Charles Church and 360° Filming. KAROL KWIATEK

Karol Kwiatek is completing doctoral research with the University of Plymouth.

> In [...] multiple screens we see the beginning of immersive environments, virtual worlds and interactive relations between spectator and image. The spectator slowly becomes part of the system that he observes.
>
> (Shaw & Weibel, 2003, p.117)

Introduction

The history of visual adventuring through multiple screens started in the 1950s (a seven-screen display called "Glimpses of the USA" by Charles Eames – 1959) and culminated in the World's Fair, Montreal – Expo'67, where a large number of movies, using multiple screens, were presented to the international audience. The extension from the single screen to multiple screens provided an expansion of visual horizon, a new type of experience and had a significant effect on the production of narratives. Multiple screens broke up the linear approach to film narrative so that branched storytelling became possible in film productions, however the research of non-linear narratives to date has tended to focus on television and Internet multimedia presentations, rather than 360° immersive environments.

This study examines a 360° film that was produced for a multiple screen which was set up in a circular form creating one seamless projection surface, similar in design to historical painted panoramas presented in rotundas in the 18th century. This film is presented as a branching narrative and the action occurs mainly in Charles Church, a bombed building in the urban space of Plymouth (UK). The ruined building is itself the site of the 360° filming using a 360° video camera. One of the most significant interventions in the production of this film is the application of the computer-reconstructed church in order to integrate the memories of the couple, Ken and Phyllis Beer, who were married on the site in 1941. The 360° film was converted from a linear narrative to a branching story, so that diverse endings are possible. The basic element of a film is a frame, whereas in 360° film it is the 360° panorama. In recent years, there has been increasing development of digital equipment that records not just a limited part of the environment, as is the case of traditional cameras, but the whole surrounding world (360° video camera). 360° film-making is more easily available for non-professional users now, thanks to digital technology.

For the research project, the story of a wedding that occurred in 1941 was recorded using a 360° video camera, the event was recreated via the use of computer techniques and then presented to a wide audience gathered in a large immersive environment. A key aspect of the project is the use of all-surround video for the visualisation of the present ruin along with the historical condition of the heritage site. The potential of interactive 360° films is explored as an engaging method of transporting the viewers so that they have an opportunity to interact with this heritage narrative. The spectators are asked to make decisions about further development of the story, which is set in a dramatic moment of time in 1941 with the constant threat of bombs. Up until now the available 360° immersive environments present single and linear films (Garlot, 2011; Yelin, 2000). However, there are researchers who are pioneering new types of interactive narrative for immersive environments. These researcher-film-makers have created a number of projects that offer new methods of interactive narratives: 'co-evolutionary' narrative in Place-Hampi (Kenderdine et al., 2008; Kenderdine, Shaw & Kocsis, 2009), narrative techniques created by aesthetic transcription in T_Visionarium (Del Favero et al., 2005) or narrative strategies with self-motivated agents in UNMAKEABLELOVE (Kenderdine & Shaw, 2009). Kenderdine states that such environments where historical monuments are visualised "can help people to better appreciate these often fragile heritage sites" (Gaffney, 2006). The research to date has tended to focus on discovering new types of interactive narratives for cultural heritage sites, rather than using the existing approaches in film narrative for multiple screen environments.

The application of panoramic imagery and panoramic video for the creation of interactive narratives where the viewer has the opportunity to choose the further developments of the story seems to be a promising concept for edutainment, based on existing approaches to film narrative, not only about historical buildings, but also about past events.

This paper has been divided into five subsections. The first one deals with 360° film narrative that tries to explain a method of storytelling by the application of still and video panoramas. Then, the ruined building of Charles Church, its history and the event that took place in this church in 1941 are presented. The next section is concerned with 360° filming inside the bombed church. After that, a discussion about interactive films and how they could provide a more engaging experience is presented. The article ends with the explanation of the immersive environments that are employed to present interactive 360° films.

