

Andreas Schiffler (2011), 'New Game Physics: Added Value for Transdisciplinary Teams', Ph.D. University of Plymouth, UK.

This study focused on game physics, an area of computer game design where physics is applied in interactive computer software. The purpose of the research was a fresh analysis of game physics in order to prove that its current usage is limited and requires advancement. The investigations presented in this dissertation establish constructive principles to advance game physics design. The main premise was that transdisciplinary approaches provide significant value. The resulting designs reflected combined goals of game developers, artists and physicists and provide novel ways to incorporate physics into games. The applicability and user impact of such new game physics across several target audiences was thoroughly examined.

In order to explore the transdisciplinary nature of the premise, valid evidence was gathered using a broad range of theoretical and practical methodologies. The research established a clear definition of game physics within the context of historical, technological, practical, scientific, and artistic considerations. Game analysis, literature reviews and seminal surveys of game players, game developers and scientists were conducted. A heuristic categorization of game types was defined to create an extensive database of computer games and carry out a statistical analysis of game physics usage. Results were then combined to define core principles for the design of unconventional new game physics elements. Software implementations of several elements were developed to examine the practical feasibility of the proposed principles. This research prototype was exposed to practitioners (artists, game developers and scientists) in field studies, documented on video and subsequently analyzed to evaluate the effectiveness of the elements on the audiences.

The findings from this research demonstrated that standard game physics is a common but limited design element in computer games. It was discovered that the entertainment driven design goals of game developers interfere with the needs of educators and scientists. Game reviews exemplified the exaggerated and incorrect physics present in many commercial computer games. This "pseudo physics" was shown to have potentially undesired effects on game players. Art reviews also indicated that game physics technology remains largely inaccessible to artists. The principal conclusion drawn from this study was that the proposed new game physics advances game design and creates value by expanding the choices available to game developers and designers, enabling artists to create more scientifically robust artworks, and encouraging scientists to consider games as a viable tool for education and research. The

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practical portion generated tangible evidence that the isolated “silos” of engineering, art and science can be bridged when game physics is designed in a transdisciplinary way.

This dissertation recommends that scientific and artistic perspectives should always be considered when game physics is used in computer-based media, because significant value for a broad range of practitioners in succinctly different fields can be achieved. The study has thereby established a state of the art research into game physics, which not only offers other researchers constructive principles for future investigations, but also provides much-needed new material to address the observed discrepancies in game theory and digital media design.

Keywords: game physics, computer game design, transdisciplinary studies, digital art

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