Visual-Narrative and Virtual Reality

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Abstract

This paper explores the relationship between the image and the narrative in virtual reality (VR) environments. It addresses three main issues; how we engage in images, how the VR technology can enhance this engagement and how narratives can maintain this engagement. We present an initial investigation into the development of a visual-narrative model to increase immersion and engagement in a VR environment and discuss the state of the art VR technology being developed by the Benogo project. Additionally, we propose a three-part study to elicit a set of design requirements to support the development of this visual-narrative model and report the initial stages of this study.

Introduction

Images and the art of storytelling have a very long and intertwined history. In fact, more than 30,000 years ago, man was creating immersive environments by using images on cave walls to tell stories and transport the viewer into other worlds. These cave images not only tell us more about the lives of these people but also they are examples of *'virtual environments of the earliest known form of human expression'* ("Through the looking glass", 2000). Today we are living in a world where many forms of knowledge and entertainment are visually constructed and after centuries of 'word' dominance, we are finally realizing that *'what we see is as important, if not more so than what we hear or read'* (Rose, 2001, p.1). This new post-linguistic and post-semiotic rediscovery of the picture (Mitchell, 1994, p.16) brings with it many new visualizing technologies which are steadily taking the place of written texts as a new exciting means of communication and storytelling.

Virtual reality is one of these new and fascinating visual media. In this paper, we are exploring the notion of applying a narrative framework to images in a virtual environment. We claim that the creation of a visual-narrative in a VR environment will help generate a more immersive and engaging experience. We present a theoretical model for the development of a visual-narrative and propose a three-part study using the latest state of the art Benogo VR technology to elicit a set of requirements to support this model. We report the initial stages of this study.

How Do We Engage In Images?

Using the image to communicate is the nearest we can get to the true nature of reality (Dondis, 1973, p.2). Since prehistoric cave paintings, humans have used the image to deliver their message to the world. And regardless of the fact, that over time, the image has evolved, first into the pictogram and then in turn into the alphabet, (which subsequently has seen the ascendancy of the word in terms of a communicative tool), we are still, today, using images as a primary source of information and communication (Hugo, 1996, p.4). In fact, we are now, more so than any other era, living in a world of images and we are surrounded by different sorts of visual technologies and media. As Nicolas Mirzoeff describes: *'Visual technology is any form of apparatus designed either to be looked at or to enhance natural vision from oil painting to television and the Internet*' (1998, p.3).

It is through this developing technology that we are slowly beginning to realize once again the true values of the image. The new age in communication technology makes evident what has been known and understood about images since they were first created (Lester, 1994-1996). We are beginning to appreciate the whole concept of the 'spectator', the action of looking, glancing, gazing and observing, as an alternative way of reading and understanding information. We are realizing that even though a visual rhetoric can inform literature, it can also exist on its own and is not dependent on incorporating a literary component.

But how do we engage in images? What does it mean to read an image? All images can report information and ideas and *'visual literacy allows the viewer to gather information and ideas contained in the image, place them in context and determine whether they are valid'* (Thibault and Walbert, 2003, p.1). But in more detail, when reading an image, we must firstly examine the image and then try to distinguish the composing parts that build the image, for example, the form of the image - dot, line, color, shape, light, texture, the subject matter, the medium and the context. After that, it is a case of interpreting, thinking about and understanding what we see and then perhaps connecting a judgment.

For effective visual communication, the image must have both 'strength and clarity' (Altengarten, 2002, p.1). The term 'strength' concerns the ability of the image to attract the viewers attention and the term 'clarity' refers to the ability of the image to keep the viewers interest. According to Csikszentmihalyi, for attention to be attracted to the object a whole other set of conditions are needed, in the sense that the object must contain a set of visual challenges that engage the interpretative skills of the beholder and the environment must encourage a centering of attention on the object and a screening out of distractions (1990, p.18-19). For example, when one reads a book for pleasure, the reader experiences an unforced concentration that transports them to another place (Nell, 1988, p.1). The reader is drawn into the world of the book and this in many

ways screens out the real world and its distractions.

In the visual experience, there is a difference between passive reception and active perceiving (Arnheim, 1969, p.14). As we look around a room, everything we see is there without having to do anything to produce it. We receive this information passively, its just exists but when we start to be attracted to certain objects and to want more information, then we become actively involved.