360° film narrative

The procedures for the creation of narratives have long absorbed authors, theorists and film producers. Black (2001, p.300-303), while defining a narrative, states that filmic representations of stories in the form of feature films, horror, fiction or even documentaries involve the communication of the

events to the audience. This communication is in most cases via a narrator, however many literary texts have non-identifiable narrators and the story develops when the narrator is unknown. In the film, the relation between narrator and author is more complex than in the literature. Books are mostly created by individuals, whereas films are more often collaborative mediums for presenting stories so that the concept of the narrator in films is almost indefinable. Voice-over, as a technical term in scripts, refers to a spoken narrative in film and may not necessarily relate to a character who is talking. Silent moments in films are possible, because voice-over narrators tend to appear and disappear from the films. The narrative still continues to develop even when the narrator is not talking, because of the application of moving images, whereas this effect would not be possible in written literary texts.

Similarly, 360° film narrative is represented by a series of moving panoramas, where the event recorded is communicated to the audience, even when traditional voice-over is not played at the same time. What is more, Stam (1992, p.97-102) states that the feeling of narrated films is evident when technology itself tells a story, even when human characters are not introduced. However, approaches of this kind carry with them various well known limitations. 360° film narrative is a form of medium that generates a meaning in the mind of a person who is watching it and, indeed, a human character or an actor creates a meaningful film by storytelling. The meaningful interpretation is created in the mind of the viewers; even if they do not see all the screens of the 360° immersive environment they start to interpret the narrative. Every spectator gathered inside the 360° image space can have a diverse interpretation, which depends on the direction of viewing. However, the events do not have to make sense at the first time of watching. Thanks to the use of multiple screens, each viewer re-narrates events, as proposed by Mansfield (2001, p.3), to produce a new self-understanding and a new interpretation. 360° filming has the power to provide an appreciation of historical narratives, but does not produce explanations of events.

The aim of the project is to provide a new type of experience for viewers, without additional explanation, within the 360° wrap-around viewing area. This engagement for the spectators is proposed to be in the form of interactive and immersive 360° films which are prepared to be experienced in groups, rather then individually.

Söke (2002, p.27-31), while exploring the potential of narratives on multiple screens, lists the characteristics of panorama, in relation to the audience, as a form of art that is no longer for the individual, but for a large number of observers, where the point of view is not fixed. The audience decides from which point to observe the painting. The observer is no longer in front of the picture, but is surrounded. However, such explanations tend to overlook the basic concept of panorama, which is defined by Oettermann (1997, p.41) as an experience of gazing upon an artificial image and believing that it is real and

not a painted panorama. Oettermann does not relate his definition of panorama to the audience, but to an individual experience in a single observer. The understanding of the audience within rotundas and then within immersive environments helps to understand the branching narrative applied to the 360° filming in Charles Church in Plymouth.

Charles Church in Plymouth

The location of the 360° filming for this project was Charles Church. The building was completed in 1657 and consecrated by the Bishop of Exeter in 1665. Charles Church was destroyed by incendiary bombs and burnt out on the night of 20th and 21st March 1941 during the Second World War. In his study, Moseley (2010) suggests that this church was regarded as "one of the last Gothic churches to be built, before the style disappeared". Today, the church is situated in the middle of a busy roundabout. The church was dedicated to King Charles I and not to be confused with Charles the Martyr (Fleming, 1987).

For the project the church was visualised using panoramas and then reconstructed in 3D modelling software. The process of reconstruction, based on historical images found in a number of Plymouth archives, is described in a recent publication by the author (Kwiatek, 2011). 3D modelling applications were necessary to render a number of diverse alternatives that were subsequently edited-in to create panoramic linear movies which were then converted and linked into a branching narrative. Having various content rendered in 3D modelling software, recorded with virtual cameras, the researcher is proposing a 'pano-video multimodal interaction paradigm' which extends the model defined by Shaw (1997). The proposed paradigm is based on still and video panoramas, where after choosing a new branch of non-linear narrative, the observer of the interactive environment no longer immediately moves to a new position (new still panorama), but a video panorama is played that presents a journey from one point (one still panorama) to another chosen point in the space (another still panorama). Shaw does not include narratives in such movement and the observer has to wait until they reach another 360° image in order to continue a narrative. In the case of this project, video panoramas with voice-over are applied to movements between still panoramas which in whole generate an interactive narrative about the past event that occurred in Charles Church.

