

# **Presence as Experience: Framework to Assess Virtual Corpsing'**

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## **Abstract**

Experiences and the activities that provide them are associated with the virtual places where they were encountered. Conversely, we associate a virtual place - that we have visited - with experiences where they occurred and this will enforce the illusion of having been somewhere in another environment other than where the mediating system resides (e.g. home, lab). In short, experiences encountered in virtual places (i.e. context of use: spaces within 3D computer mediated environments) provide a sense of having been present somewhere else. Hence, finding ways to capture user experience may provide an alternative and indirect way to assess presence. This paper is divided in two parts. Firstly, informed from film it describes the background work towards the development of a framework of potential experiences that may be induced in users of a variety of mediated environments of various media types. Secondly, as a starting point in an attempt to capture the broad experiences of the framework, a questionnaire has been developed. This allows users to articulate sensational, thrilling and empathic experience, evaluators to capture experience and designers to gauge/judge their designs for experience. Two studies were carried out to test the effectiveness of the questionnaire at capturing users' induced experience within two interactive mediated environments.

## **Introduction**

Implied in the definition “perceptual illusion of non-mediation” (Lombard and Ditton 1997), presence is the consequence of transparent mediating systems, both interactive and non-interactive. Whilst recent work developed a model of virtual reality (VR)<sup>2</sup> interaction using activity theory and formulated evaluation guidelines for the design of transparent interaction in VR (Marsh, Wright and Smith 2001), transparency on its own however, will not hold user' attention in the illusion or content (i.e. mediated environment) of the mediating system.

<sup>1</sup> *corpsing/ to corpse - acting term (UK) to denote falling out of character*

<sup>2</sup> *VR and interactive mediated environments are used interchangeably throughout the paper to encapsulate all computer-based mediated configurations comprising: 3D computer generated visual environment and the potential for user activities including, navigation and exploration, and/or object manipulation within the environment. To emphasis a line of reasoning a computer-based mediated configuration will be referred to by name.*

That is, irrespective of the transparency or invisibility of enabling or mediating technologies, if the content is uninspiring, dull or boring to interact with/within, it has the potential to break users' attention. The shift in users' focus of attention from the mediated to the real world will be referred to henceforth, as *virtual corpsing*. Informed from film the approach argued in this paper as a way of overcoming these difficulties is to enhance user experience. This raises a number of questions. In particular, what kinds of experience will be induced in users, how do we enhance experience to grab and hold attention and perhaps provide the motivation to want to experience more interactive mediated environments for long periods of time and how can we design/evaluate to create these experiences.

To a large extent the VR community has been designing virtual or mediated environments for experience for some time. Consider for example potential applications and scenarios that may benefit from enhanced user experience. From education: history and geography - enable users to visit different places or past civilizations and experience them first hand; training: fire fighting and surgical etc. - induce a feeling of concern or perhaps agitation and fear of the risks attached to the task at hand, flight simulator – feel what it's like to take the controls of a 747 passenger airline; entertainment: become a character and feel the emotions of either interacting with the virtual world and with other characters or as an invisible observer (spectator) moving in-between the unfolding story, action or/and narration; engineering: vehicle design - go beyond ergonomic assessments and feel/experience what it's like to sit behind the wheel and drive a car that is yet to be built; psychotherapy: treatment of phobias - allow patients to overcome their fears through gradual exposure to the cause of their anxiety; to e-commerce: in a shopping mall or supermarket - absorb the atmosphere as you pass by stores and through shopping aisles with ambient sounds of check-out tills, eclectic muzak and announcements of price reductions. See Brooks (1999) for a recent and informative survey of virtual reality applications including some of the above examples that are identified as being in “routine production use”. It is argued that enhancing experience will grab and hold users' attention and perhaps provide the motivation to experience more interactive mediated environments possibly for longer periods of time. Furthermore, a central argument of this paper is that experiences and the activities that provide them are associated with the virtual places (i.e. the context of use: the scenes, sets and settings) where they were encountered. Conversely, we associate a virtual place - that we have visited - with experiences where they occurred and this will enforce the illusion of having been somewhere in another environment other than where the mediating system resides (e.g. home, lab). In short, experiences encountered in virtual places - spaces within 3D mediated environments - provide a sense of having been present somewhere else. Hence, finding ways to capture user experience may

provide an alternative and indirect way to assess presence and it argued that this is a key concept in the evaluation and design of computer-based mediated environments.