John Berger claims that *'we never look at just one thing; we are always looking at the relation between things and ourselves*' (1977, p.9). Whenever we try to make sense of information visually, we firstly see the similarities and the differences. These relationships permit us to not only identify objects but also to give them meaning. As soon as we have an understanding of the relationship between elements, we can stitch together the whole story and understand what we are seeing (Wroblewski, 2003, p.1). As Graham Coulter Smith points out *'visual-narrative does not depend upon art incorporating a literary component, but that the rhetoric of visuality offers a complexity and sophistication that can inform literature'* (2000, p.105). Once we know the basic ways to visually distinguish objects (for example color, line, texture, shape, direction and size), we can concentrate on the bigger picture and use the visual relationships to tell a coherent story. Elements within a visual narrative are organized in a logical ordering, which can be described as a visual hierarchy (Wroblewski, 2003, p.2).

To build effective visual hierarchies, we use visual relationships to add or subtract visual weight to image elements and thereby establish a pattern of movement through the whole picture. Visual weight can be measured by the extent to which an image element demands our attention or maintains our interest. Generally, a centre of attention attracts the viewer's attention and this attention is kept by creating focal points that compel the viewer to look at them. Focal points have a strong attentive value and they help form the parts that glue the story together. However, it is important to point out '*that a better understanding and mastery of visual communication requires not only this ability to read images but also a thorough understanding of the nature of these new visual technologies and media and their codes and conventions'* (Hugo, 1996, p.4).

How Does The VR Technology Enhance Engagement?

Virtual Reality is predominantly an image environment, (Lister, Dovey, Giddings, Grant, and Kelly, 2003, p.35). It is a visual technology (Bates, 1991, p.3), which allows for the communication of ideas (Sherman and Craig, 1995, p.2). However, in order for it to join the cinema and television as a successful artistic medium, it needs to have its own language with which to communicate more effectively. The problem is that virtual reality is a relatively new medium and, as such, has not developed its language (Sherman, 1995, p.3). The structure is still largely missing for virtual reality work (Bates, 1991, p.3): *'Virtual reality has no firmly settled institutional pattern of distribution, exhibition or use'* (Lister et al., 2003, p. 108). To achieve this structure and to understand form in any art, we must be familiar with the medium (Bordwell and Kirsten, 1990, p.126) and of course, any study of one medium helps us to understand all others (McLuhan cited in Sherman et al, 1995, p.3).

A virtual reality environment can be defined as *'a computer generated three-dimensional landscape in which we would experience an expansion of our physical and sensory powers*' (Ryan, 2001, p.1). Through the use of certain virtual reality technologies, one can interact physically with the environment but also recent Image Based Rendering (IBR) virtual reality research (Benogo project) shows potential to visually explore, visually engage and visually immerse in these environments. In fact, *'virtual reality has a long history of immersive images… the search for illusionary visual space can be traced back to antiquity'* (Grau, 2003). It is about trying to trick the viewer into believing they are in the same space as what they are seeing.

When we look to the successful visual medium of cinema, we can get a clearer understanding of the foundations of the virtual reality phenomenon. In fact, like virtual reality, *'early cinema based itself on its ability to show something, it solicits spectator attention, inciting visual curiosity and supplying pleasure through an exciting spectacle'* (Elsaesser, 1990, p.58). When we look carefully, we can begin to see '*the clarity and seduction of cinema's visual imagery and the immersion of its viewers against which emerging and potential virtual reality experiences are measured …cinema is a key factor in virtual reality's remediation'* (Lister et al, 1995, P. 136). Nevertheless, as much as it is important to identify these common characteristics and establish certain foundations, it is also essential to determine what characteristics of virtual reality that makes it different from other media: *'Today we still approach new digital media in terms of "old" ways of thinking – even the seemingly most revolutionary new media, such as multimedia CD-ROMs, the World Wide Web and virtual reality (VR)… It isn't conceived with digital media in mind and doesn't exploit the special qualities of digital media'* (Holtzman, 1998, p. 13).