The basic element of the interactive narrative that happens in Charles Church is a panoramic linear movie which is played between decision points within the 'pano-video multimodal interaction paradigm', which in turn defines the further development of the story, by asking the user or audience to make choices. In order to present this type of branching narrative, I chose the story of the wedding of Ken and Phyllis Beer who married in the ruins of Charles Church on 22nd March 1941. The Blitz began on the night of 20th and 21st March 1941.

As a result incendiary bombs left the church in ruin and the location of their reception was also destroyed. Ken is 98 years old and Phyllis Beer is 92 at the time of writing this article. In 2011 they were celebrating their 70th wedding anniversary. The original marriage took place on the day after the bombing of Plymouth, but I decided to move this event in time for the purpose of the 360° interactive film, to create a dramatic atmosphere. The story starts one day earlier, when there is a threat of bombs (not when the building is destroyed), which the couple and guests were not aware of at the time.

The unique aspect of this research is that it takes panoramas (not standard movies) as the basis for the branching narrative, which is presented to a large audience in a 360° immersive environment. Spatial sound makes the audience constantly aware during the time of the presentation within the immersive environment and this is a significant improvement in the approach of telling compelling branching stories, because two different options are played for the spectators from the opposite sides of an immersive environment only during decision points.

The intention of this project is to prove that the interactive narrative can be rendered as a 360° film on the basis of a real building and also its virtual reconstruction. The process of recreating the site enables the local people to understand the history of such a location by interacting with the narrative, especially when projected on a 360° screen.

360° Filming

360° digital filming is still in the experimental stage, as the creation of 360° analogue form has been performed almost from the beginning of cinema. The first experiment with multiple cameras arranged in a circular set up was conducted by Raoul Grimoin-Sanson who created Cinéorama in 1900 (Michaux, 1999, p.61). Cinéorama was an early film experiment that simulated a ride in a hot-air balloon over Paris. Panoramic paintings and the recently invented technology of cinema were merged together. The creators of similar innovative forms of presenting immersive films (Tudor, 1979; Voyce, 1960) did not use a single lens but a number of individual cameras, which were set up in a circular rig. This type of an arrangement of cameras enables the 360° camera operator to use new techniques of filming that are not suitable for traditional filming (e.g. very slow horizontal and vertical movements of the camera).

As Burton (2001, p.65-66) notices, the point of view of the camera can also be used as a tool for storytelling. A subjective shot can be achieved by locating the camera in the position of a character. The use of other points of view may provide the audience with some narrative information or atmosphere and these positions are objective. In this project, the camera often corresponds to the

movement of the main character in the story (Kwiatek & Woolner, 2010). The application of both fixed and mobile cameras while rendering video panoramas fulfils the image requirements of creating narratives for a 360° environment. Fixed positioning of the panoramic camera represents the movement of the actors around the camera, whereas a mobile camera is used to demonstrate the main character, displaying the view that they observe during the change of their position. There are a number of concepts which have to be redefined when dealing with 360° environments. A completely new language, that of an immersive cinema, has to be created, similar to what happened with traditional cinema (Neafus, 2011). The audience, too, has to abandon their old hypnotic attachment to a seat and a rectangular screen in order to experience an immersive production. What is more, the project includes a new method of narrative exploration for such 360° films by converting them to branching forms.

