ie2010

The 7th Australian Conference on Interactive Entertainment

22-23 November 2010

Massey University, Wellington, New Zealand

ieconference.org

Fish of the day

Cultural Play
Social Play

Technical Play
Visual Play

Experimental Play
Art and Design

Fish of the day:
Play as an agent for change

7th Australian Conference on Interactive Entertainment
Nov. 22-23, 2010

Massey University, College of Creative Arts,
Institue of Communication Design, Wellington, New Zealand

http://ieconference.org/ie2010

Endorsed by

DesignResearchSociety

acm In-Cooperation

Association for Computing Machinery, Inc.

ISBN 978-1-4503-0566-2

Welcome

In this current economic climate of uncertainty, we see a convergence of innovative minds, creative solutions and emerging technologies enabling change. IE2010 will cover how PLAY can contribute to both major and minor challanges we are facing in these roaring times. What can we learn from being inventive and playful? And how can interactive entertainment contribute towards facilitating these changes? What do we need as designers, developers, critical thinkers and researchers to consider, bring in, promote when faced with these challenges? What is the role of play in future scenarios?

The Australasian Conference on Interactive Entertainment, in its seventh year, is cross-disciplinary conference that brings together researchers from artificial intelligence, audio, congnitive science, cultural studies, drama, HCI, interactive media, media studies, psychology, computer graphics, as well as researchers from other disciplines working on new interactive entertainment specific technologiesor providing critical analysis of games and interactive environments.

During two exciting days at College of Creative Arts of Massey University in Wellington, New Zealand we met to present and discuss research in the area of play and interactive entertainment, including both academic and industry, national and international attendees.

We were also fortunate to have two keynote speakers for the IE2010 conference. Katie Salen, game designer and Professor of Design and Technology, and Director of the Center for Transformative Media at Parsons the New School for design will be joining us from the USA. And our local speaker is noted Art Director Joe Bleakley, known for his creative work on the Lord of the Rings Trilogy and King Kong.

We hope you have enjoyed this IE2010 as much as we did.

Warm wishes on behalf of the Organizing Committee

Conference Chair: Aukje Thomassen
Programme Chair: Erik Champion
Honorary Chair: Yusuf Pisan

IE2010 would like to thank the following people of the organising committee for their research contributions

Conference Manager: Brownyn Holloway-Smith
Exhibition Curator and Project Leader: Tanya Marriott
Long and Short Paper Facilitator: Gray Hodgkinson
Demonstrator Fasilitator: Karen Curley
Play Walk Facilitator and Designer: Anthony Nevin
Visual Communication and Brand Design and Strategy: Gerbrand van Melle
Graphic Design Support: Katie Bevin, Jess Lunnon
Technical facilitators: Ken Elliott, Durgesh Patel, Tim Turnidge and Karl Partsch

Paper Reviewers

Matt Adcock, CSIRO, Australia
Laurent Antonczak, AUT, New Zealand
Michael Barlow, Australia Defence Force Academy, Australia
Mark Billinghurst, HIT Lab New Zealand
Erik Champion, Massey University, New Zealand
Brigid Costello University of New South Wales, Australia
Anders Drachen, Institue for Informatics, Copenhagen Business School, Denmark
Steve Goschnick, Universityof Melbourne, Australia
Michael Hitchens, Macquarie University, Australia
Gray Hodgkinson, Massey University, New Zealand
Andrew Johnston, University of Technology Sydney, Australia
Russell Lowe, University of New South Wales, Australia
Hongen Lu, La Trobe University, Australia
James Noble, Victoria University of Wellington, New Zealand
Yusuf Pisan, University of Technology Sydney, Australia
Kura Puke, Massey University, New Zealand
Debbie Richards, Macquarie University, Australia
Peter Rive, Victoria University of Wellington, New Zealand
Malcolm Ryan, University of New South Whales, Australia
Gareth Schott, University of Waikato, New Zealand
Nicolas Szilas, Universite de Geneve, Switzerland
Aukje Thomassen, Massey University, New Zealand

All abstracts in the proceedings were independently reviewed by two members of the committee. Authors were then invited to submit either full papers or extended abstracts for further review, according to the conference criteria.
Upon review, feedback and any revisions requested by two independent reviewers, selected papers were accepted as full papers.

Programme

Sunday 21 Nov	
1.00-3.00pm	Play Walk: Join us for a walk through Wellington City to explore play in the urban landscape. We start at College of Creative Arts, facilitated by Antony Nevin.

Monday 22 Nov	
8.30-all day	Registration and all events in Tea Gardens
9.00am	Mihi by Ross Hemera, Welcome and Opening by Chris Bennewith and Aukje Thomassen
9.30-11.00am	Keynote lecture by Prof. Katie Salen - Parson's New School of Design, New York
11.00-11.30am	Morning tea
11.30-12.30pm	Paper session chaired by Yusuf Pisan (UTS) Elective Music Students Experiences with Jam2Jam *Andrew Johnston* and exhibition talks by **Playing the Museum: towards a rationale for games in exhibition design** *Anton Berndt* **Interactive memories within museums** *Tanya Marriott*
12.30-1.30pm	Lunch
1.30-3.30pm	Paper session chaired by Erik Champion (Massey University) **Building Better Bad Guys: A New Framework for Game AI Design** *David Conroy and Peta Wyeth* **Sketch Interaction in Real Time Strategy Games** *Elwyn Benson and Peter Andreae* **Playing in Traffic: pervasive gaming for commuters** *Kah Chan*
3.30-4.00pm	Afternoon tea
4.00-5.00pm	Paper session chaired by Gray Hodgkinson **Towards the Problem of Maintaining Suspense in Interactive Narrative** *Yuliya Khrypko and Peter Andreae* **Constructionist learning through serious games** *Kah Chan*
5.00-5.30pm	Exhibition opening and closing of the day by Aukje Thomassen Exhibition talks by **Exhibition: More Than A Craze: Photographs of New Zealand's early digital games scene** *Melanie Swalwell* **Face to Face: meeting histories on the street** *Caroline McCaw, Morgan Oliver, Leyton Leyton and Mark Miller*
5.30-9.00pm	Buffet diner

Programme

Tuesday 23 Nov	
8.30-all day	Registration and all events in Tea Gardens
9.00-10.30am	Opening and welcome by Erik Champion Keynote lecture by Joe Bleakley
10.30-11.00am	Morning tea
11.00-12.00pm	Demonstrations chaired by Karen Curley in Spatial Design Area **Up with the Play** *Stuart Foster, Sven Mehzoud and Rodney Adank* **HotPOI, Locative Exhibitions on Mobile Devices** *Werner Lonsing and Stephan Drescher*
12.00-1.00pm	Lunch
1.00-2.000pm	Exhibition Tour by Tanya Marriott
2.00-3.30pm	Industry Panel chaired by Prof. Katie Salen and Erik Champion Jared Forbes- Lumen Digital Timothy Grieg - Collective Noun Minty Hunter- Nectarine Colin Phillips - Base Two
3.30-4.00pm	Afternoon tea
4.00-4.30pm	Closing with Erik Champion and Aukje Thomassen

Papers

In order of appearance

Elective Music Students Experiences with Jam2Jam

Andrew Johnston
Creativity and Cognition Studios
School of Software
University of Technology Sydney
Australia
andrew.johnston@uts.edu.au

James Humberstone
University of New South Wales
Sydney, NSW
Australia
aftertrace@me.com

ABSTRACT

This paper presents findings from a trial of the interactive music software Jam2Jam in a classroom music setting. Jam2Jam is software which allows musical novices to control generative music in real time. It has an interface which enables users to control multiple audio-visual parameters with a single gesture – an approach intended to facilitate complex, conversational interaction. Examination of students experiences with Jam2Jam indicates that students find Jam2Jam attractive and that it has considerable potential. However, a number of issues for improvement, particularly a need for increased transparency of operation are identified. Extensions to Jam2Jam which would enable students to incorporate more of their own material into the music and visual they create during jam sessions are also proposed.

Keywords

Music, performance, Jam2Jam

1. INTRODUCTION

This paper presents findings from a trial of Jam2Jam conducted at the MLC School, a private girls school located in suburban Sydney, Australia. We examine students' experiences with Jam2Jam in order to evaluate how effective it was in its current form and identify what changes could be made in order to improve it. We were particularly interested in identifying which aspects of Jam2Jam's design helped students engage creatively with the software, and in identifying barriers which prevented students from fully engaging with Jam2Jam and unlocking its potential as a teaching and performance tool.

2. CONTEXT

MLC School is a large private girls school in Sydney, Australia. Our study involved year 9 and 10 students (14–15 year olds) who participated in the elective music program. Thus, the students were musically experienced, able to read and write music and play acoustic instruments.