Above all, Virtual reality is an immersive, interactive and self-controlling/creating experience which appeals to all the senses simultaneously. Even though primarily the visual, the aural and tactile senses are also engaged (Lister et al., 1995, p.35). It is often described as *'the last gasp of renaissance space where the images are no longer artifacts that we look at but environments that we inhabit'* (Morse cited in Lister et al., 2003, p.125). We do not stare or gaze; rather we glance here and there at various

manifestations of the media (Bolter, 2000, p.81). It is like immersing/entering oneself in the image space (Grau, 2003 p. 7) similar to jumping into a television or passing through the cinema screen into the image. The technologies employed by virtual reality, (for example head mounted display [HMD] or glove etc.) are more or less worn by the viewer as extensions of their visual and tactile senses. Yet even though the five senses may be immersed in a virtual world, the physical body always maintains its presence in the actual world and at the best of times, this can cause confusion and often a break in the immersive experience. Nevertheless, when we experience a VR environment we experience it directly; we are in the environment and our actions determine what type of experience we have.

In virtual reality everything is in real time. The images are in motion but their sequence is in the control of the user who has the role of both the character and the narrator. In other words, the outward structure of the story depends on the choices of the user inside the story and hence by making these choices they play an important role in how the story is both received and delivered.

'I was fascinated with being both in the picture and having control over it.' (Morse, 1998, p.182). It is this type of experience, which leads to a new kind of relationship between spectators and images. It gives us a new visual perspective with spatial depth and temporal continuity and holds perceptual opportunities, which have the potential to give the user a set of convincing experiences (Fencott and Isdale, 1999, p.4). As Marsh and Peter state *'performing activities within three dimensional virtual space has the potential to induce a unique experience in participants'* (2000, p.1). We are not looking through something anymore; we are immersed in a new environment looking at the image and we are actively involved in a responsive visual exploration of an environment. As Margaret Morse says '*the allure of this cyberspace was the impression that it was responsive to me, as if my gaze itself were creating (or performing) this world'* (1998, p.182). Through this exploration, the user can create their own individual story. In that sense the virtual reality environment and the perceiver depend on one another. *''The filmmaker says 'look I'll show you' the space maker says 'here I'll help you discover' ''* (Rheingold, 1991, cited in Bolter and Grushin, 2000, pg 162).

In order to encourage this exploration and sense of discovery, the virtual reality system like other artworks needs to be patterned and structured: *'It needs to have a form and content, which catches and holds the user's attention and absorbs the user in the illusion of interacting in the three dimensional space ...'* (Marsh and Peter , 2000, p.1). It needs to provide organized elements or sets of elements, which will maintain our attention while at the same time draws it away from the artificiality of the system: '*Without the artworks prompting, we could not start or maintain the process; without our playing along and picking up the cues, the artwork remains only an artifact'* (Bordwell and Kirsten, 1990, p.34). However it is one task to identify and create cues, but it is another to link and structure the cues so that the user is attentive and immersed for a substantial period of time. To do this, *'we need to balance the interaction (exploration) with an ability to guide the user, while at the same time maintaining a sense of pacing or flow through the experience'* (Galyean, 1995,p.1).

How Can Narrative Maintain Engagement?

Stories have been described as 'innumerable' (Louchart, 2002, p.4), they are present in many different forms and are such *'a pervasive aspect of our environment that we sometimes forget that they provide the initial and continuing means for shaping our experience'* (Pradl, 2000, p.1). To tell a story, we need to assemble information into a coherent structure. As Mary Devereaux states: *'when we read novels, we read them as if the text is organized in a certain way. We read it as organized so as to allow us to ask certain questions'* (2004). This coherent structure is known as the narrative, *'while the story is the irreducible substance [A meets B, something happens, order returns], the narrative is the way the story is related [once upon a time there was a princess]'* (Fiske et al cited in Wilson, 2004). Narrative is the means of organizing and understanding information … '*it is the organization of experience, which draws together many aspects of our spatial, temporal and causal perception….'* (Branigan, 1992, p.4).

