Designing a Movement-Based Interactive Experience
Using Empirically Derived Personas and Scenarios

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ABSTRACT
This research project draws together two areas: interactive art and Human-Computer Interaction (HCI). This paper describes the data collection of audience behaviour in a variety of museum and gallery locations. Subsequent data analysis leading to persona and scenario design illustrates how empirical data can inform the design of a movement-based interface. Finally, low level prototypes were developed to aid the artist/designers in their aims to create an interactive installation in which visitors could learn contextually driven behaviour.

Keywords
Scenarios, personas, prototypes, audience behaviour, interface design

INTRODUCTION
This paper describes how scenarios and personas were used to provide a range of design options for the interface design of an immersive installation in which the audience experiences a sense of being psychologically and/or physically present in a computer-mediated space. The rationale for using HCI methodologies developing personas and scenarios grounded in field studies are that they offer essential theoretical and methodological tools to develop a better understanding of the audience experience of interactive art, and an expanded critical vocabulary to describe it. This paper offers a case study of how observations informed the development of personas and scenarios, leading to low level prototypes.

The overall aims of this project were to design an interface that allows users to access an archive of historical crime scene photographs and accompanying poetic texts. Secondly, to reflect on how traditional HCI practices might be used and developed to maximizing the potential interaction and experiences of audiences in multi-user, immersive, interactive gallery or museum environments.

The following sections describe the key features of this installation project and then explain the ways in which HCI has been applied to its design. Subsequent sections describe how personas, scenarios and low level prototyping, grounded in user observations, were used to inform the design of an interactive installation. Finally, reflections and recommendations for future use of HCI approaches to installation design are discussed.

INTERACTIVE, IMMERSE INSTALLATION
This project is based on an installation that is the most recent work in a suite of multimedia artworks ‘Life after Wartime’ created since 1999 by Ross Gibson and Kate Richards, assisted by a production team that has included a graphic designer, a composer and several programmers. The designer goals of the interactive, immersive multi-walled room were that it would intuitively teach visitors to be attentive, respectful, cautious and custodial to historical material (archival crime scene photos).

The original idea was that when someone enters this room they would immediately be able to respond to the historical material and the technology-surveyed room itself would respond to the presence and activity of those in the room by changing what material was revealed and how it was displayed. The corresponding audience response encouraged by historical material was envisaged by the artists to include quiet, slow movements and general bodily stillness. The interactive space would be a ‘hypersensitive’ and ‘haunted’ environment. Key goals included that the interface would be intuitive and would encourage collaborative group behaviour.

The design specifications of this exhibition included a multi-walled environment with computer fed crime scene photos and poetic text moving across the walls in a pattern similar to that of flocking birds. Motion sensors would detect the movement of visitors to the room and depending on the movement detected, cause the pictures and text to move differently. The designers envisaged that the pictures and text would ‘flock’ around the space at different speeds depending on the behaviour of the people. They assumed that if people were too active (i.e. not attentive, respectful, cautious etc.) the room would ‘react’ by moving pictures and text in an incoherent, disturbed manner. This was seen by the artist/designers to be a punishment for incorrect behaviour. Conversely, if people were respectful and
cautious etc. the room would slow down, become calmer and more coherent. This was seen by the artist/designers to be a reward for appropriate behaviour.

However, the designers’ visions of how the installation and audience would interact, assumed user behaviour with no empirical evidence of whether audiences would interact with the room or learn from the room in the manner described. In order to address these assumptions, and to better understand audience behaviour, techniques and methodologies from HCI were called upon to inform the installation’s design process.

**HCI INFORMING INTERACTIVE ART**

HCI approaches are envisaged to improve the ‘efficiency’ of the process of designing such a complex environment. In this context the meanings of ‘efficiency’ included: that already understood potential problems of technology use might be anticipated and avoided during the design phase; that the ‘usability’ and ‘usefulness’ of this installation could be defined according to audience experience and the situated use of the technology; that the technology did not drive the process and become the content of the final environment; and, most importantly, that the effects of multiple users on the behaviour of the room, and on each others’ experience of it, could be explicitly addressed and kept active during the installation’s design and development.

With the advent of computer-based interactivity a new kind of art-experience has come into being which is beyond the reach of existing art-theoretical approaches [7]. The experience of art is fundamentally interactive, comprising interplay of environment, perception and the generation of meaning in the mind of the audience. However, whilst lines of inheritance and continuity can of course be traced through aesthetic and technical developments that inform interactive art there is something new that appears with the arrival of the computer [5, 6]. In computer-based interactive art, interactivity itself is the very medium of the work.