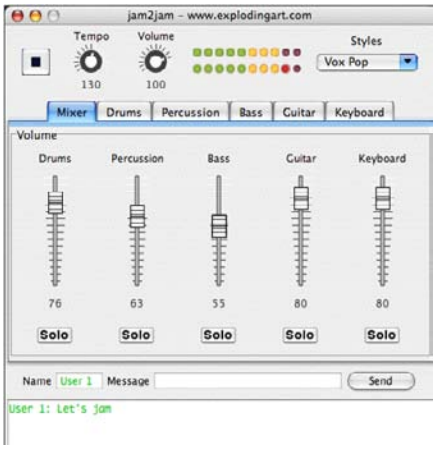


Figure 1: Jam2Jam Gray screenshot.

2.1 Jam2Jam

Jam2Jam is software which allows musical novices to control generative music in real time [3]. The music is generative in the sense that the computer uses algorithms to compose music based on parameters controlled by the user. Thus, as well as adjusting the volume or mix of instruments that are playing, the user is also able to change the parameters that affect the automated compositional processes applied by the computer.

Basic parameters that can be manipulated include the volume of individual instruments in the mix and the overall tempo of the music. In addition, compositional parameters for each instrument include density (number of notes or beats per time unit), timbre, pitch and articulation style. Each of these parameters is adjusted using on-screen controls.

There are two distinct versions of Jam2Jam: Jam2Jam Gray and Jam2JamAV. In this paper we focus on Jam2Jam AV. When we refer to 'Jam2Jam' this is the version we are referring to. The older version will be explicitly referred to as 'Jam2Jam Gray'.

Jam2Jam Gray uses a more basic user interface based on sliders (figure 1). Users switch between controlling the mix of individual instruments using a standard mixing desk metaphor and controlling the generative music parameters by selecting on-screen tabs.

Figure 2: Jam2Jam AV screenshot.

Jam2Jam AV, on the other hand, provides support for generative video as well as audio and uses a more complex interface (figure 2). In addition to controlling the audio and compositional parameters described above, users are able to mix videos based on pre-recorded video files or live video from a webcam, and control a range of video effects and settings such as kaleidoscope, brightness, ghosting, frame rate and saturation.

Of particular interest is that the interface for Jam2Jam AV is designed to enable users to control multiple audio-visual parameters with a single gesture. As figure 2 shows, icons surround the screen. Each of these is a 'parameter selection' icon which corresponds to an audio or visual parameter that can be adjusted by the user. Audio parameter selection icons (instrument volume, density, etc) are arranged on the left and bottom of the screen and visual parameter selection icons (saturation, frame rate, etc) are on the right and top of the screen. Users are able to select parameters for adjustment by clicking on the icons.

In the centre of the screen are five 'parameter adjustment' icons. Four of these represent instrumental roles in the sound mix: drums, bass, lead (guitar icon) and chords (keyboard icon). Moving these icons around the space in the middle of the screen adjusts whichever parameters have been selected using the parameter selection icons around the screen edge. The fifth icon (webcam) is used exclusively to adjust the selected video parameters.

For example, if the user selects the volume icon on the left of screen. then moving the drum kit icon up and down will adjust the volume of the rhythm track, moving the bass guitar icon will adjust the volume of bass in the mix, etc. If the volume parameter alone is selected for adjustment in this way, then Jam2Jam AV is effectively working like a basic mixing desk - moving instrument icons up and down changes their volume in the music being generated.

Where things get more complex is when more than one parameter adjustment icon is selected. It is possible, for example, for the user to select the volume parameter selection icon on the left of screen *and* the timbre parameter selection icon on the bottom of screen. This means that moving an instrument icon up and down will adjust its volume and moving it left and right will adjust its timbre.

This feature enables the two dimensional gestures made with the mouse to be 'cross coupled': one gesture affects two parameters. Cross coupling is a key feature of acoustic instruments - increasing volume on a brass instrument also affects timbre and pitch, for example - but, because of the separation of control interface and sound production inherent in electronic music, it is often not present in computer based instruments. Experiments, most notably those conducted by Hunt [6, 5], have shown that cross coupling is an effective strategy for enhancing the expressiveness of computer-based musical instruments.

Cross coupling is a strategy to enable musical interactions which are 'conversational' [7, 8]. In conversational interactions the user and computer share control over the music in much the same way that musicians in a more traditional ensemble do. While the user may at times seek to explicitly direct the performance, at other times they will surrender control and let the computer shift the performance in new, possibly unexpected, musical directions. Past studies involving professional musicians have indicated that if a computer's musical response to a given input is completely predictable it is unlikely to trigger conversational interactions [7]. Obviously though, a computer response which has no apparent relationship to the actions of the user is equally problematic. The key to effective conversational interactions is finding a balance between controllability and complexity.

Jam2Jam provides additional scope for conversational interaction by allowing multiple users to share control of the interface. When two users are running Jam2Jam on a network, they are able to link together, which enables joint control of the music and visuals. When one user moves an icon on their screen the corresponding icon moves on the other user's screen and vice versa. Thus conversational interaction can occur between each user and Jam2Jam, and also between users *through* Jam2Jam.

3. METHOD

This paper is primarily focused on examining students' experiences with Jam2Jam. This is part of a larger program of creative work and research in the area of designing for musical expression that the first author has been conducting for several years. As part of this work, a research framework aimed at linking design and evaluation has been developed. In this section we will describe this framework in order to place the Jam2Jam evaluations in context.

At a high level our approach draws on action research and design science, in that we attempt to improve understanding of the nature of musical expression by actively developing strategies and techniques to support it. By carefully examining the impact of our work in real-world contexts we are able refine our designs but also, and perhaps more importantly in the long run, improve understanding of musical expression more broadly.

A simplified view of an action research approach is shown in Figure 1. This very simple process involves drawing on literature and past experience to develop a theory and plan of action. This plan of action is implemented and the effects

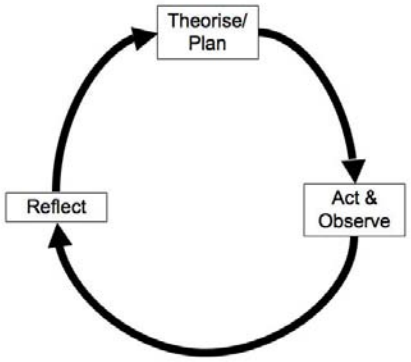


Figure 3: The Action Research cycle

carefully observed. Reflection on the impact of the actions taken lead to refinement of the theory and development of further plans informed by past actions.

Thus, in the case of Jam2Jam, theories of musical expression, interaction design and software development lead to the development of software which is in a sense an embodiment of these theories. By carefully observing Jam2Jam in use we are able to reflect and draw conclusions that lead us to refine our theories of creative interaction and improve the design.

Other authors have provided a rationale for the design of Jam2Jam [3, 4]. Our focus in this paper is on examining its impact in a particular context and reflecting on the implications the experiences of particular users have for its future development.

3.1 Human Computer Interaction

Several authors have recognised the potential of human-computer interaction (HCI) techniques to investigate the experiences of performers who use musical interfaces. In general, the approach has been to use quantitative techniques from HCI which tend to equate interface effectiveness with efficiency. Wanderley and Orio [13], for example, propose a series of "musical tasks" which might be used in order to evaluate how effectively an input device can support expressive performance. These tasks are intended to create a kind of benchmark which will make it easier to compare one interface device with another. The intention is that these benchmark figures, derived as they are from formal studies of users doing prescribed musical tasks, might complement traditional technical measures of device capabilities such as output rate and precision.

This would certainly be worthwhile. However, this approach is very much focussed on the devices and their ability to efficiently translate the intentions of the user into parameters for the computer. The experiences of the users who use the devices, being hard to quantify, are comparatively neglected.

Kiefer, et al [9] draw on Wanderley and Orio's task-based approach but extend it by gathering qualitative data during interviews with study participants. They found that analysis of the interview data provided significant insights, surfacing a number of unexpected issues and suggestions from users for alternate uses of the controllers they were evaluating. Of particular interest is their observation that the findings based on quantitative data "seemed to be a limited measure of the device compared to the subtlety of the participants' observations".

Stowell, et al [12] present a qualitative evaluation method based on Discourse Analysis which they applied to a voice-based interface they developed. Unlike the more restricted task-based approach, the participants in their study were not given specific musical tasks to complete but were instead encouraged to explore the interface in their own way, at least initially. Following the free exploration, participants were played some example recordings created using the interface and asked to use these as inspiration for creating their own work. Finally, a semi-structured interview was conducted in which video recordings of the participant's session with the interface were sometimes used to stimulate discussion. Of particular interest was the use of discourse analysis techniques to analyse the interview transcripts. The use of structured qualitative analysis methods such as these is one way to maintain rigour without compromising relevance by forcing study participants to only perform actions which are easily measurable.

The work described by Kiefer et al and Stowell is significant because it broadens the scope of what constitutes 'evaluation' in this context, recognising that while ergonomics and efficiency are important, they are not the primary determinants of the quality of a musical interface. This thinking is reflected in the broader field of HCI, where there has been recognition that the task-based approach alone is inadequate, particularly when considering software intended to support creative work. A number of HCI researchers therefore have turned their attention to the 'user experience' (eg. [1, 10]).

