



ISPR 2011:

THE INTERNATIONAL SOCIETY FOR PRESENCE
RESEARCH ANNUAL CONFERENCE

EDINBURGH, 26-28 OCTOBER 2011

EDITED BY PHIL TURNER



ISBN: 978-0-9792217-4-3

© *The copyright of each separate paper published within these proceedings remains vested in its author. Authors have assigned to ISPR 2011 organizers and ISPR (International Society for Presence Research) the on demand availability rights for their work and the right to create a derivative work from it, including conference proceedings.*

From Sensory Dream to Television Format: Gathering User Feedback on the Use and Experience of Omnidirectional Video-based Solutions

Lizzy Bleumers, Bram Lievens, Jo Pierson

IBBT-SMIT, Vrije Universiteit Brussel, Belgium
 {Lizzy.Bleumers@vub.ac.be}

Abstract

As applications of omnidirectional video are only recently becoming available for the general public (e.g. in the form of online advertising), research on user attitudes towards and experience of this technology has been limited. In this paper, we report the results of a qualitative user study in which we collected feedback on the use of omnidirectional video in a theatrical performance and for television. Participants were surveyed before and after the performance and a selection of them volunteered to participate in an in-depth group interview later on. The experience of presence, interactivity and narrativity formed the focal points of this inquiry. We report our preliminary findings and identify directions for future research.

Keywords---Presence, Interactivity, Narrativity, Omnidirectional video, User research, Television.

1. Introduction

In this paper, we report on a study that is part of the interdisciplinary project xTV (explorative television). The goal of xTV is to develop production techniques and formats for iDTV (interactive digital television) based on surround video, and to investigate users' experience of these solutions.

Surround (omnidirectional and panoramic) video consists of moving images in which one can look around. The viewer can choose where to look, similar to when one is gaming (but with recorded images) or inspecting panoramic pictures (but with moving images). Thus, it provides viewers with a new form of interactivity. For an example, see [1].

In the case of television, interactivity holds a promise for new user experiences and practices [2]. The interactivity afforded by surround video, i.e. looking around in the image, may enhance users' sense of presence when watching iDTV. Indeed, a higher degree of

control over a mediated environment has been linked to stronger presence [3].

As Ursu and colleagues [4] explain, television has traditionally revolved around bringing a coherent and high-quality story to the audience. However, as interactive media gain importance, this no longer seems to suffice. In their view, the value of interactive digital television lies in combining the medium's excellence in storytelling with the freedom enabled by interactivity.

The switch of analog to digital television and the introduction of cross-media interactive platforms have shown that whether new interactive services live up to their promise, does not depend on technical accomplishment alone. Some have noted that precisely because television is still strongly perceived as a storytelling medium, viewers may not be prone to become active users [2]. Producers wish to retain authoring control, while TV viewers appear satisfied with current types of lazy interaction (e.g. pausing and voting) that do not really call for high involvement [2].

While much remains to be investigated, few studies have examined user experiences and practices with surround video-based applications. Certain studies look into immediate behavioral responses to surround video ([5], [6]), but do not deal with actual applications. The lack of such studies is probably due to the fact that applications are only now becoming available for the general public.

In this paper, we report the findings of a qualitative user study in which we asked users to recount their experiences with an omnidirectional video-based performance. These experiences were taken as a reference point for discussing the potential of omnidirectional video for television.

2. Key concepts

In this section, we will describe the key concepts that shaped our inquiry.

2.1. Presence

In line with the statement issued by The International Society of Presence Research ([7], we understand presence as a variable psychological state or subjective perception that can be part of any technology-mediated experience, that is influenced by factors proper to the medium, the represented content and the user, and that is multi-dimensional.

The multi-dimensionality of presence is illustrated by the many conceptualizations of presence reviewed by Lombard and Ditton [8]. These can be divided into two categories: physical presence or the “sense of being physically located somewhere” and social presence or “the feeling of being together (and communicating) with someone” [9].

2.2. Interactivity

Steuer [3] defines interactivity as a property of the medium that enables malleability of content. According to Bucy [10], this definition is too limited. It does not take mediated social interaction into account, only impersonal interaction with media content. In addition, it does not consider the role of user experience and societal impact.

Bucy [10] notes that how users engage with a medium ultimately depends on how they perceive it. Users may, for instance, perceive a lack of interactivity because they do not recognize the opportunities that the medium provides. By looking at interactivity as a psychological variable it not only becomes a measurable but also an everyday phenomenon.

