

Presence as Performance: the mystique of digital participation

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Introduction: The Idea and the Method

Elsewhere, we have discussed perceptually-seductive technology - interactive media designed to engage relatively direct perception rather than thoughtful reflection (Waterworth, 2001). Our Focus, Locus and Sensus (FLS) model of experience suggests that digital media that have this effect also generate a strong sense of presence (Waterworth and Waterworth, 2001). At Presence 2001 we described experimental results providing some confirmation of this idea, based on an interactive production called *The Illusion of Being* (Waterworth et al., 2001). In the present paper, we describe the use of interactive technology to seduce people to become performers – not mere “audience participation” but more “participation mystique” (Lévy-Bruhl, 1926). Our suggestion is that we can understand and maximise social presence in virtual environments in this way. Further, we suggest that viewing presence as the result of participation removes the distinction between social and individual presence.

We call ourselves a studio rather than, say, a laboratory, because we work at the borders between art, technology, media production, interaction design, and science. Our method includes the creation of working prototypes that illustrate, and can be used to test, theories of how people relate to, and are changed by, technological innovation and new media productions. As researchers with a background in informatics and experimental psychology, we often use standard experimental techniques – carefully controlled conditions, manipulation of independent variables of interest, measurement of changes in relevant dependent variables – to test hypotheses that predict how some aspect of new technology will affect experience and behaviour. But we also create media productions that exemplify theories of human-IT interaction, and test them using a different model of research more common in the world of art and the media – does the production “work”: are people moved and changed by it, do they laugh, cry and gasp, does it affect them as we predict it will?

For the present work we created a distributed virtual reality environment into which participants can enter from various places around the world. We have previously experimented with interactive theatre, in a production called *Is There Anybody Out There?* This short drama involved audience members in active decision making which partially determined how the plot unfolded. It was performed in a real, physical theatre with specially constructed seating. For some audience members, their chairs were mobile and also featured a push button. They listened to the show via personal headphones, through which they also heard the voice of a “play leader”. Different audience members heard different versions of the play, and at times had the opportunity to respond by pressing the push button once for “Yes” and twice for “No”. Partly depending on their responses, their chairs would move further from, closer to, or even into the stage area itself, and the course of the play could also change direction.

Is There Anybody Out There? was successful in engaging audience members, at least those who participated in the action; sometimes, surprisingly so, with some participants showing visible distress when they were ‘left behind’ in what they seemed to see as a race to join the actors on stage. We took this as an indication of a high level of experienced social presence for participants versus observers, in line with findings from earlier studies of social presence. We decided to explore the extent to which audience participation can shed light on social presence, and presence generally. However, there are obvious constraints on audience participation in ordinary theatres, given the limitations of real-world physics. For our next piece of interactive theatre, we moved the stage from a physical space to a distributed, shared, virtual one.

In the next section, we expand a little on the suggested link between sense of presence and the phenomenon known as “participation mystique”. After that, we describe our distributed VR theatre production, *Incarnation of a Divine Being* and the present our conclusions.