In the discussion about lenses and cameras in traditional filming and 360° filming, little attention has been paid to panoramic field of view in the film industry. 360° cameras create a content that is not understood in frames. Allan (2001, p.183-184) defines framing as a method of visualising the world in which an image has been composed, but also with regard to what will be shown to the audience. In the case of this research project, the concept of framing in 360° filming as 'principles of organisation' has to be eliminated, because immersive recordings cannot operate in a limited field of view, that can be presented on a rectangular screens. The traditional methods of filming usually hide some details of the environment or a studio, because a camera records only a limited field of view, so the material recorded could be manipulated and directed in the way not to present some views. However, there are limits to how far the idea of traditional filming can be transformed to 360° film creation, because the 360° camera records all the reality that happens all around it (even the camera operator is recorded) so it is complicated to eliminate some parts of the recording. 360° filming seems to be a more realistic and less manipulated type of recording the world than a traditional camera, because it covers a 360° horizontal field of view. Additionally, the possibility of choosing the next chapter of the story should make it more engaging, which is discussed in the following section.

Interactive films

A 360° film can also be displayed on a computer screen that presents only a part of immersive production. Interactivity in this project is understood as the option of choosing between a number of alternatives what the next event of the narrative is going to be.

Hales (2002, p.183-184), according to this understanding of interactivity, defines the concept of interactive cinema as movie scenes that are combined

under computer control, so the observer when interacting with the work, "can experience something which might be considered new and different from the well-known experience of cinema-going". What is more, Hales understands cinema as a sequence of moving images. This new stimulating experience occurred also in the results of Lee, Heeter and LaRose (Lee, Heeter & LaRose, 2010, p.779) who reported high levels of enjoyment in the viewers of the non-linear television version of the modern Cinderella story. The users were enthusiastic about the possibility of making decisions. A possible explanation for Lee's results may be due to the fact that their audience was sitting in front of a rectangular screen (television). However there is no reliable evidence that the same effect can be achieved in immersive environments for standing audiences.

The idea of interacting with video is not new. Kino-Automat presented at Expo '67 in Montreal (produced by R. Cincera in Czechoslovakia's pavilion in 1967) included this type of medium, where the audience was asked to make moral judgements upon the further developments of the plot. It was an interactive film displayed on 3 screens. The audience had green and red buttons and had an opportunity to vote on the action taken by characters in the film where each decision point had two choices. According to Marchessault (2007, p.29-34) the authors of this installation believed that it could transform the future of the cinema by creating a new form of participatory multi-screen cinema, however such branching-viewing is still an experimental medium. Ben Shaul (2008) in his study provides two main reasons for such a state. Split attention and distraction of the interactor cause problems to spectators of interactive films. Ben Shaul outlines solutions that will construct deep cognitive-emotional engagement of interactors with interactive films. A limitation with this argument for the research discussed here, however, is that Shaul refers only to film narration and immersion theories that relate to the traditional film industry, and he does not consider experimental forms of 360° filming created for 360° immersive environments.

Film producers, writers, researchers, game developers have been experimenting with a paradigm of interactive storytelling where the 'readers' could interact, control or influence the outcomes of the story. The following section presents such an approach applied to immersive environments where the interactive narrative is displayed to a large audience.

Immersive environment

The origins of immersive environments can be found in historical cylindrical painted panoramas. Robert Barker, who patented the idea of the picture without borders, erected the first cylindrical buildings (rotundas) for his painted works at the end of the 18th century. Circular paintings were one of the first trials of presenting remote locations. They also educated the audience by presenting

military or biblical stories. More descriptive methods of presenting narratives were introduced with the invention of photography (1830s), cinema (1890s) and television (1920s). Early trials that used analogue projection systems and multiple screens in circular forms were noticeable at the end of the 19th century (Stereopticon, Cineorama, Electric Cyclorama, Electrorama, Photorama). More advanced solutions for creating the illusion of being in the picture appeared from the 1950s (Fernstrom, 1958; Mosby, 1958; Voyce, 1960), where the technology enabled the creation of seamless multi-projector wrap-around displays. However, the past decade has seen the rapid development of 360° digital projection systems (Haslem, 2009; Kenderdine, 2007; Piccolin, 2005; ZKM, 2008).

