



Editorial

Introduction to special issue: Video games as research instruments

There is no denying the tremendous success of video games. This makes them fascinating objects of study in their own right. But in addition, it is clear that the rich variety of worlds they offer, makes them useful for research purposes as well. This is not a new idea. They have been used in research at least since the mid 90's, when Kirsh and Maglio [1] used Tetris to investigate the difference in the actions humans perform from a cognitive perspective. However, it seemed to us that recently games were being used more and more as new tools with which to carefully study people. For this reason, we ran a workshop at the ACM CHI 2009 [2] conference to explore the use of video games as research instruments. The conclusions reached in the workshop were that: video games motivate participants in a controlled experiment setting, but that there is a need for caution in the data collection and consideration of ethical issues. Following on from its success, we have brought together this special issue of *Entertainment Computing* to represent the state of the art in using video games to further wider research, rather than as a domain in themselves. This issue reflects some of the huge variety of ways in which games can help contribute to knowledge, as well as the challenges and opportunities that games offer. For this reason, we decided to accept two types of papers: research reports and technical notes. The former showcase how video games, and video game technology, are currently being used to study phenomena from different disciplines; the latter share expertise on how to use video games as tools.

The most straightforward applications for video games in research is to study the players and the factors that influence their experiences. In this issue, McMahan et al. look at the effect of the naturalness of the interaction on how players performs. They use *Mario Kart Wii* as the game but their focus of attention is on comparisons between interaction techniques. Downs and Sundar (this issue) are looking at the psychological phenomena of people associating themselves with success and dissociating themselves from failure, and whether video games provoke similar responses as those found in social situations.

Kivikangas et al. present a technical note to showcase how to collect different kinds of data, from physiological responses to qualitative data from surveys, while using videogames. Lankes and Bernhaupt (both this issue) look at people's responses in game to facial expressions but primarily as a way of investigating people's responses to other people, offering rich experimental stimuli that are not possible in more traditional psychological experiments. Lankes and Bernhaupt are looking at people's interpretation of complex social scenarios. This study could have applications for the definition of avatar behaviours in video games.

Away from studying the players themselves, the papers here show the opportunities for research in a wide variety of domains. Schofield (this issue) discusses the possibilities offered by using video games as a way of providing evidence in courtrooms. Staiano

and Calvert (this issue) consider how video games could be used to encourage and monitor adherence to exercise regimes. Smets et al. (this issue) are looking at whether it is valid to use a video game environment to evaluate a navigational aid for use in emergency incidents.

The overall message coming through the papers here is that video games are valued for their richness and complexity whilst at the same time providing an environment that can (at least sometimes) be strictly controlled. This allows researchers to combine the complexity inherent in real world situations with the need for repeatable and consistent stimuli for all participants. This can perhaps be seen in the choice of games used across these papers.

Only two papers used off-the-shelf commercial games: McMahan et al. used *Mario Kart Wii* and Downs and Sundar used *AMF Bowling 2004*. These provided real games in which to study gaming experience and the psychological effects of winning or losing, respectively. In these contexts, it is clear that using video games is necessary but even so both papers argue carefully for their choice of games for these studies.

However, almost all the other papers that undertook specific studies with games, used game engines to build the game they needed; the exceptions being Staiano and Calvert, who primarily review the range of existing exercise games that are available, and Schofield who programmed what he needed. Game engines are not games themselves but allow anyone to create games in the style of existing games. Several engines were used: Unreal, Hammer, Source SDK and CryENGINE. Here the engines offer the opportunity to build a rich environment for a scenario which can then be played out. At the same time, the fact that the environment is defined entirely within the game context gives the researcher a high degree of control of the scenario. Whilst this level of control is vital in some studies, for example, Lankes and Bernhaupt, for Schofield using the games to illustrate evidence, it perhaps offers new problems when some of the details of the scenario are essentially arbitrary and yet can be picked up on as salient by jurors.

As the use of video games as research instruments is relatively new, there are many pitfalls and challenges faced by a researcher using them. Many of the papers here are concerned with how best to use video games in research and give useful advice to other researchers. It is encouraging to note that the primary concerns are those of traditional validity in experimental work: construct, internal and ecological validity. McMahan et al. in particular provide a lot of advice on the selection of commercially available games particularly in providing the necessarily control over the game to provide good internal validity. Staiano and Calvert in looking at exercise games (exergames) as a way to monitor people's adherence to exercise regimes concern themselves extensively with the issues of construct validity: are the measures provide automatically by exergames accurate indicators of the amount

and quality of the exercise done by the player? Several of the studies are actually using video games in order to improve the ecological validity of the experimental tasks and Smets et al. are specifically concerned as to whether the video game setting has sufficient ecological validity that results from the game mean that real world trials are not necessary.

Judging by the enthusiasm, variety and quality of the papers in this special issue, using video games in more general research is likely to become increasingly common. The papers presented here cover the major questions that other researchers would need to ask: why use video games, which games, what for and how? Furthermore, with this issue we have aimed to highlight the importance of a research tool that, even though is widely available, needs to be framed within a proper methodological and experimental discussion. Thus, we hope to solidify its usage under a clear scientific perspective, as well as to motivate and even inspire future users of video games as research instruments.

References

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