Focus: Presence and Participation

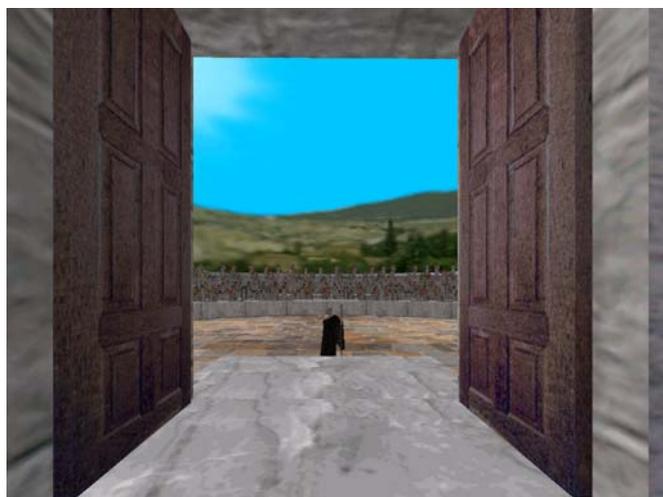
As already mentioned, the FLS model (Waterworth and Waterworth, 2001) suggests that sense of presence is strongest when attention is most occupied by perception of the environment (physical or electronic), and weakest when attention is most occupied with mental reflection. By this view, media requiring more abstract processing (text, maths formulae, etc.) tend to result in a lower sense of presence than media that are perceived more concretely (film, VR, etc.) – i.e. more like the way we perceive the physical world. The difference is in the nature of the contents of consciousness. Conscious attention is always a result of brain activity. But perception of the physical world, and of VR, is experienced as something “out there”, not in the head, whereas mental images, thoughts, musings, fantasies, and so on, are experienced as “in here”, inside some internal space inside the head. For a clear account of the vital importance of this distinction

to an understanding of consciousness, see Velmans (2000, e.g. page 126). The FLS model, and some early evaluations of presence with media varying in degree of abstraction, suggests that this distinction in conscious experience may also underlie variations in experienced presence.

Velmans puts it (p. 110) like this: “what we normally call the ‘physical world’ just *is* what we experience. There is no *additional* experience of the world ‘in the mind or brain’”, whereas, “We also have ‘inner’ experiences such as verbal thoughts, images, feelings of knowing, experienced desires, and so on.” and “In so far as these processes are experienced, they are reflexively experienced to be roughly *where they are* (in the head or brain)”. In terms of the FLS model, this distinction represents extreme points on the focus axis; normally of course, the contents of consciousness are a mixture of these two types of experience. FLS suggests that the proportions in the blend determine the degree of experienced presence.

What is called self-consciousness is a reflective state, because what we call “the self” is a mental construction – made of thoughts and images, not something that is or can be perceived in the way the external world (including one’s own body) or a VR can. At the extreme end of the focus dimension, there is no observer/observed distinction in the contents of consciousness. This would seem to be related to Csikzentmihalyi’s notion of *flow* (see e.g. Csikzentmihalyi, 1993), the merging of action and awareness. It may also be what Blackmore (1999) describes as getting “out of the meme race”. Something akin to this does sometimes happen in people’s experience of VR environments, when they feel more present than is ever the case in the physical world. This has been called “superpresence” (Waterworth et al., 2001) or “hyperpresence” (see also Davies, 1998, 1999).

Participation mystique (Lévy-Bruhl, 1926) refers to what was – in the early days of social anthropology – regarded as a psychological state of under-development, found in young children and “primitives”, where the self is not differentiated from something outside the self. Harding (1965) gives an unusually clear account of this from a Jungian perspective. This “something” could be an object in the environment – a tree, rock or animal, for example – or, most commonly, the group. In participation mystique the individual experiences unreflective engagement with the group. We can see that this may occur in several types of contemporary social situation: rock concerts, football matches, battle situations, lynchings and religious meetings, for example. More reliably and with generally less drastic effects, it sometimes occurs on stage, when an actor becomes transformed in performance. After such an event, the participant may ask himself “Did I really do that?”.



The chorus leader waiting for the participants

The Production: Incarnation of a Divine Being

Avatar (from Sanskrit *avatara*, 'descent'): In Hindu religion, the incarnation of a divine being which descends into the world to restore order

The Thames and Hudson Dictionary of Art Terms

Incarnation of a Divine Being opened on September 1st, 2001 at the annual [Ars Electronica Festival](#) in Linz, Austria. During the festival there were more than 30 performances of the show, all different from each other because the course of events is determined as the action unfolds. The inspiration was from the ancient Greek theatre, which did not apply just to the design of the scene, but also to the whole concept, including the chorus and their leader who assists the visitors in bringing the story forward. The vision behind the creation of the theatre was to provide a virtual space where people can meet and together create an improvised performance. During the Festival, the chorus leader was located in Umeå, North Sweden. The "actors" (members of the public) entered the stage from other places in the world - Rotterdam, Buffalo, Linz, Budapest, Indiana and Chicago.