Multiple projections systems had an important role not only in the imaging technology "capable of articulating a new perception of the world" (Shaw & Weibel, 2003, p.117), but also in developing a new form of storytelling, where spectators become part of the system. A 360° screen provides an opportunity for spatially situating the audience within the site where the narrative is located; here they would feel personally involved. This project supports the visitor in imagining the Charles Church before it was destroyed by triggering emotional responses to the tragedies from the past.

The panoramic film about the wedding in Charles Church was presented three times on immersive screens. First, in August 2009 in the Vision3D lab at the University of Montreal (Canada), then in February 2010 in Plymouth during the event called Arena360, and then in September 2010 in Plymouth (ICCI360 Festival). The audience was enthusiastic about the opportunity of making choices, and what is more, they wanted to test other alternatives which were not chosen during their first viewing. It was evident that most of the audience wanted to choose the more dramatic option at the beginning of the interactive film.

Conclusion

This article has given an account of and the reasons for the widespread use of 360° filming to transport the audience to the past of our built heritage. 360° interactive narrative is a powerful tool for visualisation of not only the present and past conditions of heritage buildings but also to present the historical events in the contemporary ruined buildings. 360° environments provide an opportunity for filmmakers to work beyond a traditional rectangular frame. Heritage sites, especially those that are incomplete or which had been destroyed could be presented in a form of 360° narrative to local residents in order to remind them about historical events. Future research should therefore concentrate on the investigation of instant narrations. The events from the real world could be visualised for the user and in this way enable the observers to

create new narratives as they become a camera operator or a narrator in the story.

