COMPARISON OF LIMITATIONS OF FILMS AND VR

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Introduction

Through the last thirty years, technology has evolved in a way to converge different media. This convergence that Negroponte has foreseen in the mid-seventies (Brand, 1987), has given new opportunities in storytelling, and messages have displayed traces of media, other than they were created. In an era in which films display characteristics of video games, magazines of web sites, many research has been initiated to use virtual reality (VR), one of the most powerful visualization tools of the present day (Wexelbalt, 1991, p.255), as a storytelling medium.

Even as it dates back to Morton Heilig's “El Cine Del Futuro” (The Future of Cinema), which conceptualizes a movie that the viewer not only sees and hears, but also may be able to smell and touch (in Biocca, Kim & Levy, 1995, p.11), there haven't been many researches on the usage of VR as a storytelling tool, except pioneering projects such as Carnegie Mellon – OZ or Stanford Virtual Theatre (e.q. Smith & Bates, 1989; Bates, 1991, 1992; Kelso ve dig?erleri, 1992; Meyer, 1995; Rousseau, 1996; Mateas, 1997) which focus on dramatic narratives or believability of the characters.

But based on Negroponte's idea of convergence, employing film language may expand the possibilities of storytelling in VR. For such a usage, first of all the limitations of film and VR should be explored to find out which elements could be employed directly and which should be adapted for the new medium.

This paper focuses on the comparison of the limitations of film and VR media, to build a foundation for an adaptation mentioned above. For this aim three research questions will be examined:

What are the limitations of film medium?
What are the limitations of VR medium?
What are the differences between the limitations of these two media?

This study assumes that film is a medium (Arnheim, 1958, p.17) and VR is a medium (Rheingold, 1991; Biocca & Levy, 1995a, p.127; 1995b, p.15; Steuer, 1995, p.33), and is based and limited with Arnheim's (1958) theory on the limitations of film, as it is the foundation of such studies, focusing only elements of film, excluding elements such as acting, sets, mise-en-scene, and script. Also design issues and qualities concerning VR have been excluded in this study. Further studies on excluded issues are always possible.

Film has been a medium that many theorists have focused on since its appearance in the late 19th century. Through many approaches, two major theories have been focused on the relation of film with reality. While the realist approach has been an advocate of films representing actual reality as it is, claiming that the illusion of film is based on reality and departing from reality leads the film to a failiure (Bazin, 1995, p.91), stating that the film is equipped to record and reveal the actual reality (Kracauer, 1985, p.8), formalists think opposite.

To the formalists, film is based on the obvious difference between the actual event and its projection on the screen, and mention that the film should depart from representing actual reality (Pudovkin, 1995, p.88).

Arnheim, building his ideas on Gestalt, embraces the formalist approach to film. According to Arnheim, film

should avoid from being the mechanical reproduction of reality (p.17). Frontiers of the Gestlat theory found that the vision does not record the surrounding environment, on the contrary, organizes the raw stimuli creatively according to the principles of simplicity, unity and balance (Koffka, 1922; Wertheimer, 1923; 1924). Based on these evidences, art is the transformation of observed realities qualities into the form of the medium, not the selection or duplication of reality, Arnheim mentions (p.12).

Besides, art psychology scholars emphasize that understanding an image is a participation to the formation process, therefore a creative action. So being exposed to a visual image, no matter what it is, is a formation, dynamic unification process, a “plastic” experience (Kepes, 1995). According to this, film may not be able to duplicate reality and the filming process turns into a creative just like the seeing process (Arnheim, 1958). This is because of the limitations of film.

1.Limitations of Film Medium

According to Arnheim (1958), these limitations that avoid film to mechanically reproduce actual reality, and differentiates film from virtual reality, a medium that senses are immersed and stimulated partially or fully by artificial stimluli and all the presentation is made according to the users point-of-view (Laurel, 1999, p.119), or simply which is an attempt to simulate reality may be listed like this:

1.1. Projection of Three Dimensional Objects on a Two Dimensional Surface:

In reality, objects are three dimensional, they have height, width and depth. But the film strip that the reality is recorded on is two dimensional. There is only the height and width. The eye senses the reality in a similar way. The light is exposed on a two dimensional retina. But the difference stands on the stereoscopy of the seeing process. While a direct projection of a cube may result as a square (as the front surface hides the other aspects of the cube) on filming process, even this projection will be same on one eye, but the other eye, as it sees from an other angle and the perception will be a synthesis of both eyes, hence the seeing will be stereoscopic. So the filming process is limited with one point of view.