The chorus leader interacts with two visitors (unseen here) who have entered the stage

In the production, a chorus assists the chorus leader, just as was customary in the ancient Greek theatre. The chorus reacts to what is said and done on the stage. It gives advice, expresses opinions and asks questions such as: "If the king is dead, who killed him? "We want you to help us", "We have heard evil rumours". It also expresses emotions through sounds and acclamations: "Ahhhh", "She's a liar!", "Hahahahaha". The chorus's and the chorus leader's role is to incite, encourage and prompt the actors to improvise, interact and communicate, and thus stimulate both the action and the interaction.

The participants appear on the virtual stage in the form of avatars, i.e. digital incarnations of the participants. Tracking systems locate the individual actor's position in relation to the co-actors and to the virtual theatre, and also detect some arm and head movements. Other interaction devices include joystick, wand and mouse (depending on the role of the participant). The chorus have some simple pre-programmed behaviours, such as arm movements, but were mostly controlled by members of the production team at the Umeå site, including the selection of vocal phrases and effects that were pre-recorded and sampled into a keyboard. The chorus is there to respond to what is happening on stage in a way that enhances the effectiveness of the chorus

leader. The chorus leader (played by a professional actor/director in Umeå) lays out the plot and guides the improvisation. All the models used in the theatre, including the settings and the avatars, were created by 3D-modelling tools as polygonal models covered with textures to make them more realistic.



Chorus leader interacts with the visitors, here dressed up as goddess and old man

In the following sections we take a closer look at the software that was utilised in displaying the virtual environment in the theatre.

OpenGL Performer

At the lowest level, closest to the computer hardware, OpenGL Performer is used as the application development environment. It provides a comprehensive programming interface for developers who are creating real-time visualization simulations and other graphical applications directed toward high-performance 3D graphics.

The benefit gained in using Performer is that the development of real-time applications is much less time-consuming than when starting from scratch, using pure OpenGL. Performer is also optimised for performance; it is easy to build efficient applications that will get the most out of the hardware. The developer does not have to spend much time in fine-tuning an application to achieve higher performance.

Ygdrasil

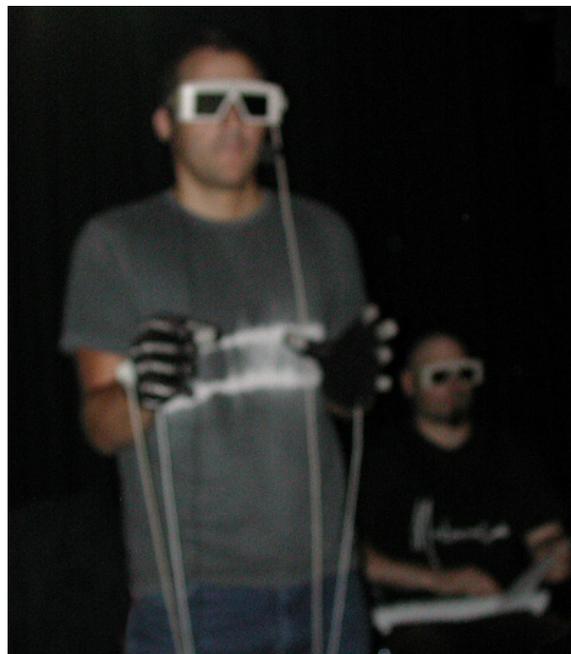
The name Ygdrasil originates from Norse mythology, where it represents a giant tree symbolising the universe and its creation. In this case Ygdrasil (Yg for short) is a scripting language developed at Electronic Visualization Laboratory (EVL) in Chicago. It is made to simplify the task of writing collaborative VR-applications. Yg is built in C++ on top of the following libraries: CAVE library, SGI's OpenGL Performer visual simulation toolkit, and the CAVERNsoft G2 library.