Just how to approach this is a difficult issue. As we have discussed, 'traditional' approaches have focused on measuring user performance when carrying out various well-defined tasks such as navigating a web-site or entering figures into a spreadsheet. Software designed to facilitate musical expression presents a problem in this context as it is difficult to formulate tasks to assign to users which are measurable but also meaningful [13]. If the aim was to produce a general-purpose musical instrument for performing traditional music, then evaluation would be simpler. Tasks such as playing a scale, trilling, etc. could be assigned and measurements made to ascertain how successfully users were able to execute them. The benefit of this approach is that it would be possible to somewhat objectively compare two different musical instruments in terms of this restricted definition of playability. However, where a new 'instrument' is intended to create new and unusual sounds - to explore new languages of composition and performance - this approach is problematic. Part of the rationale for creating new musical interfaces is that they disrupt performers' ways of thinking about music so that they are stimulated to try new ways of playing and composing. Attempting to determine how effectively they enable performance of current styles of music might be

interesting, but it would not facilitate learning about how to design instruments which encourage divergent thinking.

Researchers in the broader field of Human-Computer Interaction have recognised the limitations of task-focussed approaches and are proposing new ways of thinking about 'evaluation' in the context of systems which have uses that are open to a range of interpretations. Sengers and Gaver [11], for example, argue that interaction designers are becoming less concerned with designing software which unambiguously conveys and supports a clearly defined 'purpose'. They propose that HCI needs to support interactions in which users may have multiple interpretations of what a system is for and how it works. 'Evaluation' in this context goes beyond identifying whether users' interpretations of a system's purpose and behaviour matches the designer's anticipated interpretation. Rather, "evaluation shifts from determining whether an authoritative interpretation was successfully communicated to identifying, coordinating, stimulating, and analyzing processes of (evaluative) interpretation in practice" [11], p.105.

3.2 Approach

Our approach has been to focus on two key areas:

1. Examination of students' experiences with Jam2Jam in the context of the meaningful engagement matrix [4] and modes of interaction [7, 8].
2. Identifying opportunities for improvement in the design of Jam2Jam.

In order to study students' experiences with Jam2Jam, we conducted a series of interviews with students as they used it. The author, equipped with a small digital video camera, moved about the classroom observing (and recording) the students as they explored Jam2Jam. Students thoughts and opinions were actively solicited during this time. In general, open questions were used to encourage students to verbalise their experiences and to help reduce the effects of interviewer bias. However, the aim of the study was to get as rich a picture as possible of the students' experiences with Jam2Jam and this was prioritised over consistency of procedure. In essence, the process was more akin to a user dialog than usability testing [2].

In addition, an interview with the classroom music teacher, James Humberstone, was conducted after the students' sessions with Jam2Jam. The aim was to get additional perspective on the use of Jam2Jam in the music program at MLC and to identify areas for improvement.

The software Transana [15] was used to facilitate analysis of the 4.5 hours of video that was gathered. Transana is open source software for conducting qualitative analysis of video and audio data. In particular, it facilitates the annotation of video with keywords and comments as well as tools for grouping related video clips together based on these keywords. This enables the researcher to build hypothesis and gather evidence through detailed examination of both the verbal comments and responses of the musicians and their behaviour while using the software.

4. FINDINGS

4.1 Usability Issues

Students were initially asked to simply play with Jam2Jam and see what they could do with it. During this session the researcher moved about the room with a small handheld video camera, observing what the students were doing and asking students about their experiences.

Students were attracted to Jam2Jam and understood the underlying idea that it allowed them to control various musical properties by moving icons around the screen. The fact that the selection icons around the outside of the screen determined which audio/visual parameters the moving icons adjusted was intuitively understood by most students.

However, beyond this, several characteristics of the interface prevented them from really grasping the details of specifically how to establish control over what Jam2Jam was doing. The main aspects which inhibited students' ability to establish control over Jam2Jam were:

- Lack of clarity of whether icons around the outside of the screen were selected or de-selected.
- Difficulty recognising the internal state of Jam2Jam. Changing some parameters had immediately perceivable impact on either sounds or visuals but others were more subtle and hard to pick up.
- The link between the icons around the outside of the screen and the movement of the movable icons was unclear. Students at times selected an icon on the bottom of the screen for example and then moved a movable icon in the vertical direction. Intuitively they felt it should have an effect but because there was no horizontal movement the music produced by Jam2Jam was unaffected.
- Because they didn't realise which musical parameters the parameter selection icons referred to - and were not always able to identify this through experimentation - students needed guidance (from the teacher or from the Jam2Jam documentation) to get started. Comments from students included: "With the manual it makes it completely understandable..." and, "I realised that if you moved them around it would change but I didn't know why."

Mostly, these issues are easily addressed and do not relate to the core functionality of Jam2Jam. Subsequent releases of Jam2Jam for example have improved the visual design to some degree so that it is now much clearer whether icons are selected or deselected.

Making the state of Jam2Jam more readily perceivable is a design challenge relating to both the visual design and the algorithms used to manipulate the generated audio. One aspect of Jam2Jam's interface which caused recurring confusion with students, particularly in the early stages, was that the link between the icons around the outside of the screen and the movement of the movable icons was unclear. Students at times selected an icon on the bottom of the screen

for example and then moved a movable icon in the vertical direction. Intuitively they felt it should have an effect but because there was no horizontal movement the music produced by Jam2Jam was unaffected.

This comparatively minor problem is compounded though when movement in the *correct* direction doesn't result in audible change. This is usually because the instrument that has been selected is not sounding at the time. For example, if the keyboard icon moved in the horizontal direction while the 'timbre' parameter is selected on the bottom row, the timbre of the keyboard sound will normally be altered. However, if the keyboard is not sounding at the time then moving this icon will appear to have no effect – at least until the keyboard begins playing again. It should be noted that while students were often confused by Jam2Jam in the early stages, they remained interested and did not appear to become frustrated:

> Researcher: So, before you figured that out, were you getting frustrated because you can't figure [it] out?
> Student 1: No.
> Student 2: We were just enjoying the sounds, dragging them around. We knew that they were changing.

While these students were unable to articulate exactly what was happening and how their actions were linked to what Jam2Jam was producing, they could hear that there was a link and were happy to enjoy them without necessarily needing to control them.

4.2 Engagement

Dillon et al [4] categorise users' interactions with Jam2Jam into a set of categories they call the 'meaningful engagement matrix'. This matrix is made up of five different 'modes of creative engagement' which are linked to three aspects of musical meaning. The modes of creative engagement are:

- "Appreciating – listening carefully to music and analysing music representations.
- Selecting – making decisions about musical value and relationships
- Directing – managing music making activities
- Exploring – searching through musical possibilities and assessing their value
- Intuiting – participating in intuitive music making." [4], p. 6

The aspects of musical meaning which complete the matrix relate the actions of the user to the socio-cultural context within which they take place. As the students in our study primarily interacted with Jam2Jam as a stand-alone (rather than networked) instrument, we did not examine these social aspects of their jamming in detail.

We did, however, note that the students primarily interacted with Jam2Jam AV in either the 'appreciating' or 'exploring' mode. We did not see students move into the other modes, primarily because they failed to establish a sufficient degree of control over the performance. Dillon et al [4] describe engagement with Jam2Jam Grey as being primarily in 'exploring' and 'appreciating' (see p.6). They described more advanced users as moving into 'selecting' and 'directing' modes at times. The students in our study (using the newer Jam2Jam interface) didn't appear to make this jump.

The comments by this year 9 student illustrate how a lack of instrumental control over Jam2Jam may have contributed to this:

> "'Just then we actually changed the music. Which was the first time that happened. Not just speeding it up or slowing it down - the music actually changed. And that was the breakthrough. But I don't know how we did it!"

Likewise, Dillon et al [4] describe students using Jam2Jam Gray gaining insights into styles by noticing for example that hip hop slowed down sounds like reggae. The newer Jam2Jam AV interface did not seem to provide this same insight as the changes made to the interface seemed to have more complex, unpredictable effects. Because they could not establish clear links between their actions and the resulting musical changes it was hard for them to gain musical insights of this type.

Interestingly, Jam2Jam Gray was trialed by a few students who found it installed on the lab machines. They found that while less immediately visually appealing, it was simpler to understand and manipulate:

> "...It is a lot simpler, because you got all the things in one. Because you can see which way the things are going."

One student in particular articulated a key difference between Jam2Jam AV and Jam2Jam Gray:

> "It depends like what you want to do with the software. Like if you just want to play with things I guess this [Jam2Jam AV] is alright. But like if you actually want to like perfect music with it then you should do the sliding bars [Jam2Jam Grey]. Because that would be a lot easier."

This student identifies how the playfulness of Jam2Jam AV comes at the expense of controllability. The transparency of Jam2Jam Gray tends to encourage an instrumental (or 'directing') approach in which the music is 'perfected'. The lack of control she felt with Jam2Jam AV tended to lead her to a more 'playful' approach.