All technologies reflect the humans that create them; Latour [4] describes this process as bi-directional, with tools also forming human behaviour. Technologies are the means by which humans shape the world, and in return they shape our relationship with it. Art and new technology practice is conceptually very rich. It helps us begin to understand how human-computer interactivity itself can work as a medium. An artwork’s location of meaning is not just interactivity in an abstract sense, but situated interactivity. Within this project’s environment, the room is not ‘used’ in any traditional sense in that it has no tasks and supports no active goal related activity.

**USER RESEARCH**

In this project, personas, scenarios were developed from participant observations of interactive, immersive museum and gallery spaces in Australia and France. The results of these techniques were then used to generate design possibilities that maintained a connection with audience experience.

**RESEARCH DESIGN**

Our approach was to gain an understanding of the behaviour of visitors to similar cultural spaces. This understanding was used in two ways; firstly to develop design options which related the design aims and specifications of the project HCI techniques, and secondly to create personas that could help us to evaluate, from the point of view of user experience, the effectiveness of the design options through the construction of scenarios. Techniques used in this project were informed by descriptive and imaginative approaches to developing personas and scenarios [1, 2, 3]. These techniques offer a framework of formative evaluation based on an iterative process that can be appropriated maintain accountability to the primacy of real, lived audience experience. Based on this evaluation we selected and further refined one design option from three initial design options for which we created a paper prototype. The observations, persona and scenario development are now described.

**OBSERVATIONS**

Two separate studies of audience behaviour in immersive spaces were completed. The main study in three prominent gallery and museum spaces in Sydney involved several researchers. A smaller parallel study of similar spaces in Paris was conducted by a single researcher. In total, over one dozen immersive spaces were observed.
Both studies investigated audience behaviour within available examples of cultural/artistic installations that shared one or more qualities with the aims of our design project. Traditional museums as well as a range of art gallery environments were visited in both cities because it was (correctly) assumed that audience behaviour would vary according to the prevailing social protocols of the particular institutions. All observations were written up, including the physical configuration of the exhibit and the behaviour of the audience. Raw data was shared with the group, and findings extracted and recorded.

RESULTS OF OBSERVATIONS
One of the key findings was that audience behaviour was unlikely to be controlled or predicted by the design team. Other important observations related to the designers’ original assumptions of their future audience including, uncontrolled, unpredictable audience behaviour and numbers; visitors not responding to others’ verbal suggestions; lack of visitor understanding as to what the art and interaction was trying to achieve; a lack of reading or heeding instructions; lack of knowledge that art was interactive; interactivity distracting from content and meaning.

Specific behaviours observed that also challenged designers’ original assumptions included audience members performing one (or more) of the following behaviours, ‘poking their heads in’ and retreating; walking into the space, standing still and walking out (30 seconds to 3 minutes); ‘skimming’ through the museum or gallery for something to catch their eye and then performing the former behaviours; attempting to work any and all devices but disinterested in the content; or ‘serious engagement in their movement within the installation, for example, moving around the edges of the room.

In addition, museums and some galleries function as childcare/entertainment and places where people do not have to keep still. Children ran wild in these large spaces and touched as many things as they could.

PERSONAS AND SCENARIO DEVELOPMENT
Based on the observations of different behaviours and types of people, three key personas were developed. These personas reflected the observations made by the researchers. The personas included a middle aged woman visiting with a friend; an 11 year old, very active boy; and an audience member who regularly attended such exhibitions.

The following excerpt is an example of the latter persona based on some typical behaviour observed in several museum spaces.

Luke, aged 25, is a full-time arts student, a painter. Luke is a regular visitor at exhibitions, going fortnightly to different spaces. He prefers art galleries like the MCA, and avoids places like the Powerhouse Museum where there are lots of kids. Luke is very interested in the significance and meaning of art works. He spends a large amount of time in each exhibition, absorbing the art and the artist’s intention. Luke visits galleries with his girlfriend, Gemma, or with friends who are similarly involved in art. They often whisper to each other or point out things of interest within the space, and then stand outside of the entrance afterwards, either re-reading parts of the info panel or discussing their experience of the art. Luke is highly irritated by people who interrupt his experience of the art, such as talking people or active children. When irritated, he often leaves the space and attempts to return later when no one is there.

SCENARIO DEVELOPMENT
In order to highlight audience behaviour observed in similar installations, the scenarios were created to explicitly address the following three issues. Firstly, we found that individual versus group experience is a very challenging negotiation especially when considering the number of different types of people that may enter a public exhibit. Our answer was to create scenarios that highlighted both participation and non participation, within the immersive experience which could allow for different behaviours of others in the space and limit the frustration of individual users whose experience is disrupted. Secondly, we constructed scenarios describing personas intuitively understanding, or failing to understand, the interface. The following is an excerpt of a scenario developed for the project.