1.2. Loss of the Sense of Depth:

Because of the stereoscopic sensing, there is a certain perception of depth in seeing (Bruce et.al., 1996, p.137) but the (traditional) film camera has only one lens, so capturing the depth cues similar to human seeing in not possible. This leads filmmakers to employ different techniques to close the gap, and differs from reality, which exposes a depth effect that is not fully two dimensional nor three (Arnheim, 1958, p.28). This is because the film camera is limited to record with one lens.

1.3. Lighting and Absence of Color:

Even absence of color has disappeared with the invention of color film, lighting is still a differentiating factor between actual reality and film. Lighting as an important factor in the reproduction in film (Arnheim, 1958, p.22), appears in film for many reasons. To Millerson (1990, p.182), lighting is used in film and television, aside of making objects visible, it is also used in an artistic manner to create a meaning on time and space (p.183) and mood. Orientating factors, as Zettl (1999) classifies the means of lighting, affects how the viewer perceives (outer orientation factors) and feels about (inner orientation factors) the on-screen events.

Whether technical or artistic, lighting is crucial, thus a differentiating factor in film.

1.4. Framing and Distance from Objects:

Even the sight of human is limited, there isn't rigid borders, and that differentiates film from actual seeing process (Arnheim, 1958, p.23). This is caused from the continuous movement of the human eye. This limitation creates the concept of framing. From its very beginning, any kind of representation required a limitation of the surface used, even if not very obvious. But in time, starting from Renaissance and especially with the introduction of photography, these limits started to appear very rigid (see Gombrich, 1986). With photography, the artist faces new limitations on the borders of the surface – as these borders are predefined, and has to explore new methods of organizing the image.

This organizational decisions in image creations lead the artist to place the camera in order to capture the

best meaning, hence defining the shots and angles. Via images captured through a camera, the viewer is now able look “at” and/or “into” an event (Zettl, 199, p.186). This also varies from real life. In reality an observer has to go to the event, while the event comes to the viewer via the camera. This is also exposes framing and distance to objects as a differentiating factor.

1.5. Discontinuity of Time and Space:

As Einstein mentions in his masterpiece, the Relativity Theory (2001), the universe is four dimensional: as the width, length, depth, and as time a the fourth. In reality, with our recent knowledge, jumps in time and space is not possible. But film enables the viewer to pass through times and spaces (Arnheim, 1958, p.26), via editing. As Montagu (1994, p.157) mentions, film is built from portions of time and this enables the filmmaker to establish, demolish and deconstruct a film time. To mention, this process will not disturb the viewer, only when it is founded on some principles (Arijon, 1995; Sokolov, 1995; Zettl 1998, etc.). This discontinuity is an important and significant difference between film and reality.

1.6. Absence of Senses other than Seeing (and Hearing):

Human beings perceive the surroundings via their senses. While there are seven senses (visual, hearing, touching, tasting, smelling, and, vestibular and kinesthetic senses), film in traditional sense, is only able to project two: seeing and hearing. This is also a very obvious and significant difference between film and reality, leading the filmmaker to give information regarding other senses via audio-visual messages. Also referring the first item above, these all stimuli is given from a certain and/or limited point of view.

All the limitations above lead the film to create a language specifically appeared for its own, hence all the techniques and principles of storytelling in film. (For further information: Spottiswoode, 1973 and Arnheim, 1958)

2.Limitations of VR Medium

Virtual Reality (VR) is defined by Heim (1993) based on the words' literal meanings: virtual as something designed in mind but not actually exists, and reality as everything that exists. So virtual reality is a reality designed in mind, or something that's affect is real but itself isn't. This is based on capturing reality via illusion (Rheingold, 1991). Lanier (1988) mentions that VR is just involved in how and what senses perceive, as human gather information about their surroundings via their senses.

VR, from this standpoint, tries the user's brian to perceive an artificial surrounding by stimulating the senses with artificial stimuli. Even most of the media try to do the same thing, VR has an extra effort. To Biocca, Kim & Levy (1995, p.7)

> “...the dream of the 'ultimate display' accompanies the creation of almost every iconic communication medium ever invented. There are two aspects of this dream, and Vr shares these with older iconic media like painting, photography, film, and television. The drive powering the creation of many of these media has included (a) the search for the essential copy, and (b) the ancient desire for physical transcendence, escape from the confines of the physical world.”

Even identified with the technologies developed to cope this dream, the technology isn't enough to define VR (Steuer, 1995, p.35). Heim (1993) states that the main qualities; simulation, interactivity, artificiality, immersion, and, telepresence, as the foundations of a definition of VR. These qualities also reflect the limitations of VR.