At the end of one of the classes some of the students discussed which 'audience' Jam2Jam AV would be best suited

to. One student suggested that it would be best targeted at "Young kids...before (grade 4 to 5)". She felt that the colourful graphics and video would be appealing to this age group. However, she felt that "older kids" (their age), would find a program such as GarageBand more appealing because "...it has a lot more features in it. Like you can mess around with more sounds". This student also suggested that being able to load in her own songs and then use the Jam2Jam controls to remix and edit in real time would make the software more appealing.

Another student disagreed that Jam2Jam AV was best targeted at young kids "...because to understand how it works...you need to like have a basic understanding of music in general." She felt that understanding concepts such as density and articulation would require a higher level of musical skill. She felt that the visuals were appealing to both older and younger students but that younger students would lack the necessary musical understanding to meaningfully control the sound and musical parameters that Jam2Jam users control.

4.3 Design Issues and Suggestions

A number of issues and suggestions for further refinement of Jam2Jam AV emerged from the sessions. The most often repeated comment was that students would like to be able to upload their own music and videos into Jam2Jam and use its features to manipulate and vary that music. While they didn't mind the tunes generated by Jam2Jam, they felt that being able to provide their own music would enhance their engagement with the software. Several students mentioned that software such as GarageBand was more enjoyable for them because it provided them with features for manipulating their own material and thus provided more variety.

> Researcher: So in which ways is Garageband better do you think? What do you enjoy more about it?
> Student: The variety of sounds. Like the variety of like clips and you can upload your own like... little sound samples into it.

Later, this student went on to say that if Jam2Jam was able to be made more complex it would be more appealing to older students. She thought Jam2Jam in its current form was appealing particularly to younger children, but that it should be able to be reconfigured to provide greater complexity for more advanced students.

> "If you like added complexity to it, so in like separate files, so you can do a really complex version, and like give a simple version to kids."

We see this as a request for a musical application which has a "low 'entry fee' with no ceiling on virtuosity" [14]. Jam2Jam has many features which attract students. They like the idea of mixing music and visuals in real-time, but they didn't seem to make the step to using Jam2Jam as an expressive instrument.

Because of bugs (addressed in subsequent releases), the students experience of networked jamming was limited. Even when students did manage to connect Jam2Jam with other students in the room they found it frustrating that they were unable to determine who they were actually jamming with. If Jam2Jam were able to make the identity of the networked jamming partner more visible it could help students focus on collaborative jamming. The following quote illustrates a situation which often arose:

> Student: We changed the background as well but the actual melody seemed to go to a variation or something. Something we did changed it.
> Researcher: But you're not exactly sure what it was that changed it?
> Student: No I'm still not sure what's changing mine.
> Researcher: Is that frustrating for you?
> Student: Um, a little bit. Yeah because sometimes I don't know if I'm clicking it or if someone else is clicking it, cause I don't know who I'm with. If I knew who I was with it might be a bit more helpful.

This student went on to suggest that the webcam could be used to put other jammers' faces on or next to the icons they were moving that this would help make the behaviour of Jam2Jam more understandable.

4.4 Teachers' Perspective

After the sessions with the students, the author and the MLC instrumental music teacher, James Humberstone, met to reflect on what had occurred and discuss possible future directions for Jam2Jam. This discussion was video recorded and analysed with the help of Transana. In this section I will detail these ideas, several of which have already begun to be incorporated into more recent versions of Jam2Jam.

James' key concern was that Jam2Jam did not provide musical experiences which were complex enough to justify its inclusion in the musical curriculum at MLC beyond one-off special classes. He wondered whether a way could be found to allow students to create their own customised musical content for Jam2Jam as he sees this as a way to more fully engage students both compositionally and instrumentally. He believes this could be a way to integrate repertoire being studied by the class into Jam2Jam sessions. Using Jam2Jam to explore this repertoire could enhance student engagement with this material by using the Jam2Jam controls and interface as a vehicle to explore it in new ways. In order to achieve this though, Jam2Jam needs to provide better support for instrumental improvisational performance.

> "To me I really want to take the element of improvisation and performance much further with the software. I feel that we'd certainly exhausted everything that the year 9's and 10's could do with it – and fair enough, they're quite old, musically literate kids. But...even for younger children, there's only a certain amount that you can do with the sliders that are given and the variation of audio and video. So I would really like to

> see future tools that would allow a higher level of improvisational control."

James felt that earlier versions of Jam2Jam (Jam2Jam Gray) were better in this respect. In the classes, several students found this application and felt that it was easier to feel a direct link between their actions and the sounds produced by the software.

> "And in the earlier version of Jam2Jam, which wasn't half as, um, attractive as this one. But you could do things like change the chord progression which was going on. So that gives you quite big control."

James went on to say that it was critical for students to feel ownership of the music they were creating. The move (in more recent versions of Jam2Jam AV) to allow students to bring their own music into Jam2Jam is a very positive step in this direction. Improved support for instrumental control would also help students feel ownership of their real-time performances as well as the compositions being used as source material.

> "I think the students have to be able to feel some ownership of it – at any age at some point. And as I say it's very engaging as it is and you know, you make the changes with the sliders. But to go to the next level, to make them want to use it again and again and to integrate it more completely into an ongoing music curriculum I think it has to have that next level [of support for bringing content into Jam2Jam]."

Another way to add depth to the students' experience with Jam2Jam would be to allow students to see the music being generated in traditional music notation. James argues that this would allow musically literate students to more readily perceive what Jam2Jam is doing:

> "For students that are musically literate it would enable them to analyse more closely the changes that they are making. As well as hearing them - and we've already said sometimes those changes aren't always easy to hear - they'd be able to see them."

A variation on providing a traditional notation view of the music Jam2Jam is producing could be to provide students with access to the Jam2Jam code that is generating the music. Jam2Jam is essentially an interface which allows users to adjust parameters for generative processes that produce music. If students were able to see, and perhaps modify, the underlying algorithms which generate this music, it would provide them with yet another perspective on music and composition, and add depth to their experience with Jam2Jam.

5. SUMMARY AND CONCLUSION

Based on our observations we have identified some key areas to address in the design of Jam2Jam. First, basic usability needs to be improved to remove unnecessary impediments to full engagement. Previous studies indicate that conversational interaction requires a degree of instrumental control. Performers want and expect a certain degree of autonomy from music software used in live performance - in the sense that its responses should be surprising at times [8, 7]. However, for the interaction to be conversational, these responses need to be clearly related to the input from the user. As we have discussed, the ability of Jam2Jam to cross-couple two audio and visual parameters should encourage conversational interactions by increasing the complexity of the audio-visual response to user input. However, this falls down when users are sometimes unable to perceive whether their input is having any effect at all.

This leads to the second area for improvement: making the internal state of Jam2Jam more evident. As we have pointed out, if students adjust parameters of an instrument that is not sounding at the time there will be no audible indication that their actions are having any effect. In addition, the only visible indication that they are having an effect is movement of the icon. In order to address this issue either the effect of the user's actions on the parameter must be made more visible (eg. by increasing or decreasing the size of a bar next to the icon) or the state of the icon should indicate whether an instrument is sounding or silent (eg. by altering transparency). That is, when the effect of the parameter change will not be audible, it should either be made visible, or the fact that the parameter change will have no effect should be conveyed.

A related area for improvement is in enhancing the visibility of the connection between Jam2Jam partners. Currently Jam2Jam does not identify the jamming partner in any way. As we have observed, this can lead to frustration because users see their icons being moved about but don't necessarily associate this with musical actions of another person. Simple measures such as overlaying the name (or better, a photo) of the networked jammer on the icon they are currently moving could help enhance the networked jamming experience.

The teacher and students involved in this study are keen to see extensions to Jam2Jam which would enable users to incorporate more of their own material into the music and visuals they create during jam sessions. As we have outlined, Jam2Jam does not play pre-recorded music but instead allows students to control parameters for algorithms which generate the music in real-time. Within this paradigm, students could for example begin to explore the creation of their own algorithms to create unique rhythms or melodies. This would provide more advanced students (such as those in the elective music program we studied) with scope for more in-depth engagement with Jam2Jam and potentially give students new perspectives on compositional processes.

In this paper we have examined the experiences of teacher and students at MLC with Jam2Jam. Our focus has been on how Jam2Jam could be improved and enhanced to provide users with a more expressive and flexible tool for collaborative audio-visual performance. While we have been critical

of some aspects of Jam2Jam, it is important to stress that we see the Jam2Jam in its current form is a great foundation upon which to build. Dillon et al [4] describe Jam2Jam as the "xylophone of computer music" and point out that using computers in this context seems intrinsically attractive to most students. Our observations back this up – the students were interested in Jam2Jam and immediately understood and were attracted to the notion of collaborative audio-visual jamming. We hope that the work we have described here encourages others to explore the use of Jam2Jam in the classroom and will enable those who design new technologies for musical expression to draw on the lessons we have learned.

6. ACKNOWLEDGMENTS

Our thanks to the students of MLC who participated in this study for their enthusiasm and insightful comments.

