The Transmutation of Perception: Research of Attention and Visual Guidance in the Virtual Reality Context

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Abstract

As the panoramic experience of virtual reality (VR) breaks the 'frame' of traditional film, the old audio-visual language is dissolving and a new system has not yet been established. So far, developers and researchers have not reached a conclusion about the audio-visual system in a stereoscopic, user-controlled environment, and this has already become the most urgent issue in the VR industry. In order to provide a solution, the relationship is examined between visual machine, visual mechanism, and visual attention based on visual archaeology and visual attention theory. A discussion is introduced about how films could learn from the visual attention guidance of digital games in the VR environment and to eventually build a visual attention guidance system that serves as a practical reference for creation in the future.

Context and motivation of research

Since virtual reality devices became affordable in 2016, the VR industry has achieved fundamental preparation of end-user hardware, such as the Oculus Rift and HTC Vive. Mainstream social gaming platforms like Facebook, Steam, and Sony PlayStation have all stepped into the ecosystem of VR. But as many expected and mass media predicted, the next new era

of VR dominance in digital media did not come about. After an influx of VR films and games, Facebook announced plans to shut down its AMMY-award-winning Oculus Story Studio and transfer its budget to support external projects. With this we realize there are still many problems existing in current VR films and games, such as a lack of subject, clueless narratives under the dissolution of montage, disorientation and physical discomfort in the VR environment, and so on. The main reason for this trend is that the panoramic view of VR goes beyond the traditional visual frame of films and non-VR games. Developers and researchers have still not reached a viable solution for presenting narrative in a stereoscopic, user-controlled environment.

Research objectives/goals

This research looks back at the relationship between visual machine, visual mechanism, and visual attention based on visual archaeology and visual attention theory. We suggest that digital games can serve as a reference to VR films on visual attention guidance, like films serve as a reference to digital games for constructing narrative. This analysis can eventually be used to build a visual attention guidance system in the Virtual Reality context, and serve as a practical reference for creation in the future.

Background/Literature review

Jonathan Crary in his publications about visual culture asserted that, in the context of culture and technology of modern society, the new form of vision and perception is subjective and internalized by the viewer [1]. In the late 19th century, people's way of watching was completely changed by impressionism and modernist paintings, as well as new technologies based on optical images like photography and film. The notion of 'subjective vision' was particularly strengthened by film technology focusing on the persistence of vision [1]. The visual evolution of the 19th century transformed humans into a countable, disciplinable subject. Afterward, human vision became a measurable, changeable material; the transmutation of vision and the people who are watching is the reflection of transition of the modern subject [2]. Attention became productive [3]. Therefore in a modern artificial or digital environment, attention guidance is the key factor for users to receive information efficiently. Recently a second visual evolution has been taking place through the change of screen, from the traditional frames of cinema, television, smart phones, and personal computers to IMAX, 3D, and virtual reality devices. The 'frame' is disappearing; the dismantling of its edges brings about the possibility of a panoramic environment with a user-controlled perspective. The characteristic of this new medium is fragmented, interactive, and immersive, and achieves the dimension of distance missing from traditional film [4]. The conventional audio-video language based on screens and montage is no longer effective in a VR environment because of a totally different way of watching. User-controlled cameras and the power of involvement not only made the change for audiences, but also for developers. As such, the audio-video system is evolving from a camera language to a presence language, from force-to-observe to guide-to-observe [5]. The existing storytelling model in films does not translate to a guide-to-observe system. While digital games have long adopted this model, films have not yet rationalized how to fully utilize an audience-interactive experience. As games are defined as a volunteered, time- and space-limited activity [6] wherein players participate in conflicts that are defined by human rules to produce

quantifiable results [7], many parallels can be drawn to the VR environment, such as immersion, involvement, and interaction of the subject within a specific time and limited space.

Hypothesis/Problem statement

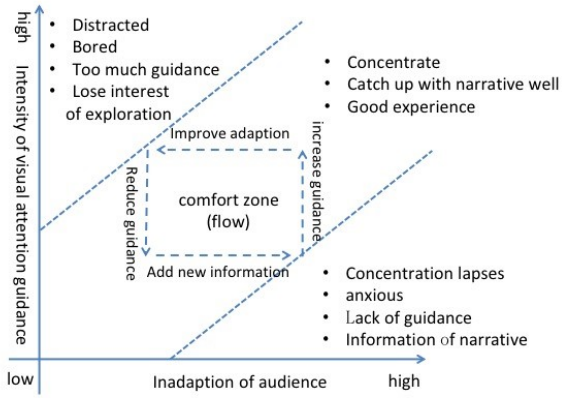
Combining the mechanisms of visual/perceptive interaction currently found in digital games, a visual attention guidance system can be built for a VR environment. As games have characteristics presently lacking in VR, *e.g.* they are immersive, interactive, promote player involvement, and take place in with limited time and space, the vision mechanism in digital games is relevant, parallel, and translatable to VR.

Research approach and methods

1. Document research method: review and analysis of academic materials.
2. Case analysis method: study, comparison, and analysis of representative VR and game works
3. Quantity analysis method: development of a visual attention guidance model in VR context, tested with various representative VR works

Results to date and their validity

A user-experience-centered visual attention guidance model is being developed and is soon to be tested for functionality in a VR environment. The model is inspired by flow theory commonly used in game-difficulty balance systems. Much research has been done on how and what kind of visual guidance from digital games can be extended to VR, but practically, the visual guidance in most current VR works is very similar. The following validity model can be used to test whether the visual guidance system really absorbs the audience/user and maintains their attention.



Dissertation status and next steps

At the end of the first year of study of PhD study, this research is still in the stages of reading and case study. The next step is to improve the validity model of visual guidance, then to perform testing on some representative VR works to validate its principles. At the same time, development will begin on some VR demos that follow the concept of this model to verify its functionality.

Current and expected contributions

I will continue work on the visual guidance model and hopefully lead to a full published paper in October. Furthermore I hope to publish 2-4 theses and 1-2 VR works about my dissertation topic by the time of the project's completion.

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