In human-computer interaction (HCI) we have recently seen a shift in focus from traditional performance-based and work-related design and evaluation criteria (e.g. effectiveness, efficiency and user satisfaction (ISO 1996)) towards a more non-work-related emphasis. This paradigm shift reflects recent interest in so-called affective (Picard 1997) and hedonic (Hassenzahl et al. (2000) computing that aims to achieve a pleasurable interaction. For example, Hassenzahl et al. (2000) call for an “expanded concept of usability”, one that promotes users’ “fun and enjoyment” and is additional to traditional task and work-related design and evaluation criteria. They cite earlier work that makes similar observations arguing that the “narrow focus” of traditional usability doesn’t extend well to consumer or home products. In an effort to find design principles to promote fun and enjoyment of a software system they suggest analysing “what makes computer games fun”. In particular, Malone (1983) in his work on intrinsic motivation identifies three broad design categories: “challenge”, “fantasy” and “curiosity” and each consists of “recommendations for designing an appealing computer game”. However, whilst these categories may well be appropriate to earlier computer games (circa 1980’s) it is questionable whether they transfer well to the enormous increases in complexity and evolving genres of today’s computer games. Additionally, it is difficult to see how they transfer to developments in other computer-based mediated environments, and hence, prompting the need for more appropriate criteria. In a footnote, Hassenzahl et al. (2000) acknowledge the similarity between the International Organization for Standardization’s (ISO) third broad category “user satisfaction” and their proposed expansion to the concept of usability to incorporate fun and enjoyment. The awkwardness of this footnote points to the tension between ISO’s user satisfaction and the call for a new or expanded concept of usability. To ease this tension it is perhaps reasonable to suggest that user satisfaction be expanded to incorporate components such as, fun, enjoyment, affective, hedonic, challenge, fantasy and curiosity, etc. To account for this shift to a wider arena, it is argued that the more appropriate term user experience be used to embrace this expansion. In order to inform methods for design and evaluation of user experience in 3D computer mediated environments this paper looks to another artificial although highly successful visual medium whose central goal is in the shaping of experience – film.

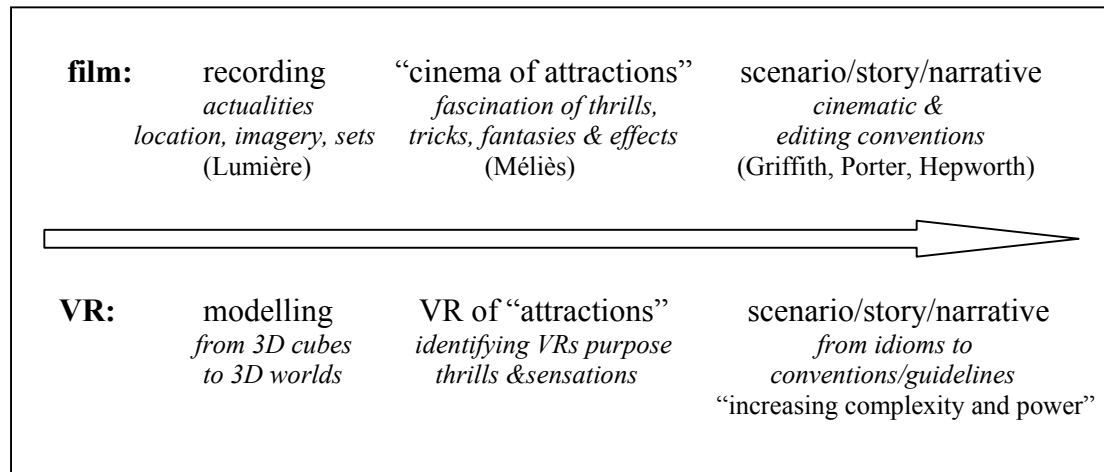
### **VR: Remediated Film**

In a way, similar parallels can be made between the innovative and technological developments in computer-based mediated environments (i.e. from the 2D GUI to 3D VEs)

and those of film. Indeed, various writers have explored the relevance of techniques in filmmaking to interface design (McKendree and Mateer 1991; May and Barnard 1995) and to the design of virtual environments (Laurel, Strickland, and Tow 1994; Pausch, Snoddy, Taylor, Watson and Haseltine 1998; Persson 1998; Marsh and Wright 2000a). Whilst the literature demonstrates the obvious enthusiasm, there appears to be little in the way of implementations or concrete examples arising from a clearly drawn out path from filmmaking to interface/content design. An exception can be found in the latter paper that develops guidelines (from cinematography conventions) to inform design, to improve user comprehension of space and so reduce the occurrence of user disorientation during navigation and exploration (Marsh and Smith 2001a; 2001b).