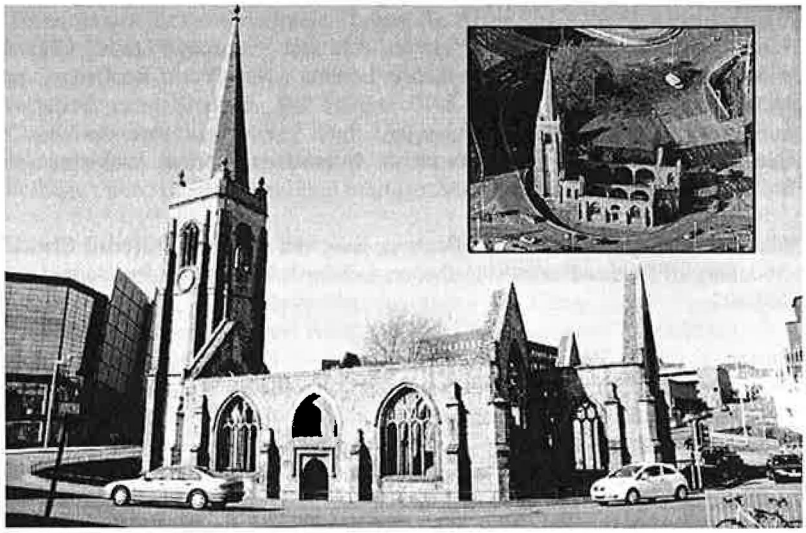

PHOTO: K. KWIATEK 2010, CHARLES CHURCH IN PLYMOUTH

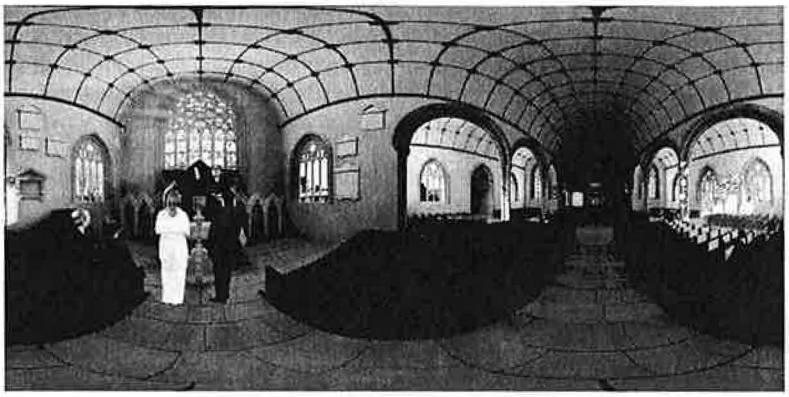

PHOTO: K. KWIATEK 2011, A PANORAMIC FRAME FROM THE 360° FILM CREATED IN A COMPUTER-RECONSTRUCTED CHARLES CHURCH

Bibliography

Allan, T. (2001) 'Framing'. in Pearson, R.E. and Simpson, P. (eds.) Critical dictionary of film and television theory. London ; New York: Routledge, pp 183-184.

Ben Shaul, N. (2008) Hyper-Narrative. Interactive Cinema. Problems and Solutions. Amsterdam: Rodopi B.V.

Black, T. (2001) 'Narrative'. in Pearson, R.E. and Simpson, P. (eds.) Critical dictionary of film and television theory. London ; New York: Routledge, pp 300-303.

Burton, T. (2001) 'Point of view of the camera'. in Pearson, R.E. and Simpson, P. (eds.) Critical dictionary of film and television theory. London ; New York: Routledge, pp 65-66.

Del Favero, D., Brown, N., Shaw, J. & Weibel, P. (2005) 'T_Visionarium: the aesthetic transcription of televisual databases'. in Frohne, U. and Schieren, M. (eds.) Present, Continuous, Past. New York: Springer.

Fernstrom, R. (1958) 'Shooting a Film for the Fair', American Cinematographer, February 1958 pp. 92-116.

Fleming, G. (1987) Plymouth in War & Peace. St Teath: Bossiney Books.

Gaffney, D. (2006) 'Wrap-around Cinema', UNSWorld - The magazine for Alumni and Friends, (5), pp. 9.

Garlot, P. (2011) 'Totavision: Versailles and science - the making of 360-degree film for 360-degree screen in Versailles'. [Online]. Available at: http://sites.google.com/site/totavisioncatalogueevi/news/august2010 (Accessed: 12.03.2011).

Hales, C. (2002) 'New Paradigms <> New Movies'. in Rieser, M. and Zapp, A. (eds.) New screen media : cinema/art/narrative. London: British Film Institute, pp 105-119.

Haslem, W. (2009) A new cinema: immersive and interactive. RealTime Arts, (89) 23.

Kenderdine, S. (2007) 'Speaking in Rama: Panoramic Vision in Cultural Heritage Visualization'. in Cameron, F. and Kenderdine, S. (eds.) Theorizing digital cultural heritage: a critical discourse. Cambridge, Mass.; London: MIT, pp 301-331.

Kenderdine, S. & Shaw, J. (2009) 'UNMAKEABLELOVE: Gaming Technologies for the Cybernetic Theatre Re-Actor'. ACE 2009. Athens, Greece: 29.10 - 31.10.2009.

Kenderdine, S., Shaw, J., Del Favero, D. & Brown, N. (2008) 'Place-Hampi. Co-evolutionary narrative and augmented stereographic panoramas, Vijayanagara, India'. in Kalay, Y.E., Kvan, T. and Afflek, J. (eds.) New heritage : new media and cultural heritage. London: Routledge, pp 275-293.

Kenderdine, S., Shaw, J. & Kocsis, A. (2009) 'Dramaturgies of PLACE: evaluation, embodiment and performance in PLACE-Hampi'. Proceedings of the International Conference on Advances in Computer Enterntainment Technology. Athens, Greece: ACM, pp 249-256. (Accessed: 22.02.2011).