This research was conducted within the Australasian CRC for Interaction Design (ACID), which is established and supported under the Australian Governments Cooperative Research Centres Program.

7. REFERENCES

[1] M. A. Blythe, K. Overbeeke, A. F. Monk, and P. C. Wright. *Funology: from usability to enjoyment*. Kluwer Academic Publishers, Norwell, MA, USA, 2004.

[2] J. Buur and K. Bagger. Replacing usability testing with user dialogue. *Communications of the ACM*, 42(5):63–66, 1999.

[3] S. C. Dillon. Jam2jam: Networked improvisational musical environments. In M. Moore and B. W. Leung, editors, *School music and teacher education : a global perspective in the new century*, pages 19–30. Dept. of CAPE, the Hong Kong Institute of Education, : ISME International Office, Hong Kong : Nedlands, W.A. :, 2006.

[4] S. C. Dillon, B. A. Adkins, A. R. Brown, and K. L. Hirche. Communities of sound : examining meaningful engagement with generative music making and virtual ensembles. *International Journal of Community Music*, 2(1), 2009.

[5] A. Hunt, M. M. Wanderley, and R. Kirk. Towards a model for instrumental mapping in expert musical interaction. In *Proc. International Computer Music Conference*, 2000.

[6] A. Hunt, M. M. Wanderley, and M. Paradis. The importance of parameter mapping in electronic instrument design. *Journal of New Music Research*, 32(4):p429 – 440, December 2003.

[7] A. Johnston, L. Candy, and E. Edmonds. Designing and evaluating virtual musical instruments: facilitating conversational user interaction. *Design Studies*, 29(6):556–571, 2008.

[8] A. Johnston, L. Candy, and E. Edmonds. Designing for conversational interaction. In *Proceedings of New Interfaces for Musical Expression (NIME)*, 2009.

[9] C. Kiefer, N. Collins, and G. Fitzpatrick. Hci methodology for evaluating musical controllers: A case study. In *New Interfaces for Musical Expression (NIME)*, 2008.

[10] J. McCarthy and P. Wright. *Technology as Experience*. The MIT Press, 2007.

[11] P. Sengers and B. Gaver. Staying open to interpretation: engaging multiple meanings in design and evaluation. In *DIS '06: Proceedings of the 6th conference on Designing Interactive systems*, pages 99–108, New York, NY, USA, 2006. ACM.

[12] D. Stowell, M. D. Plumbley, and N. Bryan-Kinns. Discourse analysis evalutation method for expressive musical interfaces. In *New Interfaces for Musical Expression (NIME)*, 2008.

[13] M. M. Wanderley and N. Orio. Evaluation of input devices for musical expression: Borrowing tools from HCI. *Computer Music Journal*, 26(3):62–76, 2002.

[14] D. Wessel and M. Wright. Problems and prospects for intimate musical control of computers. *Computer Music Journal*, 26(3):11–22, 2002.

[15] D. Woods and C. Fassnacht. Transana v2.22. Madison, WI: The Board of Regents of the University of Wisconsin, 2007.

Building Better Bad Guys: A New Framework for Game AI Design

David Conroy
Queensland University of Technology
31 Iona Tce, Taringa
Queensland, Australia
61 07 3160 9823
tinman.predazon@gmail.com

Peta Wyeth
Queensland University of Technology
Queensland, Australia
peta.wyeth@qut.edu.au

ABSTRACT
Realistic artificial intelligence in video games is important to developers in the games industry. It helps to better immerse the player and keep them in a state of flow. In order to achieve this it is important to design computer opponents to behave and react similarly to human players. In this study we designed a model of human behaviour for a specific interactive component in gaming (aiming). It was built using player game play data and user opinion regarding the subject. The result was a system of behaviour akin to that of human players.

Categories and Subject Descriptors
H5.2. [Information Interfaces and Presentation]: User Interfaces – *User-centered design*.

General Terms
Design, Experimentation, Human Factors

Keywords
Game design, Non-player characters, Interaction design

1. INTRODUCTION
As games and virtual technologies become more advanced, it is necessary for non-player characters (NPCs) to be portrayed more realistically. Unlike human players, non-player characters are often restricted to non-situational and often inappropriate algorithms that determine their actions during play. While many of these actions closely mimic human thought and response patterns (such as prioritizing), others like aiming and dodging in First Person Shooter games are often considered to be evidently 'bot-like' in their execution. This execution is often considered unfair and unrealistic and leaves many players opting for real life opponents for more competitive or balanced play.

To create a gaming experience where unpredictability and randomness occur, we need to purposefully design for the many limitations inherent in human behavior. Such design better mimics play against human opponents. While this could be coined as 'artificial stupidity', it should be considered as an attempt to model the 'uncertainty' that human players exhibit in gaming. This paper reveals a method of creating human-like game AI that is both modeled on and representative of human reactions and behaviors when aiming in First Person Shooter (FPS) games. Through the use of a detailed user study and data analysis process, a basic model of designing more realistic NPC interactions has been developed. This model addresses the aims of the project: to identify differing aspects of interaction between human and artificial players; to formulate a design framework based on these differences that can be practically implemented; and to test this framework in a simple prototype.

2. BACKGROUND
One particular component of video games that is often overlooked is the level of complexity and realism that is found within its Non Player Character (NPC) artificial intelligence (AI). NPCs in games can range from enemies to characters merely used to make the scene seem more realistic. They are controlled by some form of AI that in turn defines their activities and behaviour.

When interacting with video games or virtual environments, human players become immersed in the atmosphere and environment of the game world. However, inconsistencies in games remind the player that it is just a game, breaking their 'suspension of disbelief' [4]. No clearer can this be seen than in FPS games, where programmed 'bots' interact directly with human players. NPCs have game state giving them a distinct advantage over the human player, especially where coordinate space locations are concerned [3]. Artificial behaviours such as flawless accuracy, extrapolation and extraordinary reaction times result in NPC opponents that are unrealistic. From a game play point of view, the bots can be seen as cheating [5].

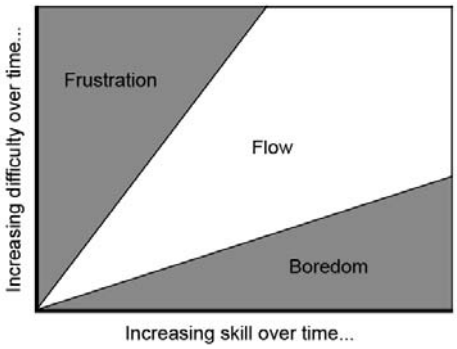


Figure 1. Game Flow

The ideal immersive game experience, called Flow [1], usually lies between the realms of boredom and frustration/anxiety. Boredom correlates directly with a player's skill level and frustration relates to how hard the game is (see Figure 1). Failure of NPCs to behave like human players can destroy a game's immersive experience. This is especially the case in FPS games that exhibit unrealistic traits, such as perfect accuracy in aiming a weapon.

This paper examines the question of how bot behavior affects player immersion with the view of creating new models of AI that better map to human behavior and consequently product more engaging game play.

3. USER STUDY

In order to better understand player views of bot behaviours, a user study was conducted. This study examined the experiences of expert FPS game players while playing a popular 3D FPS game, Quake 3: Arena [2]. A total of twenty-one participants were required to play a single 30 frag (kill) death-match session against seven bots of the same skill type. The participants were aged between 18 and 23, and all had experience playing FPS games. Roughly 50% of players had played Quake 3 before with over 80% having played similar a game. The bots they competed against were chosen specifically for their varied play styles which ranged from reckless to cautious. The play sessions were recorded in-game. The participants were also given a short questionnaire regarding their opinions of their play session, the bots they competed against and the test itself. Questions related to the perceived difficulty of the bots, the suitability of bot behaviour and the level of challenge encountered.

3.1 User Study Results

The questionnaire results showed that participants were concerned with the level of believability and execution of certain bot behaviours. Almost all participants mentioned some aspect of the bot's navigation, aiming and tracking of other players. Concerns about aiming and the bots' ability to use certain weapons were identified by 66% of study participants.

Another behaviour that was identified was that of a bot's enhanced ability to see the player character. Approximately 62% of participants were uncomfortable with the bot's ability to lock onto their presence and found that even when they were occluded from direct line-of-sight, the bot could still find and target them without error. The participant Sin described this when he mentioned that *"They are able to tell where you are if you attempt to sneak up on them"*.

Of particular interest was a comparative analysis of two questionnaire questions. The first asked participants to identify aspects of bot AI behavior that they felt was unrealistic (question 1). The second asked players to reflect on their own game play performance, looking for details on game play experience that was challenging or hard to master (question 2). In both questions players were asked to comment on key areas of FPS game play such as predicting enemy behavior, targeting and aiming, movement, navigation, weapon usage and resource acquisition. Table 1 details the percentage of positive responses to both questions. The highlighted sections show aspects that were seen to be **both** difficult for players and unrealistically represented in the AI. This is important to recognize as it denotes a perceived imbalance between the activities by the participants.