According to Bolter and Grusin (2000), looking to film to inform visually mediated environments is unsurprising as all visual media is refashioned or remediated from old. For example, they discuss the remediation of photography from painting, film from photography, and so following this line of argument they suggest that a natural progression would appear to be the remediation of VR from film. To lend further support to the notion of remediation this paper formulates a close mapping between developments in VR and those of film. In reference to figure 1, the developments in film are widely described by film-theorists as a progression from actualities or recording (e.g. documenting of actual or real life events: Auguste and Louis Lumière). A film presentation typical of this phase would consist of shots taken from different scenes/locations, say for example, a street scene and workers exiting a factory, and these were simply joined together to form one continuous film presentation devoid of any continuity between shots. The next developments in film can be described as an ephemeral experimental phase - testing/pushing the boundaries of the medium to see what works. Films characteristic of this phase are captured well in Gunning's (1990) widely used term "cinema of attractions" with its "fascination in the thrill of display" or spectacular virtues, "féeries" (i.e. magical spectacle/fantasies) and tricks (e.g. disappearing in a puff of smoke: Georges Méliès – although more recently his work is identified as having elements of narrative structure; for discussion see Ezra 2000). Finally, to the emergence of cinematic and editing conventions and the arrival of scenario/narrative in cinema (e.g. construction of story: David W. Griffith, Cecil Hepworth and Edwin S. Porter) and the enhancement and shaping of character and spectators' experience (Boorstin 1996) to provide meaning. It is interesting to note that Georges Méliès encountered a steady decline in audience numbers for his féeries to the emerging films of the day that contained scenarios. The central reason for this decline was the "dramatic compositions" of scenarios and their potential to evoke a greater wealth of experiences than those obtained from thrills, tricks and fantasies. The writers of these earlier film scripts were referred to as scenario writers (e.g. D. W. Griffith began his film career

writing scenarios) and their emergence marks the beginning of narrative film (Loughney 1990).



**Figure 1 Parallel/natural progression from film to VR**

Although developments in film are widely described as following a chronological progression (as shown in figure 1), some film-theorists however, would argue that in reality there is a blurring between these categories. Hence, the exact nature of developments in film is still under debate and is beyond the scope of this paper. For further discussions on the tensions that exist between these categorizations the interested reader is referred to for example, Elsaesser (1990) and Ezra (2000). Although it is acknowledged that some blurring between categorizations exists, for the purposes of this paper however, the categorizations provide a useful framework to draw comparisons with developments in VR. Furthermore, it should be emphasised that the progression in developments doesn't necessarily contain only elements from the last category (i.e. scenario/storytelling/narration) but is entirely dependant upon the film's genre and the kinds of experience that the filmmaker wishes to transfer to spectators. Hence, a film may contain elements of some or all three: recording/actualities, thrills/tricks/fantasies, and scenario/storytelling/narrative. The current trend for large budget commercial mainstream film (i.e. the so-called Hollywood blockbuster) is to concentrate more on “attractions” (e.g. thrills, explosions, effects) and less on narrative. Subsequently, there is a widespread belief that this has had a detrimental effect on story and hence, increases the reliance on the “attractions” to carry the film. Central to the success of film and encapsulated in the term “invisible style” (see: Messaris 1994; Rosenblum and Karen 1979) is its ability to hold spectators' focus of attention in the illusion of film in a way that hides the underlying artificiality used to capture, manipulate and then project film within the borders of

the projection screen. As a consequence, spectators are able to receive continuously uninterrupted varying levels and varieties of experience that provide meaning intended by filmmakers. For an in-depth treatment of the historical progression and developments in film see for example, Arnheim (1957), Elsaesser (1990), Parkinson (1995), Cook (1996).

In reference to figure 1, similar developments in interactive mediated environments are identified to that of film. It is argued that modelling, from cubes (Sutherland 1965; 1970) to 3D worlds, is likened to film's recording or actualities phase. The similarity that is being made here is not so much with the precise content of these media (though, one is real and the other could be representations of the real world), but that it marks the starting point, the beginnings of development of each medium and although some manipulation of the imagery takes place this is in most part devoid of any complex techniques. That is, in film this in most part refers to recording or capturing of actual everyday real life events and scenes by pointing a camera in the right direction to frame the image. In order to strengthen the resemblance between film's recording and VR's modelling phases the former will be extended to include location, imagery, scenery and sets. Similarly, in mediated environments this is the computer-generated representation of real or imaginary (or abstractions of) objects and 3D environments. Although in mediated environments we don't have the benefit/advantage of being able to point a camera to capture content – we have to construct or model it. Furthermore, the camera captures a sequence of images that are presented to passive spectators whereas, in interactive mediated environments the user is active and chooses where to look and move. The additional interactive component is one of the central differences between film and interactive mediated environments and provides the means to view, move around and through the model.