Kwiatek, K. (2011) '360° film brings bombed church to life', Remondino, F. and El-Hakim, S. eds.). 4th ISPRS International Workshop 3D-ARCH 2011. Trento, Italy 2-5 March 2011. International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences.

Kwiatek, K. & Woolner, M. (2010) 'Transporting the viewer into a 360° heritage story. Panoramic interactive narrative presented on a wrap-around screen.'. 16th International Conference on Virtual Systems and Multimedia - VSMM2010. Seoul, South Korea: 20-23.10.2010 IEEE Inc., pp 234-241.

Lee, M. S., Heeter, C. & LaRose, R. (2010) 'Interactive vs Linear Narrative in Solitary and Co-Viewing Settings A Modern Cinderella Story: A Comparison of Viewer Responses to Interactive vs Linear Narrative in Solitary and Co-Viewing Settings', New Media & Society, 12 (5), pp. 779-795.

Mansfield, C. (2001) 'Identity and Narration in Chris Marker's La Jetée and the Appearance of the Internet as a Symptom of Cold-War Anxiety' in Ribiere, M. and Baetens, J. (eds) Time, Narrative and the Fixed Image/Tempts, Narration et Image Fixé. Amsterdam, Rodopi.

Marchessault, J. (2007) 'Multi-Screens and Future Cinema: The Labyrinth Project at Expo 67'. in Marchessault, J. and Lord, S. (eds.) Fluid screens, expanded cinema. Toronto; Buffalo: University of Toronto Press, pp 29-51.

Michaux, E. (1999) Du panorama pictural au cinéma circulaire: origines et histoire d'un autre cinéma, 1785-1998. Collection Champs visuels. Paris: Harmattan.

Mosby, A. (1958) 'Movie Systems in the Future', American Cinematographer, August 1958 pp. 492-514.

Moseley, B. (2010) 'Plymouth Charles' Church'. [Online]. Available at: http://www.plymouthdata.info/Churches-Anglican-Charles.htm (Accessed: 10.11.2010).

Neafus, D. (2011) 'The language of Immersive Cinema - Designing for Fulldome'. FulldomeUK 2011. [Presentation] Birmingham. Available at: http://www.fulldome.org.uk/?page_id=61 (Accessed: 31.03.2011).

Oettermann, S. (1997) The panorama: history of a mass medium. New York: Zone Books ; London : MIT Press.

Piccolin, L. (2005) 'Rundumkinos: Vom Panorama zu 360° Filmsystemen'. [Online]. Available at: http://www.filmmuseum-hamburg.de/856.html (Accessed: 21.05.2010).

Shaw, J., Duguet, A.-M., Klotz, H. & Weibel, P. (1997) Jeffrey Shaw : a user's manual, from expanded cinema to virtual reality = Jeffrey Shaw : eine Gebrauchsanweisung, vom expanded Cinema zur virtuellen Realität. Ostfildern: Cantz.

Shaw, J. & Weibel, P. (2003) Future cinema : the cinematic imaginary after film. Electronic culture--history, theory, practice. Cambridge, Mass.: MIT Press.

Söke, D. (2002) 'The Art of Narrative - Towards the Floating Work of Art'. in Rieser, M. and Zapp, A. (eds.) New screen media : cinema/art/narrative. London: British Film Institute, pp 27-41.

Stam, R. (1992) New Vocabularies in Film Semiotics: Structuralism, Post-Structuralism, and Beyond. London: Routledge.

Tudor, A. (1979) 'Wrap-around cinema', New Society, 50 pp. 196-197.

Voyce, A. (1960) 'Russia's Circular Kinopanorama', American Cinematographer, 41 (1), pp. 46-50.

Yelin, D. (2000) 'Iwerks in the Round', American Cinematographer, 81 (9), pp. 28-33.

ZKM (2008) 'PanoramaFestival - Panoscreen'. [Online]. Available at: http://www.zkm.de/panoramafestival (Accessed: 13.05.2010).