The CAVE library is an Application Programmer's Interface (API) that provides a software toolkit library for the development of virtual reality applications. It is built upon OpenGL Performer and takes care of the processing and rendering of viewer-centred

stereo perspective for different kinds of displays. It also handles multi-processing, synchronization, shared memory and provides general utility functions. The CAVE library is created for the CAVE system originally developed at EVL. In the current version it also has support for several other devices in addition to CAVEs, such as ImmersaDesks and HMDs (Head Mounted Displays). The details of the hardware are transparent for the application to simplify the porting of applications between different types of hardware. The library is also able to read various tracking devices and wands.

With the help of these libraries, Yg provides a higher level scripting language which makes it easy to create small, networked virtual environments. The idea behind Yg is very simple, the system provides a way to manipulate objects and their behaviour in the world. To make this as easy as possible for the user, the developer has specified this scripting language especially for this purpose. The scripts contain all the information needed by the system to build the virtual world. While parsing the script the system dynamically builds a Performer scene graph to display the graphical objects. The script may also contain behavioural information regarding the objects.

The main advantage using Yg is the support it provides for writing collaborative applications. By default, all applications based on Yg are possible to use in collaborative mode. To get a consistent view of the world, all the clients who have joined the session must have the same view of the scene graph. This is accomplished by distributing the scene graph between the connected hosts. In most cases, no single machine will have the complete copy of the full scene graph. Any particular machine will only have the parts of the scene graph that it controls, and proxies¹ for any other node that it needs for its calculations and rendering. Only the owner, the creator, of a particular node is allowed to change the state of a node in the scene graph.



The real chorus leader and the chorus controller during a performance

¹ Local copies, which are read only, of all the objects owned by other clients.

Technical Conclusions

The use of the libraries described above has made the application very flexible. It can be used on both quite ordinary PC's running Linux operating systems using the mouse as steering device and also powerful SGI graphics machines in a full CAVE system where the user is wearing tracking devices.

The main limitation for the application is the quality of the sound. The sound system is quite simple, just sending raw, not compressed, mono 8-bit sound. This could be improved a lot using effective real-time compression algorithms. Since the theatre application is highly dependant on the audio this ought to be done. Another way of improving the aural experience is to use positioned audio for the communication between the users, the chorus and the play leader. Most of the target platforms do support 4-channel stereo, so the use of positioned audio from all the participants would be interesting and easy to explore. Previous experience suggests that the use of positioned audio can improve experienced presence considerably.

Other possible extensions would be the user avatars. So far they have had only stiff arms and only one arm was tracked. This greatly limits their potential for expressiveness; many gestures require two arms to perform and body language becomes very limited using only one stiff arm. In some cases, this probably interfered with participants' sense of personal involvement.



Jonas W monitoring system backstage

Conclusions: Participation Mystique and the Unity of Presence

The improvised story was in many cases experienced as complicated and interesting, but also sometimes boring and meaningless. The chorus leader's role was crucial to the success of the experience. When the play worked, participants were surprised by their level of involvement in the play, as reported afterwards. They described their sense of dread at the thought of having to take an active part in the action, which was then replaced by a loss of self-consciousness as they became emotionally and socially engaged in the interaction.

As Nath (2001) suggests, in immersive VR every user is a performer, but VR designs rarely capitalise on this insight. In true performance mode, actor and action become one. We can see this as a special case of participation mystique, where observer and world are one. We suggest that this unity is the essence of presence – whether social or individual.

Credits

The Incarnation of a Divine Being was produced and performed by the Interactive Institute Tools for Creativity studio in Umeå, Sweden, in cooperation with the company Oryx Simulations AB, Umeå and the VRlab, Umeå University. The project was part-financed by the European Community, European Regional Development Fund.

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