Attempting to draw a parallel to film's next phase, "cinema of attractions", appears at first sight to be somewhat problematic. A way forward is to divide interactive mediated environments into two groups: computer games and entertainment systems, and VR (that in most part is in an experimental/scientific/research phase) and these are both devoid of any complex narrative structure (see later). It is easier to draw a parallel with developments to the first of these, computer games and entertainment systems running on a PC or dedicated configuration (e.g. games consoles, video arcade games or VR entertainment systems) than with VR (i.e. experimental/scientific/research). This is because the goal of development is to provide entertainments for participants and it is argued that this is described well as thrills, tricks and fantasies and hence, is directly analogous to that of film. Indeed, the inspiration of Gunning's (1990) term "cinema of attractions" can be found in the Russian Filmmaker Sergei Eisenstein's attempt to find a way to describe thrills/tricks/fantasies in film (Arnheim 1957).

Eisenstien found the closest approximation to be with fairground “attractions” and especially to his favourite, the roller-coaster or “American Mountains” (Arnheim 1957). Thus, by drawing such an analogy, this is in a way taking the meaning of “attractions” back to its origins, the fairground (i.e. the arcade). So perhaps an appropriate way to describe this is interactive mediated environment or VR of “attractions”.

With developments in VR (i.e. experimental/scientific/research) however, the analogy is not as apparent. The nature of this work which comes largely from the academic and research communities is experimental and just like that of the “cinema of attractions” it tests/pushes the boundaries of the medium to see what works (e.g. to identify optimal blends of hardware and software that are appropriate to the environment and purpose in which they are intended to be used) and to identify the purpose/goals of VR. Proponents of VR would perhaps argue that their environments are developed for real purposes: scientific, engineering, education and training, and medicine, etc. Any suggestion that these provide thrills, are tricks or can be described as fantasies in any way, shape or form would most likely be met with strong opposition. However, if one examines the purpose, goal and/or requirements of successful VR systems (some of which have been identified as in “routine production use” (Brooks 1999) - see earlier discussion) a common characteristic that can be identified in many of these is sensations, such as, driving, flying, fear inducing, etc., and these can indeed be described well as thrills.

Finally, is the development of scenario, storytelling and narrative and this is directly analogous to that of film. One of the main drivers can be found with emerging computer games. Due to the commercial nature and associated profits, their underlying developments and mechanisms remain guarded in-house secrets and hence, generally go unpublished. Work is beginning to appear that addresses the inherent tension between interaction and narration (for example see, Hales 2000; Mateas 2000; Young 2000). Examples of innovative techniques that attempt to ease this tension and are commonly found in computer games are, multi-choice narrative paths, the suspension of interaction whilst story is updated, and essentially, these are examples of new kinds of idioms. Laurel, Strickland, and Tow (1994; 1998) suggest the motivation for this, just like that of film, is that it may lead to the formation of a language that supports the creation of virtual/mediated environments of “increasing complexity and power”.

At the time of writing, developments in interactive mediated environments can be identified as belonging to both an experimental phase (i.e. VR of attractions) and more recently to developing idioms for the manipulation of narrative. Although it is anticipated that the emergence of idioms will provide the means to create richer user experiences, this is however,

by no means the goal of all interactive mediated environments and like film is determined by the application/genre, their requirements/purpose and the types of experience that are to be induced in users. Consider for example potential applications such as, architecture/real estate where the requirements are to visualise 2D drawings by constructing 3D virtual *models or actualities* and then take a virtual tour to assess the suitability/applicability to support the intended real world use; entertainment where the *thrill/trick/fantasy* is of more importance to give participants a buzz/kick; and training (e.g. fire fighting/surgical) where both *thrill/fear* and *scenario/story/narrative* are the dominant requirement/purpose. However, like film and as suggested above, an application may have elements or blends of all three: model/actualities, thrills/tricks/fantasies, and/or scenario/story/narrative.