To date, a great deal of investigation has focused on trying to understand how recurring elements and themes can make up a set of universal patterns that determine the form of a story. In fact, researchers have found that 'certain underlying narrative structures remain constant, despite the apparently endless diversity of story form and content' (Pradl, 2000, p.2). In his 'Morphology of the Folktale', Vladimir Propp compared the structure of over one hundred Russian fairy tales and identified many common themes, that he then isolated into 31 functions, of which 25 were constant. Even though he established that not all of these functions could appear in the same single tale, he maintained that those that did always appeared in the same identical order. From this work, he further suggested the structure of the Russian fairy tale as a seven part model and claimed that the tale usually began with some sort of initial situation (1968, p.25) from which a number of sections consecutively resulted. For example the initial build-up was followed by the preparatory section which provided essential narrative information which, in turn, was manipulated by the complication section. This section and the following donor section, he

suggested, seem to call for deeper understanding and then action. After this action section, the tale continues by either moving into a second move section or into the repeat section.

Other narratologists, like Roland Barthes and Tzvetan Todorov, also investigated new ways to look at how narratives are constructed, … 'the ways in which details of various kinds in a novel are organized to produce effects of suspense, characters, plot sequences and thematic and symbolic patterns' (Genette, 1980, p.8). Todorov suggested that narrative in its most basic form is a causal "transformation" of a situation through five stages; the first a state of equilibrium at the onset, then a disruption of equilibrium by some action, followed a recognition that there has been a disruption and an attempt to repair the disruption, then finally a reinstatement of the initial equilibrium (Branigan, 1992, p.4). He claimed that narrative was not a linear structure but a circular one and that the narrative was driven by attempts to restore equilibrium.

Roland Barthes, on the other hand, proposed a hierarchical approach. He felt that 'to read a narrative is not merely to move from one world to the next, it is also to move from one level to the next' (1977, p16-17). In his early work, he described narratives as a hierarchy of instances and he identified three levels -functions, actions and narration: narration on the top level, actions in the middle and functions on the bottom. A function is the smallest unit of narrative and only holds meaning in so far as it combines with the other units, on the same level or on a higher level. In other words 'the essence of the function is so to speak the seed that it sows, planting an element that will come to fruition later, either on the same level or elsewhere or another level' (Barthes, 1977, p.89).

He divided the functions level into two major classes, distributional units for example functions, basically actions and events which unfold in a horizontal axis and the integrational units for example indices which are more vertical and diffuse and provide information about atmosphere, character, time and place. Within these, he subdivided the functions into 'cardinal functions' nuclei and catalyzers. He described the nuclei as key points, hinge moments in a narrative and catalysers, which are smaller supporting actions that fill out a narrative. He subdivided the indices into indices and informants which can be described as ready-made knowledge, the indices are open to interpretation while the informants are more concrete. He claimed that all these units could possibly interact together or combines with the higher levels (actions and narration) to form a narrative structure. Roland Barthes spent many years investigating these codes and how narratives are constructed and all his findings fed into and strengthened his belief that *'there must be an universal model to which any story must refer'* (Barthes cited in Louchart, 2002, p.3).

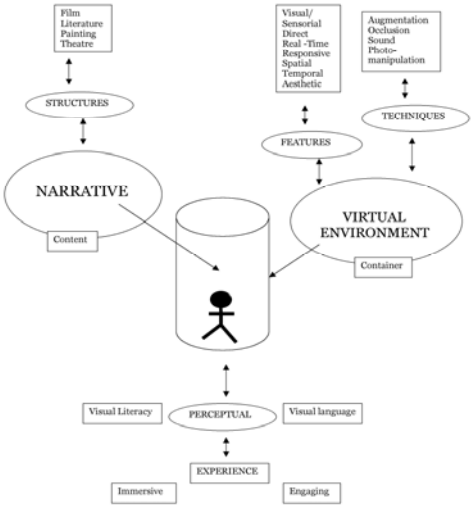
To a certain extent, this is true, as particularly today, we are seeing more and more narratives being transposed from one form to another e.g., book to film to computer game, *'the narrative component of a narrative text, can be studied without reference to the medium in which it occurs'* (Prince, 1997). Yet at the same time, it is important to bear in mind that as media and technologies change and develop, their relationship to and dependence on narratives also changes. As Janet H. Murray states, *'in a novel, simultaneous actions are presented consecutively… in a film /TV show we can cut back and forth between several simultaneous events during a brief sequence or between two or three narrative threads over a longer time… on a computer we can lay out all the simultaneous actions in one grid and then allow the interactor to navigate among them… we can have the expansiveness of the novel with the rapid intercutting of the film'* (Murray, 2000, p.157).