2.3. Narrativity

According to the International Society for the Study of Narrative (ISSN), narrative refers to “the telling of a story or communication of a chain of events, fictive or real”. Its aspects include “how the story is told, the context in which it is presented, and the construction of the story” [11]. Narrativity is used then to designate those qualities that “distinguish a narrative from all nonnarratives” [12].

Two divergent views on narrativity exist [13]. The relativist view sees narrativity as a representation form that may change in time. The universalist view conceives narrative as a timeless cognitive model that serves to make sense of events and actions. We subscribe to the latter, accepting the many possible interpretations of what a story is.

3. Methodology

Central to our approach is the experience of an art performance as a reference point for reflection on the application of ODV central in our project: television.

While the experience of the performance as such was of interest to us and the producers of the performance, we also believe that the saliency with which our key concepts (presence, interactivity and narrativity) are represented in the performance, ensured that participants would pay attention to them in their reflection on television.

3.1. Performance as reference point

The performance that formed the subject and reference point of our inquiry is called Line-Up, produced by CREW [14]. During this one-hour performance, people are not mere spectators. Equipped with video-goggles and headphones, experiencing surround video and audio, they become “immersants” that physically enter the performance and play the main role in it.

While (maximum) five participants can enter the performance at the same time, it is in essence a one-to-one performance in which actors address each “immersant” individually by talking to them and touching them. Each immersant embodies a man that suffers from losses of consciousness and gradually loses touch with reality.

The view of a participant switches occasionally between prerecorded omnidirectional video images and an instantaneous recorded view of the actual stage. This reflects the disturbing experiences of the main character. To get a better feel of the performance, we refer the reader to the following URL presenting footage taken from it [15].

3.2. Qualitative inquiry with survey and focus group

Visitors of the performance were asked to fill in a survey before and after the performance (i.e. pre- and post-survey).

In the pre-survey, we gathered basic information regarding the participants: demographical data, whether this was their first time participating in a performance by CREW, whether they had come together with others and why they were joining the performance.

The post-survey contained two sets of open-ended questions. The first directly addressed participants’ experience with the performance. The second encouraged participants to reflect on (new) uses of the technology they had experienced. In particular, we asked whether and

in which cases they would find it interesting to be able to look around in the image during TV viewing.

The pre- and post-survey were kept limited given that participants were asked to fill them in on the spot and likely had little time to do so. To be able to gather more detailed user feedback, we invited visitors of the performance to join a focus group later that week. Joining the focus group was rewarded with a ticket for another performance.

The focus group's topic list was structured around four themes: (1) Presence, (2) Interactivity, (3) Narrativity, and (4) Use of ODV in television. Subtopics for first three themes were informed by the literature (see Section 2), yet we did not enforce these conceptualizations upon participants. With regard to the fourth theme, subtopics included: formats, platforms and appropriate forms of use.

3.3. Participant information

In our study, we recruited participants from a series of consecutive Line-Up performances that took place in a Belgian cultural center from the 8th to the 10th of April. In total, 42 people took part in the pre- and post-surveys with an average age of 33.4 (SD = 9.95, ranged from 20 to 57).

The pre-survey showed that most participants had not yet participated in a performance by CREW (n=32) and came to the performance together with others (n=29). While some participated out of professional/educative interest in CREW, others were intrigued by the performance's description or had been persuaded by their companion.

Eight people that participated in the performance joined our focus group. Their average age was 33.6 (SD = 10.07, range from 22 to 50). For these participants, Line-Up was their first experience with similar performances by CREW.

4. Results

4.1. Recounting the experiences of Line-Up Concept-specific experiences

In terms of social presence, participants in the focus group described having only a limited awareness of other participants and little or no need to be occupied with them. In contrast, interaction with the actors was perceived as fascinating and intense, as they entered participants' personal space.

With regard to physical presence, participants referred to discovering and exploring the (mediated) environment. This was described as a cerebral and physical experience. Entering (and exiting) the mediated environment felt like a disturbing experience, that required a recalibration of the senses.

This discovery process seemingly pushed narrative into the background. Particularly at the start, participants were so engaged with the imagery that they had difficulty extracting a story line, yet, they did not appear to mind this.