It could be said that identifying the developments of interactive mediated environments in this way as a linear progression from modelling through a kind of VR of attractions to the development of idioms may be an over simplification. However, it is argued that this is a useful and worthwhile exercise principally for two main reasons. First, because it provides a way to draw comparisons with developments in film: to see where we are, how far we need to go to get to the stage where interactive mediated environments provide experiences comparable with those of film and inform on how we might get there. Second, the three phases of development (as shown in figure 1) can be used as broad categorizations for the different kinds of experiences that are induced in users/spectators. Thus, providing a convenient way to develop a framework of experience and this can be used to inform the design and evaluation of interactive mediated environments.

Like film, it is argued that the success of VR will come from its ability to hold users' focus of attention in the content or illusion (i.e. mediated environment) in a way that hides the underlying artificiality of the enabling/mediating technologies (Marsh, Wright and Smith 2001). As a consequence, it is anticipated that users are able to receive continuously uninterrupted varying levels and varieties of experience and this will provide meaning intended by VR designers and developers.

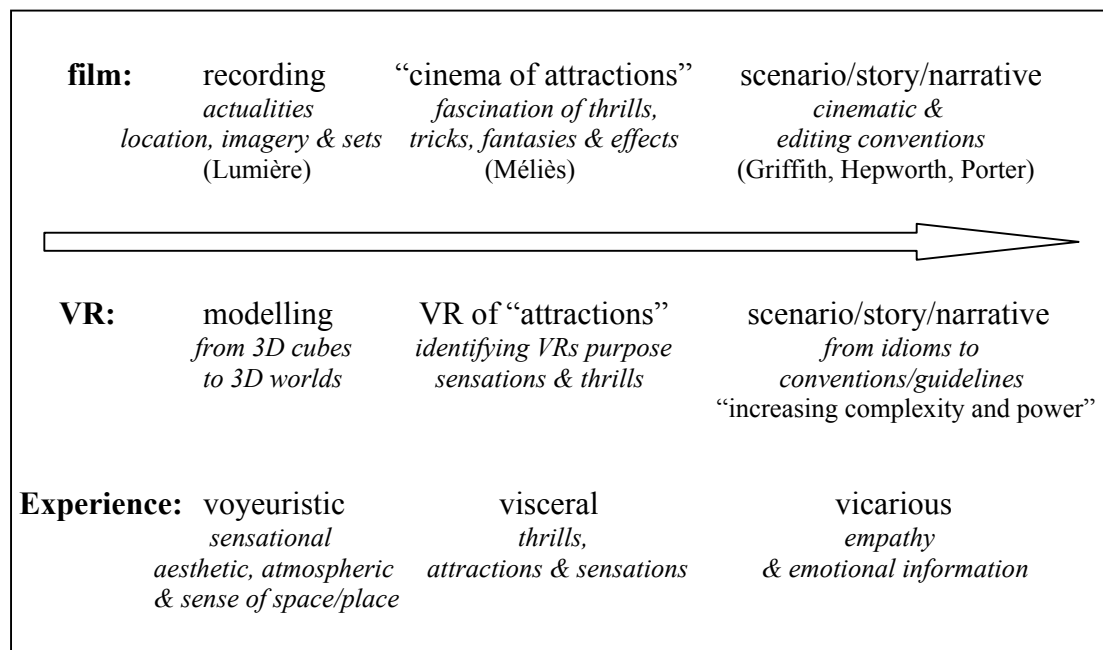
### **Framework of experience**

Boorstin (1995) states that we don't watch films in one way but in three ways and as we watch a film the three compete in us. In reference to figure 2, Boorstin's (1995) three categories: voyeuristic, visceral and vicarious (3Vs) that elegantly describe spectators' film experience link with some ease to the three categorizations in film's development (figure 1). Hence, this naturally forms broad categories for a framework of users' computer mediated experience. Building on the work originally proposed by Marsh and Wright (2000a) and in a subsequent



extended version, Marsh, Wright and Smith (2001), the broad categories forming the framework are described as:

*voyeuristic experience* is the pleasure that comes from looking, the joy of seeing the new and the wonderful – the sensational. If there is nothing to provoke our curiosity and interest (in the location, scenery, imagery, sets or/and 3D world) then simply we get bored. Essentially, this refers to the aesthetic, atmospheric and sense of space/place. Additionally, this must occur within a credible flow of time and space – i.e. the pace (shouldn't be too slow to bore or too fast that we lose track of/get lost in the 3D environment/story/game/film) and plausibility (the 3D environment/story/game/film must make sense). Either of the above has the potential to disrupt or *break* users/spectators' attention in the mediated environment and hence, cause users to *virtual corpse*.