…He starts to become absorbed in the pictures and their related texts, but the children in the room are becoming restless and more confident in their environment. They start to play games with the light, pushing one another in and out of the beams. Their giggling disturbs him and begins to annoy him, but what is worse, the images and texts on the walls begin to move too quickly for him to read. As the children become more and more boisterous running in and out of the light the images begin to swirl frenetically. He gives up reading and concentrating on the images and text and moves back to the centre of the room still sticking in the dark. The chaotic swirling of images and text are almost nightmarish and the noisy children are becoming incredibly annoying. Luckily, they are also getting bored and leave quite quickly. However the room does not settle down when they leave. When the room is empty Luke feels like stepping into the light himself. As soon as he steps into the beam of light the images suddenly slow down, though not completely, their movement is definitely more sedate. He steps towards the wall to examine them more closely, and they begin to swirl crazily again. He steps back into the light and they slowdown. He realises that this is the interactive element, and that he has a great deal of control over how the room behaves.
For many users exploring and discovering the interface was a key factor deciding their quality of their experience. Furthermore, we considered the process of discovery versus explicit instructions. Thirdly, we explored the designers’ assumptions that the intuitive interface should encourage stillness. From our observations, children tended to actively interact with such interfaces and could potentially learn the opposite lesson from the interface; more action resulting in faster ‘flocking’ behaviour. This could also be the case for audience members who would actively explore any and all perceived interfaces.

Our observations showed that achieving the design aims of the interactive immersive installation would be very challenging, as the hoped-for behaviour contrasted with much of the user interaction we had observed. Drawing on Bodker’s development of plus and minus scenarios to caricature future use situations [1], we brainstormed “extreme” design options to stimulate creative responses and to illustrate some of the problems we foresaw in controlling the behaviour of visitors to the space. As Bodker notes “it is just much easier to use one’s common sense judgement when confronted with a number of extremes, than when judging based on some kind of “middle ground” [1, p. 73].

Key features for achieving the desired behaviour included very direct imperative instructions such as, obvious visual cues such as warning signs and flashing lights, sonic cues such as alarms, and attendants correcting behaviour within the space. Drawing from the key findings from our observations of more and less effective interaction design choices, our knowledge of different audiences expressed in our personas and the ideas generated from our brainstorming session we came up with three design options. Figure 1 is an example of one design option.

**Figure 1. Light Beam Option**

This Light Beam design accounted for varying numbers of visitors. A sign on the wall outside of the entrance could provide an ambiguous description to interested visitors of the historical nature of the work without informing the visitor that the space is interactive. The light beams are the point of interaction. The interaction is activated when a visitor steps into the light beam (e.g. there is a sensor pad on the floor). The rest of the room is in semi darkness. Further rewards are given to the visitors when they work together as a group. i.e. when two people stand in two light beams, a noticeable difference occurs (than for one person) with greatest effect when all four light beams are occupied. There is continual ambient meditative noise in the room which remains peaceful, no matter what state the images and text are in. The default state of the images and text involves both ‘swirling’ fast. When a visitor stands under a light beam, the images and text slow down and are ‘peaceful’.

This design was based on a number of field observations. For example, the tendency of visitors to enter a space, pause at the door and then decide whether or not to explore the space further, and secondly, that people tend not to talk to each other, and that people tend not to explore their surroundings in an exhibition. The idea of using lights was to draw people’s attention and curiosity, and to reward people when they step into the light (bathing in light being equivalent to warmth and attention). This design solution aims to allow both participation and non-participation within the space (choice), to encourage group work, and to provide a direct and obvious mapping between a person’s movements and the response (slowing down) of the images on the screen.

The following are key features based on the observations, scenarios and personas that we explicitly included in the prototype design requirements.

- Interface allowed participation and non-participation
- Atmosphere: light/dark and sound are very important
- Implicit instructions and not being able to see in the space could create sense of mystery
- Darkness makes people move more slowly
- Children need close supervision
- Quite good possibilities for group work
- Hard to make adequate differentiation between one and many in light, whilst still making it workable for single user
- Not everyone will understand or be aware of the interface
- Content is prioritized.

**DISCUSSION**

HCI techniques informing interactive, immersive installations such as the Bystander Field provide multiple potential benefits for designers in this field by incorporating a wealth of user based approaches to maximise user/audience experience.
It is important to note that this observation and scenario writing phase occurred before a prototype of the bystander field was created. Uptake and incorporation of the findings and scenarios into the design process requires further exploration and development. Similar to this project’s goal of facilitating audience-installation interaction, further critical reflection needs to be conducted on facilitating designers to understand and incorporate the results of studies such as this one to maximise user experience.

One development currently being explored by another researcher on the Bystander Field project comprises designers playing the parts of personas acting out scripts based on scenarios within a low level prototype in order for them to experience the situation for themselves.

ACKNOWLEDGMENTS
We thank Ross Gibson, Kate Richards and all the production team of the Bystander Field for their support for this project.

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