Aspect		% Yes Question 1	% Yes Question 2
Predicting enemy behavior	Area awareness	61.9%	61.9%
	Use of line of sight	57.14%	
Aiming	Target Acquiring	66.67%	42.85%
	Accuracy	47.61%	
Movement		52.38%	38.09%
Navigation		33.33%	66.67%
Weapon Usage		23.8%	33.33%
Pickups/Resources		28.57%	38.09%

Table 1. User study question results

The game play data showed a much more detailed picture of each player's experience. Each video was examined with relation to questionnaire comments. Parallels were easy to identify. The game play data provided a solid visual database of player's interactions with the artificial opponents. Specifically, certain trends were seen in player's styles of interaction which were common across the field. Players would react to the presence of an enemy by either moving or aiming in its direction (usually a combination of both). This was approximately estimated in degrees throughout the footage analysis (see Figure 2). Participant orientation adjustment and rotation speed were dependant on the duration and speed at which they pressed keys and moved the mouse. This was measured precisely to 0.033* (30 frames/sec) of a second.

Figure 2. Visual Data Analysis

It was found that the distance an enemy was from the player determined the time taken for a player to adjust their orientation and rotation. The speed at which players undertook these activities usually affected the accuracy of their initial shot/s. It was also found that a player who acted more slowly in targeting at long distances with a large degree of rotation/orientation change were more successful than players who acted quickly in the same circumstance (see Figure 3).

Similarly, acting quickly at short range where rotation/orientation changes were smaller was beneficial. It was also observed that

when a target was further away, a player would take longer to aim then when it was close. This is because of both the danger in proximity and level of precision necessary at longer ranges (i.e. smaller target).

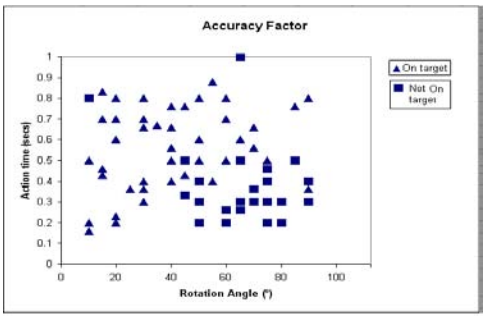


Figure 3. Accuracy Factor

The detailed examination of video footage provides the basis for a model of human aiming tendencies within First Person Shooter games. Figure 4 outlines this model.

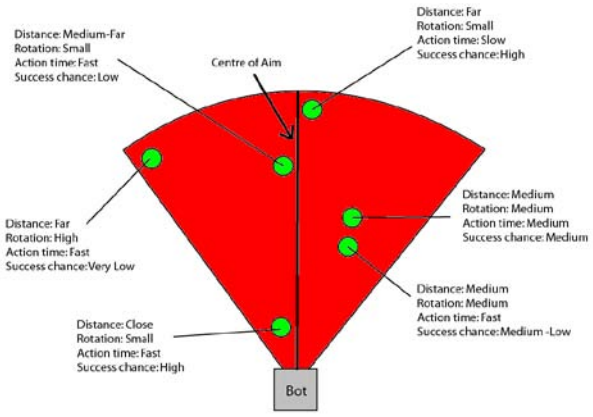


Figure 4. Model of Human Aiming Tendencies

4. DESIGN FRAMEWORK

The design framework uses the data from the user study to create a model of human aiming and tracking tendencies. Development of a framework that accurately represented a human's ability to aim and see targets has been specifically built around the player's perspective, focussing on what players find challenging and where they feel bots have a distinct advantage. The framework defines the following key features of FPS bot AI design:

- *90-120 degree field of view (FoV) of the game world*: A bot is only able to see what was within this FoV.
- *Aiming is modelled on the human aiming behaviours*: A bot aims and targets following an algorithm based on rotation direction and speed derived mathematically from user study data. Aiming within the model is implemented by turning the information gathered from the model in Figure 4 into basic rules that control the speed and duration of a bot's aiming vector. This data can be acquired by measuring the enemy's distance from the bot and the distance from its centre of aim.
- *Line of sight vision*: A bot's field of view simulates that of a human player, and takes into account target occlusion (see Figure 5). Using this model, occluded targets are invisible to the bot. Target occlusion may be effectively implemented using a conical plane as a two dimensional physical representation of a player's FoV.

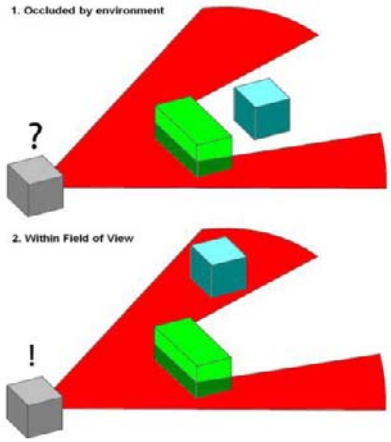


Figure 5. Environmental Occlusion

5. CONCLUSION

The devised model portrays how human players aim and see in FPS games. It proposes realistic aiming and targeting as well as a simple line of sight system. It is believed that the combination of these two attributes provides a more realistic and human-like method of aiming for AI agents in competitive games. The model is designed using both quantitative and qualitative data from experienced human players. The data analysis was used to identify the disparate qualities of AI bots and human players and to detect the subtle activities and behaviours that differentiate the two.

The ideas raised in this paper address a central area of concern for modern game developers. As games become more complex and life-like, so must the underlying design decisions manipulating their technologies. Artificially intelligent NPCs employing a realistic and human-like method of aiming should provide a more enjoyable and immersive gaming experience to players. The aiming techniques employed by FPS bots within the new framework would appear to be more natural and more consistent with how players behave.

6. REFERENCES

[1] Bateman, C. 2009. *Beyond Game Design: Nine Steps Toward Creating Better Videogames*. Charles River Media, 12-15.

[2] ID Games. 1999. *Quake 3: Arena*. ID Software.

[3] Laird, J. 2001. An exploration into computer games and computer generated forces. *The Eighth Conference on Computer Generated Forces and Behavior Representation.* Orlando, Florida.

[4] Sweester, P. 2006. *An emergent approach to game design: Development and play*. PhD Thesis, University of Queensland, Australia.

[5] Wittenburg, G. 2004. Modelling and classifying cheating in online multiplayer games. *Topics in Computer Systems Coursework.* Vancouver, Canada: University of British Columbia.

Sketch Interaction in Real Time Strategy Games

Elwyn Benson
Victoria University of Wellington
Engineering and Computer Science
P.O. Box 600, Wellington
elwyn.benson@ecs.vuw.ac.nz

Peter Andreae
Victoria University of Wellington
Engineering and Computer Science
P.O. Box 600, Wellington
peter.andreae@ecs.vuw.ac.nz

ABSTRACT

As real time strategy games are becoming increasingly complex and large scale, new interaction methods need to be explored to overcome the limitations found in conventional interaction methods. This paper explores sketching as an interaction technique, and discusses some of the advantages and disadvantages of sketching for spatial tasks, which are common in real time strategy games. The paper describes two novel sketch interaction techniques for giving precise orders to units - a technique for selecting groups of units, and a technique for specifying movement paths. The paper reports on a user study to evaluate these techniques. Our results show no significant time advantage for sketching when selecting groups of units, however the results for sketching movement paths suggest the sketching technique is faster.

Categories and Subject Descriptors

H.5 [**Information Interfaces and Presentation**]: User Interfaces

General Terms

Sketching, RTS, Command Interfaces, Object Selections, Movement Paths

1. INTRODUCTION

Real time strategy (RTS) games require users to give many commands in a time constrained situation. Users must constantly micromanage their units, buildings and resources, with professional RTS gamers often aiming to execute 100-300 actions per minute. There are many types of actions in RTS games, such as producing units, placing buildings and harvesting resources. Some of them are spatial/geographic in nature, such as selecting a group of units or specifying paths a unit should move along. Many of the interaction techniques used in RTS games are inherited from conventional software, and they do not appear to be ideal for the spatial/geographic tasks they must accomplish.

Sketching with a mouse, tablet or touch-screen as an input mechanism for creating diagrams or editing graphics has been around since Ivan Sutherland's seminal Sketchpad[4] system and is used widely today. However sketching as an interaction technique for other applications has not been widely studied.

Interactive sketching (as used in this paper) refers to free-hand drawing that is interpreted as a command or command parameter. This type of interaction provides a natural way to issue spatial/geographic commands, such as those needed in RTS games. Sketching has long been used in the United States military for planning battle strategies, an activity sharing many similar tasks to those found in RTS games; recent efforts to digitise the battle strategy system they use has shown sketching to be an effective method of conveying spatial/geographic commands[3]. Sketch interaction was used in nuWar[2], a turn based strategy game, and it is reasonable to expect RTS games might share many of the advantages in such a system.