**Figure 2 Framework of user experience in film and interactive mediated environments**

*visceral experience* is the instinctive base sensations and thrills, the gut reactions rather than emotions. Essentially these are the attractions, sensations and thrills. The kinds of experience that fall in this category are for example, the roller-coaster type of feeling, sensations of movement (e.g.vection in mediated environments), sensual and sexual feelings and those of fear and disgust. The *breakdown* in the visceral is simply, if it's not a thrill, it isn't visceral and its main criticism is “it doesn't get me” either because we have acquired an increase in

threshold for the visceral effect to kick-in or simply the design of the visceral effect is inadequate. Hence, this may result in the user/spectator to *virtual corpse*.

*vicarious* is to imaginatively experience something through another person, being or object. Within a mediated environment interaction is performed vicariously through either a first or third person perspective. Resulting experiences are for example, the transmission of emotional information through empathy. This is to know what a person is feeling and to feel what that person is feeling (Levenson and Ruef 1992). The empathic process is transferred through actions, stories/anecdotes or facial expressions usually from one person to another person. Within film (and theatre) the vicarious/empathic experience is induced through an actor's ability to convey honest emotion. Potential *breaks* in empathy are the emotionally untrue. Many methods have been developed to capture/measure empathy. For reviews see for example (Levenson and Ruef 1992). However, in mediated environments another kind of empathy is identified - the transfer of emotions and personality traits from the user's virtual character (i.e. the character that the user controls or/and represents/takes the part of) to the users themselves. The higher the transfer of emotions the higher the empathy and the term "empathic accuracy" will be used to describe this. Conversely, a weak transfer of emotions may result in *virtual corpsing*. The same approach may be used to provide a measure of the transfer of emotions between the user and other virtual characters within the mediated environment. This is the virtual actor's ability to convey honest emotion and again, a weak transfer of emotions may result in *virtual corpsing*.

As previously mentioned, a central argument of this paper is that experiences (and the activities that provide them) encountered in virtual places (i.e. context of use - spaces within 3D mediated environments) provide a sense of having been present somewhere in another environment other than where the VR system sits (e.g. home, lab, etc.). Hence, finding ways to capture user experience within the broad categories of the framework (as developed above) may provide an alternative and indirect way to assess presence and it is argued that this is a key concept in the evaluation and design of computer-based mediated environments. The next section investigates ways in which the experiences of the framework may be captured.

### **Capturing experiences of the framework to assess presence**

Presence is seen as a primary driver for design and evaluation of interactive and non-interactive mediated environments (e.g. the Internet, multi-media, virtual environments/reality, computer games, broadcast and interactive TV, cinema, simulation rides, etc.). Consequently, there has been much concern for how its subjective and objective determinates might be measured or assessed. For summaries see IJsselsteijn, de Ridder,

Freeman and Avons. (2000). The approach argued in this paper is that experience (e.g. emotional/empathic, thrilling and sensational) may provide an alternative and indirect way to assess presence. Considering that experiences are dynamic and transitory, an ideal method would appear to be the use of a concurrent (i.e. as the mediated environment is experienced) and continuous assessment technique to facilitate the capture of experience over time and thus, provide the potential to identify causal relationships (i.e. the cause of user's experience). A technique developed by George C. Gallup's (i.e. of Gallup opinion polls) company Audience Research, Inc. (ARI) to assess film presentations for market research in the 1940's and 50's seems most appropriate here and may provide some leverage to these discussions. In his method, spectators activate a dial, slider or buttons to reflect their likes/dislikes during a film presentation. Results then provide the identification and assessment of a film's negative/positive components. More recently, a similar technique has been used to assess presence. Whereby, users make on-line judgments using a sliding potentiometer to reflect their level of presence (Freeman, Avons, Davidoff and Pearson 1997; IJsselsteijn, de Ridder, Freeman and Avons 1998). However, for interactive mediated environments it could be argued that the additional physical operations of the dial, buttons or slider on top of the operations for controlling the interactive device (for example, mouse movements and mouse button presses) may overload the user. Another method to assess users' sense of presence was proposed by Slater and Steed (2000). In their scheme users verbalise the occurrence of a shift in focus of attention from the virtual to the real world to indicate breaks in presence. Although this provides a concurrent assessment of presence it is discrete in nature (i.e. verbalisation from the virtual to the real world) rather than continuous. The main drawback in common with all these methods is the user's requirement to divide their attention between the mediating experience and the operation of the dial, buttons or slider, or keep in mind the verbalization. Hence, the process of measurement (i.e. dial, buttons, slider, verbalization) may disrupt the actual thing that we are trying to measure (i.e. presence/experience). Alternative schemes that use objective physiological measures to assess users' sense of presence (e.g. skin conductance/temperature and heart-rate) are concurrent, continuous, and furthermore, do not require the user to perform any additional operations (see for example, Dillon, Keogh, Freeman and Davidoff (2001); Meehan, Insko, Whitton and Brooks (2001)). However, with all of the above examples it is difficult to imagine how the many components and variables of experience can be measured using a binary scale (e.g. on/off) or along just one dimension (e.g. low to high). That is, the measurement of experience would need to be assessed along many scales to reflect the various kinds of experience that a mediating environment is capable of inducing in users; or at least, the assessment of experiences that are the requirement/purpose of the mediated application. Hence, it is difficult to foresee how these