The limitations are also about the system used. Even there are many VR systems, varying from desktop system to simulators, immersive virtual reality systems will be taken in account here, as it is the ultimate system available, at the moment. Immersive virtual reality systems are based on the immersion of sight, hearing and touching; producing artificial stimuli, responsive to the interaction of the user.

The limitations of VR will be discussed furthermore in this paper, in comparison with the limitations of film, taking the Arnheim's statements as a base.

2.1. Projection of Three Dimensional Objects on a Two Dimensional Surface:
Even the screens inside goggles used in VR are two dimensional and have borders, as the images are created in response to the viewers point of view, the vision seems to have no borders.

2.2. Loss of the Sense of Depth:
As virtual reality systems immerse both eyes, and ears with stereo artificial stimuli, there is a certain feeling of depth. The interactive viewpoint also an element that augments the sense of depth, as changes in the viewpoint lets the user to gather further information on the dimensions and forms of objects.

2.3. Lighting and Absence of Color:
As virtual environments are absolutely artificial, anything inside these environments are created from scratch, including the light. As any light is created by the designer, a lighting process, artistic or not, is crucial.

2.4. Framing and Distance from Objects:
Framing and distance to an object are based on the viewers point of view, as mentioned in the first item, as the point of view is interactive. If a user turns his head, or moves to an object, the framing and distance to an object changes.

2.5. Discontinuity of Time and Space:
As time and space should be continuous in reality, it should remain same in virtual reality as it may disturb the perception. In most VR systems, such jumping is made through introductory elements.

2.6. Absence of Senses other than Seeing (and Hearing):
In VR systems, stimuli could be produced for most of the senses. Even it is hard to produce stimuli for tasting, recently stimuli for seeing, hearing, touching, smelling, vestibular and kinesthetic senses are being produced. (for further information and examples Konrot, 2002)

3. Comparison of Limitations of Film and VR
To make a comparison, again the foundation will be Arnheim's classification.

3.1.Illusion of Three Dimension and Depth: Effect of Lenses, Focus and Depth:
While there is a significant difference in creating the illusion of three dimension in film and VR, there is a similarity in creating the sense of depth. The perspective and focus (or depth-of-field) can be used in a similar way in VR, as it is used in film. The expansion of wide angle lenses, and contraction of narrow angle lenses can be used to gain different affects while depth-of-field can be used as a focusing factor, even the point of view changes.

As an example; a long and wide, empty desert can be created with a wider perspective distribution, and a man that is going to talk to the user appears, anything else can be blurred to gain the users focus.

3.2. Limitation of the Image and Distance from the Object: Camera Angles, Shots, Composition and Camera Movement:
Since the camera movement is not possible in VR, due to the interactive point-of-view, it will not be able to benefit from its storytelling aspects. But as anything else could be manipulated, the camera movement can be subsidized by a composition that involves the needed movement embedded. Also angles and shots, which are not possible in VR due to interactivity could be used through a similar composition.

For instance, if the same man, described in the previous example, should be seen in a close-up, and the user turns his head, hence the point-of-view, the man could be programmed to move in a sense to keep the frame in close-up.

3.3. Lighting:
As lighting is similar in film and VR, it could be used in the same way, even augmented, in VR as it is used in film.

The desert scene described above could be lighted much more artistic than reality, and still feel real.

3.4. Continuity in Time and Space: Editing and Film Speed:
Even if editing may not be so possible, or flexible in VR, changes in time, speed and places could be possible through usage of effects seem like real.

Rapid cuts between the images, however may be used only if the user is put in an environment as something like a film viewer, inside a 360° spherical film screen.

To give an example, the man that appears in the desert may say that he is going to take the user to an other place, and suddenly the earth beneath their feet can start scrolling and the time could pass away faster than real. The same affect could be gained through slight dissolves in the images, similar to film.

3.5. Stimulated Senses:
Beside the surround vision and sound, the user could be stimulated by touches, smells, and responses in vestibular and kinesthetic forms.

The man in the desert can take the user to the Gardens of Eden, where suddenly the system can emit scents of flowers. Also the user can put his hands on a peacock, feeling it through artificial tactile stimuli. Also as when he turns his head or moves, the produced image will change accordingly so his vestibular and kinesthetic senses won't fall in a gap.

Conclusion
As briefly examined and discussed above, elements of film language could be adapted in to VR in order to create an ultimate storytelling experience. Further studies could and should be made on storytelling aspects, such as interactive scripts, characters and sets, and mainly in technology, to make this kind of storytelling possible and feasible. These studies and applications will hopefully lead the stories in to “films the viewer experiences”.

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