Throughout this experience, participants felt the way of interacting with the mediated environment was highly intuitive. No substantial cognitive deliberation was required; they simply moved their heads and the image responded in a similar fashion.

4.1.1. Perceived relationships between concepts.

The focus group discussion also revealed whether and how participants perceived relationships among narrativity, interactivity and presence in the performance.

Firstly, results suggest a reciprocal relationship between narrativity and interactivity. On the one hand, interaction complicated following the story line as mentioned above. On the other hand, narrative was perceived to direct interaction. Participants realized that they were guided to look in certain directions and that they moved along a fixed path¹. Some accepted this as part of the story, while others felt restricted.

Secondly, participants related narrativity, more specifically narrative stance and credibility, to the sense of presence. In the first-person perspective, certain participants identified more with the main character than in the bird's eye view. In addition, participants described that when the performance consistently stuck to the rules it had set, it became credible and allowed them to suspend disbelief.

Finally, participants also pointed out a relationship between interactivity and presence. They believed that the intuitive interaction with the environment and the correspondence between their own physical movement and what they saw enhanced the sense that they were there.

¹ This is inherent to ODV: the viewing angle can be chosen, the viewing position cannot.

4.2. Formats, platforms and use of surround video

4.2.1. Formats and use. With regard to content, five criteria emerged from the discussion specifying which ODV content is appropriate for television.

First, the format should encourage exploration and knowledge enhancement, instead of providing passive entertainment. As an example, participants suggested educative formats in which children can increase their knowledge through exploration.

Secondly, for ODV to have an added value, content should be presented so that there are likely to be areas of interest for the viewer 360° around. For example, in animal documentaries participants could imagine being motivated to look around. This might, however require triggers embedded in the programs' narrative because unlike in real world exploration, there are no peripheral cues to attract attention.

Thirdly, content depicting events where you want to be part of the crowd, such as a presidential inauguration, seemed also fitting for ODV. Fourthly, ODV was also seen as something that could convey a sense of space, for example, in case of architecture. Participants did wonder where the latter necessitates having moving images.

Finally, content is needed in which it is unlikely to miss important events or actions. That is content in which you can easily pick up the main "story" line again after looking around such as coverage of a cycling race (vs. a more fast-paced soccer game), or in which there is no story line at all (e.g. landscape shots without narration).

4.2.2. Platforms and use. We asked participants to what extent television would be an appropriate platform for showing ODV. Specifically, we prompted participants to consider a TV only solution versus a second screen solution in which an additional device such as a tablet (e.g. iPad) or pc/laptop is used to watch ODV content alongside the televised linear view.

In general, the second screen solution was preferred over television only. Participants referred to the more lean-forward experience associated with the former, the more intuitive control (particularly, in the case of tablets) and the fact that it is a personal device that you can pick up when you feel like learning more about the televised content.

Participants did, however, also identify disadvantages of a second screen. The user has to monitor two screens and might miss out on interesting parts of the linear narration. Matters could quickly become very complex,

particularly when ODV is combined with other forms of interactivity such as delayed viewing.

Finally, participants pointed out that neither a TV only or second screen solution would come close to generating the sense of presence that they had felt during the performance. In the performance, ODV was controlled by bodily movements and associated with physical sensations, which does not occur with the discussed interfaces. They regretted this, seeing presence as an important potential value of ODV.

Conclusions

In this paper, we investigated users' experience with a theatrical performance based on omnidirectional video (ODV) and used this experience as a reference point for a discussion on the opportunities and drawbacks of ODV use on television. From this qualitative inquiry, we have gained a number of insights.

Participants experienced the performance as a physical and cognitive exploration seemingly requiring a recalibration of the senses. Wynants, Vanhoutte and Bekaert [16] have argued that it is exactly this sensory perturbation that generates a heightened sense of sensory awareness and presence as participants try to regain coherence.

Aspects of interactivity and narrativity were put forth as determinants of presence in the performance. It became apparent that to achieve presence the two determinants have to be carefully balanced. Interactivity was suggested to influence the perception of narrative and vice versa.

Reflecting on the use of ODV on television, participants stated it requires entering an interactive mode. In this respect, content should encourage looking around by offering events of interest at various angles and drawing attention to them. Furthermore, a second screen solution was considered more appropriate, due to its association with a lean-forward mode.