"Film is essentially a 'storytelling' art" (Robert Richardson cited in Scott, 1975, p.167). The viewer experiences a sequential narrative. They watch the film, pick up cues, recall information, feel either curiosity, suspense and/or surprise and then anticipates what will follow. It generally evolves from a chain of cause and effect events occurring in time and space that are in the total control of the filmmaker. Yet as Bordwell and Kirsten point out, the films use of narrative form cannot be studied apart from the film style – mise en mise, cinematography, editing, and sound (1990,p.126). Both of these factors attribute unity to the film so in that sense are interdependent on each other. And in many ways, the same is true for the medium of Virtual reality where a narrative emerges from the user's experience of the virtual reality environment, the medium and the narrative are intricately dependent on one another.

Developing a Visual-Narrative Model

'Stories live in and are influenced by their container, the medium of their telling' (Barry, 2000). When we follow Barbara Barry's train of thought, the virtual reality environment can be seen as the container that influences the reading of the content. The content is the narrative and, in this case, as it is contained in a visual technology, we are suggesting that it is primarily a visual-narrative. A visual-narrative can simply be described as pictures that tell a story. These are pictures interwoven with a narrative intent, but which do not depend on a literary component, i.e., they can be read on their own terms, rather than being over shadowed by the word. In order to maximize this 'reading' and to create an engaging and a more meaningful experience, it is important to ensure that this content/container relationship has a coherent and balanced structure (see Figure 1).

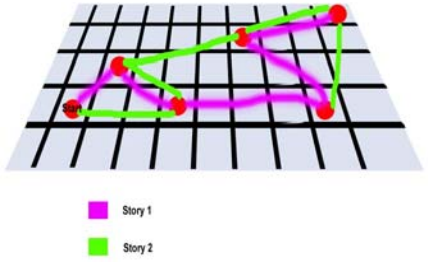
Figure 1
Proposed Mapping of Content/Container Relationship



By this we mean a balance between the user's exploration of the content and then the container's ability to support this exploration and to provide guidance without breaking a sense of flow through the experience. To attempt this, it is important to understand how the components of both the content and the container fit and work together. And secondly, we must gauge in what ways they then engage with the person experiencing the environment.

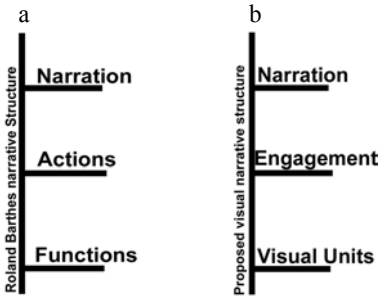
Janet Murray suggests that a kaleidoscopic structure (see figure 2) has many possibilities for narrative in a VR environment, e.g., a grid-like structure where the user freely navigates and randomly links elements to form a story (2000, p.170). Each user experiences the same environment but creates a different story depending on the choices they make and the paths they take in the environment.

Figure 2
Grid-like structure



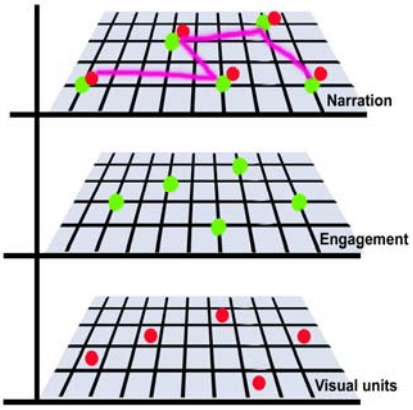
Similarly, we envision a structure in which a narrative freely emerges from the users experience in the environment. Yet in order to maintain the user's attention, a certain degree of structure and constraint is required. The narratologist Roland Barthes (1977) described a literary narrative structure as a hierarchy of instances and he identified three levels– functions, actions and narration (see figure 3a).