This paper explores the use of sketch interaction within the context of RTS games for two components of commands — specifying paths and selecting a set of units. Although sketching might seem "natural" for such spatial/geographic tasks, sketching requires carefully controlled movements and may not always be more efficient than the point and click methods used at present. Section 2 describes two implemented sketching techniques which we believe will enable efficient spatial commands for RTS games, and sections 3 and 4 discuss user experiments to identify the conditions under which the sketching techniques are more effective than point and click techniques.

2. TWO SKETCHING TECHNIQUES

The obvious implementations for selecting units and specifying paths are to allow the user to draw a boundary around the units or sketch a path. Our initial explorations made it clear that for simple situations, the standard point-and-click techniques were faster than pure sketching. We therefore developed two sketching techniques that also allowed the user to utilise some elements of the point-and-click techniques where appropriate. We implemented the techniques as part of a simple game engine.

2.1 Sketching to Select

In all RTS games, units must be selected before a command can be issued to them. The conventional method of selecting a group of objects is the selection box — a rectangular bounding box created by dragging the mouse from

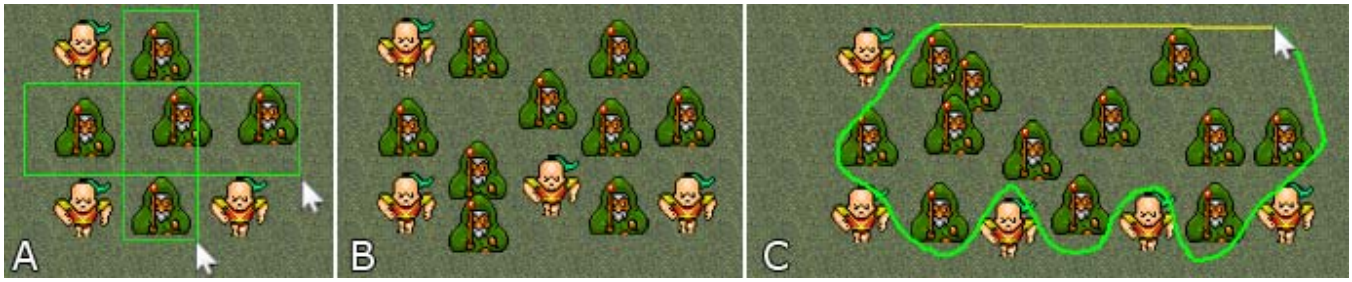


Figure 1: Unit arrangements of varying complexity. (A) requires two separate box selections to select all the green wizards. (B) requires at least three box selections to select all wizards. (C) requires four box selections, or one sketch selection (shown).

corner to corner. The selection box is problematic when the units to be selected are in a complex configuration since multiple selection boxes must be chained together (using a modifier key), which can decrease efficiency. Also, when selecting units over a large area, visualising where the edge of the box will be once it is fully drawn is difficult and it is easy for users to miss required targets or select unwanted objects.

Sketch selection allows users to draw a freehand boundary around the units they wish to select, which allows for precise control, overcoming the limitations of the selection box. The user is not required to complete the boundary — if they stop at some point, then the boundary will be completed with a straight line (which is visible at all times). Sketching is faster and easier when only part of the boundary requires precise control. Figure 1 shows three different collections of units of varying complexity, and a sketched boundary. Arrangement C shows a straight line at the top of the sketch where the system has automatically completed the boundary.

The conventional selection box can be combined with single click and double click selections. This is equally true for sketch selection.

2.2 Sketching Movement Paths

Moving units is typically achieved in RTS games by clicking the desired destination after one or more units are selected, which creates a *waypoint*. Units then walk in a straight line from their current location to the waypoint, usually with some type of path-finding to allow them to bypass obstacles. If more control is required, for example if units must stay close to the edge of a forest to avoid detection, multiple waypoints must be manually placed using a modifier key to chain the multiple commands together.

Our path sketching technique allows the user to either drag the mouse to sketch a component of the path or to click to set a waypoint. A sequence of clicking and dragging will specify a complete path, where the segments around waypoints are filled in with straight line segments. This allows a combination of sketching and clicking commands to be issued as appropriate to different sections of the path. Figure 2 shows an example of this.

This combination allows single waypoints to be placed as normal for simple parts of the path, combined with sketching for precise control of any complex parts of the path, enabling the advantages of both kinds of interaction, and therefore maximising the speed.

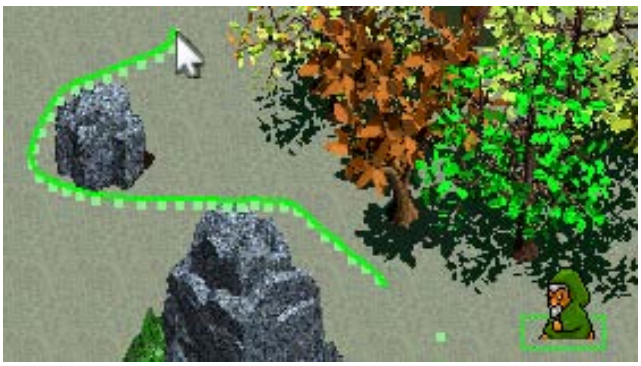


Figure 2: Sketching a movement path to provide precise instructions to the unit, in this case navigating a gap between a forest and rocks. Note the regular, individually placed waypoint in front of the wizard, which has had the sketch movement command chained to it.

3. USER STUDY

In order to evaluate the effectiveness of the two novel sketch techniques, we undertook a user study consisting of a pilot study followed by two experiments, one for each technique. Both experiments involved comparing the participants' performances on a task using both the conventional and sketch based techniques. Even though sketching may be more efficient using tablets or touch screens, the experiments used a standard mouse because this is the most commonly used input device for RTS games.

Based on informal testing, we expected that sketching would not be faster in all circumstances. For example, if the units to be selected are placed within a rectangular region and are well separated from any other units, then using a selection box is likely to be more efficient than sketching, since the mouse movement required for a single selection box (corner to corner) is less than the mouse movement required to sketch the boundary around the units (even with the "shortcut" mechanism described above). Similarly, if the desired path is a straight line from the current position to the goal, specifying the path by creating a single waypoint at the goal will be faster and more accurate than sketching along the entire path. However, if units are placed in more complex arrangements, or the separation from other units is much less, or if the path is highly curved and narrow, then

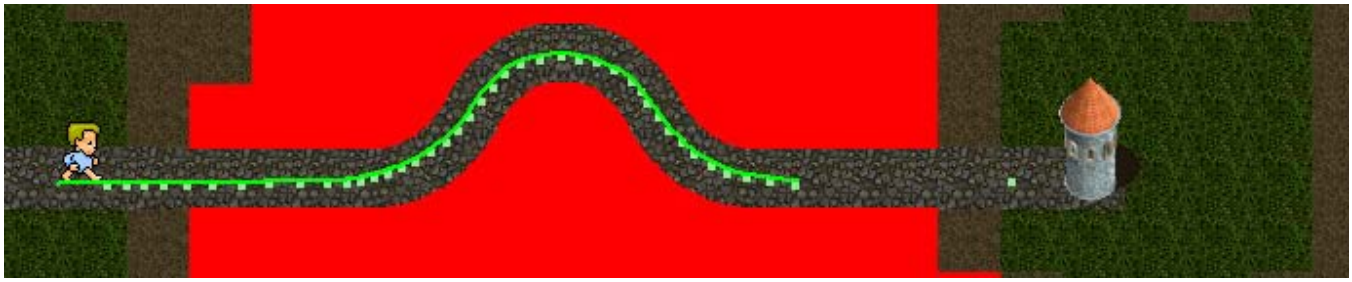


Figure 3: An example of a scenario from Experiment 2, movement paths.

our testing found that sketching can be both faster and more accurate.

Therefore, both experiments involve a range of scenarios in which we varied the factors that we believed would contribute to the sketching techniques being more (or less) effective.

3.1 Experiment 1: Selecting Units

The first experiment evaluated the effectiveness of sketching to select units. After an introduction to the system and a practice time, participants were presented with a sequence of scenarios and asked to select the wizards from a group of units, while avoiding decoy units. Figure 1 shows some example scenarios.

There were 142 scenarios, which varied in complexity of unit arrangement, spread, and margin. The complexity is defined as the minimum number of selection boxes required to complete the selection; the spread is the distance between each subgroup of wizards; the margin is the minimum distance between wizards and decoys. These three factors all affected the difficulty of the task.

The system automatically loads the next scenario in a quick-fire manner as soon as the current scenario is complete (*i.e.*, when all wizards and no decoys are selected). The system recorded the task time (from scenario load to completion), total action time (time that the mouse was held down), along with other data such as total mouse movement and action mouse movement.

The experiment used a within-subjects experimental design, with each participant using both interaction techniques. There were 14 participants split into two groups. The first group used sketch selections initially and box selections last, while the second group did the reverse.