An added value is seen in ODV's potential to invoke social and spatial presence. Hence, formats featuring social events that viewers want to be part of or interesting locations are considered appropriate. The second screen as individual and intuitive device was thought to offer more presence than the shared, remote controlled television set. However, both solutions were still believed to fall short.

Finally, participants expressed the concern that interactivity may interfere with following a story line. This risk may even increase when dealing with a second screen solution. Therefore, content is needed that is adequately paced and provides reference points for picking up with the main story line.

Clearly, without the proper implementation, ODV risks remaining a gimmick that, as one of the participants put it, is abandoned once the initial excitement about the new technology wears off. As such, our results illustrate the importance of our joint efforts in xTV combining technical research, user studies and creative production experiments.

In the future, we hope to validate and extend the current findings together with our partners. This includes further delineation of an optimal ODV format and viewing experience (through co-design) and assessing the hypothesized impact of different solutions on user experience and practices (through experimentation and field research).

Acknowledgements

This study was part of the IBBT-project xTV [17]. We thank Hilde Teuchies & Eric Joris (CREW), whose performance we studied, Philippe Bekaert (IBBT-EDM, Hasselt University), the xTV project lead developing the ODV technology used in the performance and Jan Decock & Jan Van Looy (IBBT-MICT, Ghent University) for their feedback on this paper. Finally, we thank all participants.

References

- [1] ODV example by project partner EDM URL: http://www.sporza.be/cm/porza/extra/opvallend/110331_opvallend_opdemuur
- [2] W. Van den Broeck, J. Pierson. The i in iDTV: How interactive is interactive digital television. In *Workshop Proceedings Cost 298 – Digital television revisited: Lining users, markets and policies*, 41-49. May, 2008.
- [3] J. Steuer. Defining virtual reality: Dimensions determining telepresence. *Journal of Communication*, 42, 73-93. December, 1992.
- [4] M. F. Ursu, M. Thomas, I. Kegel, D. Williams, M. Tuomola, I. Lindstedt, T. Wright, A. Leuridijk, V. Zsombori, J. Sussner, U. Maystream, N. Hall. Interactive TV Narratives: Opportunities, Progress and Challenges. *ACM Transactions on Multimedia Computing, Communications and Applications*, 4, 25:1–25:39. October, 2008.
- [5] M. F. Macedonia, T. D. Parsons, R. A. Digiuseppe, B. K. Weiderhold, A. A. Rizzo. Immersiveness and physiological arousal within panoramic video-based virtual reality. *Cyberpsychology & Behavior*, 10, 508-515. August, 2007.
- [6] R. A. Folen, S. D. Miyahari, M. Stetz. Immersive panoramic video display compared to flat screen display: Psychological and physiological reactions to anger stimuli. *Cyberpsychology & Behavior*, 12, 607-608. October, 2009.
- [7] ISPR presence explication URL: <http://sct.temple.edu/blogs/ispr/about-presence-2/about-presence>
- [8] M. Lombard, T. B. Ditto. At the heart of it all: The concept of presence. *Journal of Computer Mediated Communication*, 3. September, 1997. Retrieved from: <http://jcmc.indiana.edu/vol3/issue2/lombard.html>
- [9] W. A. Ijsselsteijn, H. de Ridder, J. Freeman, J., S. E. Avon's. Presence: Concept, determinants and measurement. In *Proceedings of the SPIE*, 3959, 520-529. June, 2000.
- [10] E. P. Bucy. Interactivity in Society: Locating an Elusive Concept.
- [11] *The Information Society*, 20, 373-383. June, 2004. ISSN definition of narrative URL: <http://narrative.georgetown.edu/wiki/index.php/Narrative>
- [12] ISSN definition of narrativity URL:
- [13] <http://narrative.georgetown.edu/wiki/index.php/Narrativity>
- [14] M.- L. Ryan. Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media. The John Hopkins University Press. 2001.
- [15] CREW website URL <http://www.crewonline.org>
- [16] Line-Up trailer URL: <http://www.youtube.com/watch?v=C5xuET8K4PI>
- [17] N. Wynants, K. Vanhoutte, P. Bekaert. Being inside the image: Heightening the sense of presence in a video captured environment through artistic means: The Case of CREW. In *Proceedings of the 11th Annual International Workshop on Presence*, 157-162. October, 2008.
- [18] xTV project URL: <http://www.ibbt.be/en/projects/overview-projects/p/detail/xtv-2>