Figure 3
Three Level Structures



Likewise, we suggest a three level structure– visual units, engagement and narration (see figure 3b). The bottom level is similar to Barthes' 'functions level' where the most basic components of the narrative exist. These will be the visual elements that people notice in an environment and they will be dispersed in a random grid-like fashion within the environment (see figure 4). The middle level is slightly different to his 'actions level' in that the focus is more on character/viewers engagement rather than on action - the emphasis being on visual engagement as opposed to physical action. The top level is fundamentally different to Barthes' 'narration level' in the sense that the main character/viewer and narrator are the same person. Hence the viewer not only plays a leading character role by engaging visually in the virtual reality environment but also creates the narrative by randomly looking around the space and connecting the various visual units together.

Figure 4
Proposed Visual Narrative Model



Method

To develop this structure, it will be necessary to conduct a number of separate yet interrelated studies. The initial study, reported in this paper, is proposed

to strengthen our understanding of how we engage in images. It uses the Benogo 'Place Probe' - a reliable means of identifying aspects and features of the environments that are attracting the attention of the viewers. But more importantly, it is a method that supports a greater understanding of why these elements are being noticed. This study highlights certain design requirements that will help to form the basic units of the visual-narrative and, at the same time, feed back into the overall model.

The next group of studies will be designed to identify ways in which the technology can strengthen the visual units and make them more interesting and engaging to the viewer. The VR technology (particularly IBR technology) affords many ways with which visual engagement might be enhanced i.e. augmentation, occlusion, image distortion, sound etc. The objective of these studies will be to investigate these characteristics of the technology and then again to identify certain requirements which can be incorporated into the visual-narrative model.

The final set of studies explores how narrative can maintain this engagement. It proposes to build an understanding of the relationship between the different visual units i.e. how they interlock with one another to build an open-form narrative to support immersive and engaging experiences. And once again to feed this back into the model.

Initial Study– Identifying Visual Features

The initial stages of this study are related to the Benogo project, which is part of the newly funded European Union initiative for researching Presence. It comprises of six academic institutions from Europe and Israel. Benogo is concerned with developing photorealistic virtual environments using image based rendering technology (IBR) and in doing so investigating the experience of 'being there'.

IBR is a rendering method, which loosely refers to techniques that generate new images from other images instead of from geometric forms. For most standard IBR, it is necessary to have in storage an image for every possible view/angle of an object or space. As a result the storage load is huge and the image acquisition is very tedious. Benogo IBR introduces a new projection model – the X-Slit Camera which uses much simpler image data and reduces storage and computation needs (Bakstein and Pajdla, 2004). The main advantage of IBR and particularly Benogo IBR is the realistic nature of the resulting images without any need for three dimensional computing. It adds mobility (ego motion) and appropriate sensory responses to an experience and it also allows for augmentation, which can attract the user's attention by adding, hiding or occluding objects in the environment. In general, it offers the virtual reality designer control in the design of visual engagement by encouraging targeted visual exploration.

For the purpose of this paper, the study proposes to identify a set of design requirements, which will support the formation of the basic narrative units and hence encourage an understanding of how we engage in images. It will focus on the Benogo IBR virtual environment of a viewpoint in Prague (see Figure 5), which was administered in Aalborg, Denmark in March 2004. At this stage, it is important to emphasize that this viewpoint environment is non-narrative. Participants are identifying reoccurring visual features yet there is no planned narrative framework connecting them. It is a monstration as opposed to a narration. Monstration is a word used by Thomas Elsaesser to describe early films where the emphasis was more on inciting a visual curiosity through an exciting spectacle – a unique event as opposed to a number of different events structured into a story (1990, p.59).

The study involved a mixed group of twenty-nine participants of sexes, various backgrounds and whose ages varied between twenty to fifty-five years. It utilizes a measurement questionnaire known as the 'Place Probe' (O'Neil, McCall, Smyth, Benyon, 2004). This measurement tool was developed by the Benogo team at Napier University, Edinburgh and even though it is still in the early design stages, it proved successful in highlighting the key features that people were noticing in each environment. Hence for the advantage of the Benogo study, it helped in identifying data that was missing from any experience of the virtual environment when compared to the real.

