' procedural rhetoric and narrative devices, appears similarly naïve.

Videogames trigger multiple and often contradictory responses and most of these are difficult to measure "in the lab" as they are not the result of linear causal relationships. This, however, does not imply that indirect influences do not exist, or that they cannot be adequately understood. Their careful identification and tracing, however, requires an interdisciplinary framework that should include, but also look beyond, the cognitive neurosciences.

Interdisciplinary game studies

To avoid infertile disciplinary dichotomisations and the tiring and time-consuming scholarly trench-warfare they often entail, we need truly integrated interdisciplinary frameworks that approach the ultimately contingent object of computer games from the perspective of the human brain, game design, player communities and their various contexts of reception, and last but not least the procedural and narrative devices that systematically invite particular player responses. To enable such an integrated approach, we need large-scale research projects combining such apparently incommensurable advances as the neurosciences, psychology, social sciences, and the humanities in an inclusive framework that draws upon the methodological advantages of each discipline to avert some of the inevitable shortcomings each singular approach with necessity always will be ridden by. An integrated inter-disciplinary project group could also successfully attend to the

important task identified by Bavelier of co- developing entertaining and at the same time cognitively and indeed politically and ethically beneficial games that employ radical game design to invite for critical play along the lines suggested by for instance Flanagan (2009).

The notion of risk in connection to computer games is too often polemically reduced to media-savvy questions of violence and addiction. Partly, this is caused by a polemic media focus that again and again conflates for instance an apparent co-variance between individual school shooters and their interest in violent games with a causal relationship. There is today little evidence pointing to a measurable direct connection between playing violent computer games and actual aggression. Studies making this connection (for overviews see Anderson 2004 and Anderson, Barlett and Swing 2009) have been rightfully criticized for not sufficiently investigating the actual source of increased violent thoughts and behavior that might just as well be dependent upon other variables than the playing experience (see for instance Egenfeldt-Nielsen, Heide Smith and Pajares Tosca 2013: 266-267).

Even though games apparently do not make us violent, they still do have effects, including negative ones. Games interfere in a complex manner with individual bodies and minds and with the collective frameworks through which we constantly form and negotiate the societal structures around us (Ash 2012; Bogost 2007; Schrape 2014). However, they predominantly do so in a non-linear and non-mechanical fashion that makes it difficult to identify direct causal relationships. A comprehensive understanding of how cultural expressions, including computer games, trigger certain responses, and affect individuals, politics, and society necessitates a framework that looks beyond cause-effect mechanics and focuses on complex patterns of support and restraint that systematically invite and predispose, yet not predetermine, particular performances, attitudes, and discursive positions, and this way either play into and reinforce, or challenge and subvert, established frames of thought and practice. Within such a framework, effects of gameplay (or of any other form of cultural expression) emerge as discursive, ambiguous, contingent upon context, and the object of constant negotiation and change (Crogan 2011; Pötzsch 2011, 2014). Only closely integrated and truly multi-disciplinary research projects can adequately assess games' potential impacts in such ambiguous and constantly changing terrain.

Conclusion

Why do we play? We play because engaging in games of various kinds is an innate human faculty that serves various individual and collective purposes from strengthening social bonds and enhancing social interaction, via facilitating learning

processes, to simple relaxation. Games have always fulfilled various important functions and continue to do so. In fact, as for instance Huizinga (1949) has argued, playing games is an equally fundamental cultural activity as telling stories. All of this, of course, is also true for digital games. However, the specific affordances of digital technologies, their almost ubiquitous availability, immersive and seductive qualities, as well as increasingly sophisticated affective and persuasive design, place these applications in a peculiar position that demands sound and critical scholarly engagement from truly interdisciplinary vantage points including, yet not limited to the cognitive neurosciences.

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Notes

1. The talk is based on her previous research output (see for instance Green and Bavelier 2003, 2006) and can be accessed here: http://www.ted.com/talks/daphne_bavelier_your_brain_on_video_games#t-10041. Quotation from the website's ingress.