techniques may be extended to capture the many different kinds of experiences without overloading or encumbering the user.

Looking to today's film review process, we find that interestingly as production costs have increased in line with the many technological advances, the review process has on the contrary, shifted from its earlier technologically driven methods and devices towards the simplest form: pen, paper and questionnaires. The obvious limitation with this simple method is the loss of data to reflect the dynamic and transitory nature of experience over the duration of a presentation/interactive experience. The main advantages are firstly, the spectators/users' ability to experience the presentation in its entirety without having to divide attention and secondly, the measurement of experience can be obtained on several dimensions. Interest in questionnaire development to measure presence has received much attention. For summaries see: Lessiter, Freeman, Keogh and Davidoff (2000) and Lombard and Ditton (2000). Of interest to this paper is not so much the measurement of a sense of presence but to capture experience induced in users of interactive mediated environments and this may provide an indirect way to assess presence. Therefore, as a starting point to capture the broad experiences of the framework, the next section develops a questionnaire.

### **Development of a questionnaire to capture user experience**

The development of the questionnaire follows investigations of the 3Vs as applied to mediated environments, in particular, film, computer games, virtual environments/reality. Specifically, this involved investigations of film reviews and rating techniques, interviews and a pilot study using an original version of the questionnaire with filmgoers of three different genres (comedy, drama, action/adventure) at two cinemas (art house and mainstream). Through investigation of computer games magazines to identify the language, descriptions and rating procedures, interviews with games designer and players (in arcades and University campus). As well as, investigation of empirical studies, questionnaires and related published work on presence.

#### *Questionnaire*

The questions used either a 7-point likert scale to rate the strength of agreement with a statement or bipolar adjectives with 7 points and both incorporated a neutral option:

voyeuristic: three components were identified to capture this experience: *pace* (unfolding of the game/story/environment), *interaction* (predictability: movements/objects and surprising/unexpected game/story/environment, autonomy: balance between interaction and

narration, and plausibility/makes sense), and *space and place* (stylish, atmospheric, creative, sense of space).

visceral: although many kinds of experience fall in this category, for the purposes of the studies two components were identified to capture this: *sensations of movement* (driving, flying, walking, running, jumping, falling) and *feelings of fear and disgust* (frightening, nauseating, disgusting, shocking).

Additional components were incorporated to capture: *involvement* (engaging, absorbing, interesting, stimulating) *enjoyment* (enjoyable, exciting, satisfying, challenging and fun) and *disruptions* (internal: display, interactive, audio; external: noise, awareness of other people; and subjective: attention wandering e.g. thinking of time, homework).

vicarious - To obtain empathic emotions/experience would be possible by directly asking how users felt interacting with their character in the environment. Although this would tell us how they felt from the transfer of their character's emotions/experience, it wouldn't however, tell us how successful this transfer was from their character. Thus, a simple matrix approach was developed whereby, users rate their virtual characters' feeling/emotions/personality traits and then rate their own feelings/emotions/personality traits as the result of controlling the character; the greater the correlation the greater the "empathic accuracy". A weak correlation identifies potential *breaks* (i.e. *virtual corpsing*). Additionally, the same approach was used to provide a measure of "empathic accuracy" between the user and other virtual characters within the mediated environment. This is the virtual actor's ability to convey honest emotions.