Figure 5
Virtual View of Prague Environment
(Used with permission of Benogo Project)

Results

The 'Place probe' encompasses a variety of data capture methods e.g. visitor's book, three features, sketch maps, semantic differentials, sounds, photographs and six words (McCall et al., 2004b). These proved successful in highlighting a range of reoccurring visual features that the participants tended to notice and experience in the IBR virtual environment. For example, it is clear from the findings that the participants seemed to identify the church, castle, city and statue as the most noticeable

features in the environment [the statue/sculpture was most frequently noted (15 times), then the church (11 times) and the castle (8 times)]. The probe also shows that the majority of participants found the environment quite attractive (52%), quite pleasant (55%), quite interesting (38%), quite permanent (28%) and quite relaxing (38%) with emerging themes such as peaceful/relaxing, weather, Mediterranean, beautiful, sounds, interesting, realistic, natural and viewpoint.

From the data, we can see that the participants are beginning to contrive a sense of 'holiday' from the experience. Why? This could be the result of a number of different factors, but from the 'place probe' findings, it strongly suggests that the participants are reading and connecting various visual cues such as the sunshine, and the architecture, (i.e., church, castle, statue) . These cues are triggering certain holiday feelings, personal experiences and emotions and are causing a number of the participants to assume the environment to be located in the south of Europe /Mediterranean. This occurred several times throughout the study, even though all participants were unaware of the exact location of the environment.

'But I really felt like a tourist…because it was a new place for me…the weather' (Danish, female, 24)

'Maybe the city was located in the southern Europe and looked a bit old' (Danish, male, 25)

'The view was from a hill overlooking a city in southern Europe on a sunny day' (Danish, male, 24)

The data also shows that certain occurrences due to flaws in the IBR system are also capturing participant's attention. As the technology is still in its infancy, certain breaks in the images occur when one moves out of the region of exploration. Also, there is no vertical parallax when one tries to look over something. These occur in the form of black spots, which are totally out of place in the environment. Similarly, due to poor resolution, certain objects in the environment are, at times, not very clear. However, the interesting fact is that participants are noticing these and then they are building up reasons/stories to explain why these occurrences are happening. For example:

'I think this brown big thing nearby was a bear' (Danish, female, 37)

'A black spot, which looked like some kind of industrial' (Danish, female, 20)

Likewise, there is a shadow of the photographer's tripod which is unintentionally evident in the VR environment. The reason for this is that it took some time to capture all the required images for the virtual environment and being an outdoor environment there was no control over the lighting. Nevertheless, one participant who was prompted by the shadow of the tripod at her feet suggested a role of a photographer to explain its unusual presence:

'I was a photographer maybe? Because of the shadows.' (Danish, Female, 24).

Discussion

In summary, the Benogo 'Place Probe' allows us to identify and gain a greater understanding about what the participants are noticing in the environments and why? For example from the data obtained it seems to show that '*Attention is automatically triggered by more or less anything that stands out against its background either because it is unusual, emotionally salient (a familiar face, say) or exceptionally 'noisy' (e.g. it excites sensory neurons by its color, motion or size).*'(Carter, 2002, p.150)

The 'Place Probe' has proved successful in identifying the key visual units in the IBR environment. More importantly, it has identified certain elements that are necessary to attract attention, i.e., something unusual or emotionally salient. For example, the data shows that the participant's attention is triggered by images that elicit a holiday feeling, by black, noisy spots of color and finally by something unusual and foreign to the environment such as the shadow of a tripod. This gives us insight into the potential of combining different visual elements to elicit certain feelings and impressions and also shows how foreign or unusual additions to the environment can engage and guide people into a certain mode of thinking

Conclusion

From the outset of this paper, we have explored the concepts of the image, the narrative and the VR environment. We have conducted research in the direction of a general framework for a visual-narrative in VR. And at this level, we have proposed and outlined a three-part study for the building of this framework. The initial study, reported here, allows us to delimit a range of variables that will support our understanding of how we engage in images. It also provides us with a well-founded basis for the next stage in the study, which concerns the investigation into how the technology can be implemented to ensure these visual elements are more interesting and engaging. This in turn, will feed into the overall design of the visual-narrative model, whose main objective is to provide design and technology guidance for the particular ease of building engaging VR environments.

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