## **Studies**

As a starting point, two studies were carried out to test the effectiveness of the questionnaire at capturing the sensational, thrilling and empathic experiences of users in two mediated environments. In each study, the questionnaire was interview administered to allow for further explanations where necessary and to ensure users understood the questions in the same way. The purpose of the studies were:

1. to capture user experience within the broad categorisations of the developed framework (i.e. voyeuristic: sensational, visceral: thrills and vicarious: empathy) in mediated environments.
2. to detect potential breaks or shifts in focus of attention from the mediated to the real world as the result of inaccurate or deficient user experience within this framework.

3. to detect potential breaks or shifts in focus of attention from the mediated to the real world as the result of disruptions (internal, external or subjective).
4. to capture users' empathy with:
  - i. users' own character in the mediated environment
  - ii. other characters in the mediated environment
5. identify correlations between components of the questionnaire and between breaks and user experience.

### *Study 1*

The first study was conducted at a computer games club with eight male users and ages ranging between 13 and 22. The test environment was a networked PC first person shooter game. The goal of the game was to protect colleagues and eliminate enemies. In addition to data collection, the initial purpose of this first study was to test the questionnaire for item redundancy and repetition. Following the study many items of the questionnaire were rewritten, refined, and made child proof ready for the next study.

### *Study 2*

The second study was conducted with twenty-four 10-11 year old school children (15 female, 9 male) from several classes/grades. The test environment was a novel storytelling/role-playing environment entitled Ghostwriter<sup>3</sup>. Building on the commercially available Unreal game/engine comprising rich graphics, music and atmospheric sound effects. Ghostwriter incorporates seven characters (Boy, Girl, Witch, Granny, Old Man, Dog and Monster) into a storytelling/role-playing environment designed to appeal to children. The objective of the game was given to children prior to the commencement: to search for Granny by exploring a castle and picking-up clues en route. The narrative of the game was steered by an actress playing the role of several characters (Witch, Granny and Old Man) - interweaving instructions and clues into the story. A wizard-of-oz type set-up was developed whereby the actress and study assistant (controlling the movements of these characters and Dog and Monster) were separated from the children by a partition screen. This attempts to conceal the artificiality of the study arrangement and provide the impression of autonomously responsive characters within an automatically responsive environment.

Within each role-playing session two children were placed back-to-back facing their computer screens. From a first person perspective, each assumed the role of one of two characters (Boy or Girl) and controlled their avatars' movements within the environment

<sup>3</sup> Ghostwriter – developed by Judy Robertson, University of Edinburgh

using cursor (forward, backward, left, right) and mouse (up/down point-of-view tilt). The assignment of character to children was random. Speech interaction between characters (except Dog and Monster with non-speaking roles) was supported through microphone and earpiece (i.e. walkie-talkie). Full-sized headphones placed over the earpiece relayed the music and atmospheric sound effects from the environment and additionally, provided a degree of sound proofing from the world external to the mediated environment. Following each session the experience questionnaire was interview administered. Further items were added to the questionnaire in order that analysis through breakdown of the novel and highly interactive nature of interaction within the environment using speech (i.e. microphone and earpiece/headphones), keyboard, cursor and mouse could be carried out.

### **Results and Discussion**

Most of the data from the study requires further analysis. Even so, the work so far shows a number of noteworthy points. The questionnaire provided users with a way to articulate experience and this can be best described as a profile of individual user's experience from interacting within the mediated environments used in the studies. Furthermore, from this a summary of all users' experience from interacting within the mediated environment can be obtained. Hence, the questionnaire provides evaluators with a tool to capture user experience and designers to assess mediated environments for experience within the framework. The main criticisms that can be levelled against using a questionnaire are perhaps, the limited range of predefined items to capture experience although this is probably sufficient enough for the assessment of applications with precisely defined requirements or attractions e.g. fear, sensations of movement, etc.

The most noteworthy correlations are all with empathy. For example: using Spearman's rank correlation coefficient, the first study shows a positive correlation ( $r = 0.46ns$ ) between empathy (with their character) with sensational (voyeuristic); and a positive correlation ( $r = 0.30ns$ ) between empathy (with their character) with thrills (visceral). Likewise, in the second study there is a negative correlation ( $r = -0.26ns$ ) between empathy (with their character) and disruptions to interactive devices/styles and this concurs with observations during the study. That is, even though the children found the novelty of the configuration exciting, and genuinely liked the mediated environment, through observed hesitations it appeared they had to think too much about operating the controls (cursor/mouse movements, keyboard control and speaking) and this seemed to shift their focus of attention and break their engagement. Although the correlations are not significant, the noteworthy results with empathy suggest a good case for further investigation.

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