3.2 Experiment 2: Movement Paths

The second experiment evaluated the effectiveness of using sketching to specify movement paths for units. The design and procedure of the experiment were similar to the first experiment. After a practice time, participants were presented with a sequence of scenarios and asked to guide a unit along a path across an expanse of lava to a tower. Figure 3 shows an example of a scenario from this experiment. Units walked in straight lines between waypoints (with no pathfinding) and the system recorded the total time spent off the path in the lava.

This experiment had 24 scenarios, which varied in the path width (affecting accuracy required), and path "curviness" (affecting the minimum number of waypoints required). The "curviness" was based on the length and height of the curve.

There were eight participants, split into two groups. Again, the first group used sketching initially and individual waypoints last, with the second group using the reverse order.

4. RESULTS AND DISCUSSION

In both experiments, we calculated the average improvement of the sketching technique — the decrease in time taken or increase in accuracy compared to the conventional technique.

4.1 Experiment 1: Selecting Units

The key results in the first experiment, shown in table 1, are the improvement in the total time taken to complete a task and the action time. A negative value means that the sketching technique performed worse.

	Total Time (s)	Action Time (s)
Mean	-0.46	-0.6
Std. Deviation	2.3	1.2

Table 1: Mean and standard deviation of improvement in time of task.

On average, the total time taken to complete the task was 0.46 seconds slower with sketching. The same analysis was performed on subsets of the data for different categories of scenarios and sketch selection was consistently slower in each case. It is clear that this data does not demonstrate any time advantage to using the novel sketch selection technique. From this, we would not expect an immediate uptake of sketching by most users if it were provided in RTS games.

This was an unexpected result: we had expected sketching to be faster for at least some categories. However, we identified two factors that we believe affected the experiment.

First, participants were allowed to use both individual selections as well as box/sketch selections, an attempt to simulate the conditions under which the techniques would actually be used. Participants used individual selections heavily, and therefore it is hard to determine the exact contribution of the sketching technique to the slower time — for example, it is possible that the sketching was actually faster, but overshadowed by an increased use of individual selections. This means our evaluation does not provide the direct comparison between box and sketch selections we originally planned.

Second, participants did not have enough practice with the sketch technique, and the practice they did have lacked tasks that simulated the time critical context of the rest of the experiment. Over half the participants commented that they would have liked to have more practice time, or felt

they would have performed better with practice. One effect of this was that participants did not take advantage of the ability of sketching to select units in complex arrangements with a single sketch. Instead, most participants used a sequence of small sketches to select groups of units in the same way that they would have selected them with boxes.

We think that if we had provided more instruction and practice time and disabled the individual selection technique, the results may have been different, especially since all of the participants were already familiar with box selection. Given that the qualitative feedback from participants was largely positive, with the majority of participants indicating that they preferred to use sketch selections over box, we believe further study is warranted.

4.2 Experiment 2: Movement Paths

The key results for the movement experiment are given in table 2, again expressed as the improvement of the sketching technique. Action time is the time spent specifying the path. On average, sketching was 1.1 seconds faster (a relative improvement of about 10%). This improvement was consistent over each category of scenario.

	Action Time (s)	Time Off Path (s)
Mean	1.10	0.11
Std. Deviation	2.17	0.63

Table 2: Mean and standard deviation of improvement in action time and accuracy.

All but one of the participants showed an improvement when sketching. Participants in the group that used individual waypoints before sketching had over twice the improvement, with an average difference of 1.52 seconds instead of 0.68 seconds. This suggests participants did not have enough time practising before beginning the experiment.

The time spent off the path is a measure of the accuracy of each technique. Overall there was a minor improvement in accuracy for sketching, (0.11 seconds less off-path time on average). While this is only a very small improvement, it was observed consistently on each subset of scenarios, which suggests sketching might be more accurate for specifying movement paths.

Qualitative feedback from participants was again positive, with half the participants commenting that sketching "felt easier". Combined with the 10% improvement in time, this suggests that using freehand sketching as an interaction technique for specifying movement paths shows definite promise. We cannot make a stronger claim than this because the number of participants for this experiment was low.

4.3 Observations

From analysing the records of the experiments, we identified several possible improvements to the sketching techniques introduced in this paper. For example, some participants attempted to execute complex selections using double looping to negate parts of the selection, but got confused about which parts of the sketch were 'inside' and which parts were 'outside'. A possible solution for this, to be implemented in future versions of the sketch technique, is to provide feedback on which units will be selected, either by lightly shading the inside of the sketch or tinting units once they are within the selection boundary.

An additional observation is that sketching with a mouse can be unnatural and may be slower than sketching with a familiar device such as a pencil or pen[1], and that this effect is particularly pronounced for sketches covering large areas. Therefore, using a mouse for sketch selections may not be the appropriate technique when selecting units from a group spread over a large region of the screen. Similarly, using a mouse to sketch paths is less suitable for long paths across much of the screen. However, the design of our path sketching technique mitigates this by allowing the user to use sketching for small, complex sections of the path and waypoints for large straight sections.

We note that this size limitation on sketching would not be present if implemented on other input devices such as a touch-screen or a tablet. However, the use of input devices other than a mouse is beyond the scope of this study, though multimodal interfaces for RTS games and touch based input devices are an interesting area to explore for future work on interactive sketching.

5. CONCLUSIONS AND FUTURE WORK

Major gaming consoles have recently released their own forms of motion sensing devices for gestural interaction in games and multimodal interfaces are becoming more prevalent, pushing the bounds of conventional human-computer interaction. Sketching provides a natural means of controlling and interacting with games and is especially suited to the spatial/geographic tasks prevalent in RTS games.

We have designed, implemented and evaluated sketch based interaction techniques for two common tasks in RTS games: selecting units and specifying movement paths. The qualitative feedback from the user study was very positive, however the measured results are less clear. There was no demonstrated advantage for sketch based selection, but the sketch based path specification appeared to be faster. Because of several limitations, the user experiments represent only an exploratory investigation of the effectiveness of sketching as an interaction technique, and we believe that further quantitative studies are justified.

6. REFERENCES

[1] A. Apte and T. D. Kimura. A comparison study of the pen and the mouse in editing graphic diagrams. In *Proceedings of 1993 IEEE Symposium on Visual Languages*, pages 352 – 357, 1993.

[2] G. Dunham and K. Forbus. nuwar: A prototype sketch-based strategy game. In *First Artificial Intelligence and Interactive Digital Entertainment Conference*, 2005.

[3] K. Forbus, J. Usher, and V. Chapman. Sketching for military course of action diagrams. In *IUI '03*, 2003.

[4] I. Sutherland. Sketchpad: A man-machine graphical communications systems. In *Spring Joint Computer Conference*, pages 329 – 346. Spartan Books, 1963.

Playing in Traffic: pervasive gaming for commuters

Kah Chan
Victoria University of Wellington
139 Vivian St,
Wellington, New Zealand
kah.chan@vuw.ac.nz

ABSTRACT

The influx of cycle commuters and the resulting paradigm shift in traffic composition is causing friction between road users. This paper proposes the use of an experimental alternate reality game (ARG) that is also a role-playing game (RPG) layered on top of the commuting experience. This experimental social game, *Playing in Traffic*, is played with a global positioning system (GPS) capable smart phone, such as an iPhone, and is aimed at the expanding community of casual gamers. The game is designed to encourage more positive behaviour while in traffic by introducing game rewards mechanisms, such as the collection of achievements, and provides a positive feedback loop to augment commuter behaviour. *Playing in Traffic* is an exploratory suggestion that looks at the role of pervasive gaming in addressing the larger issues of urban planning, traffic congestion and the challenges around active commuting.

Keywords

Pervasive gaming, alternate reality, social gaming, traffic.

1. INTRODUCTION

Environmental awareness, high fuel costs and a trend toward healthy living has increasingly made the bicycle a preferred mode of transport. The resultant traffic patterns caused by this are beginning to cause friction between road users. Motorists are often perceived as being unprepared to share the road in a safe manner, while cyclists can be mis-characterised as extreme environmentalists. Stereotyping road users in this way serves to create disassociation between groups. *Playing in Traffic* attempts to bridge this social divide by implementing an external game architecture. Incentives in the form of game rewards could help develop increased identification between groups, which would encourage more positive social interactions between the groups.

Through suggesting an experimental social game concept supported by play theory, this paper poses the question: can an alternate reality game facilitate a motivational shift? Can play facilitate a motivational shift towards a safer, more social commute on the road and perhaps a shift towards more active forms of commuting? This shift towards more active methods of commuting is important for a variety of reasons: cycling or walking is a greener, healthier method of transportation; with fewer cars on the road there will be lower fuel emissions and less traffic congestion; and fewer cars would also make life on the road safer for cyclists. Recent research in Australia has suggested that, contrary to public perception that cycling on the road is dangerous, cycling actually becomes safer with more cyclists [4].

This paper will discuss the current paradigm of the traffic landscape as a game system. Subsequently, this paper will propose a speculative game concept of encouraging a cultural shift towards alternative commuting options using a game design proposal as a formal structure. Finally, this paper will address the potential for persuasive play enabled by pervasive games.

1.1 THE TRAFFIC LANDSCAPE

There is a game on the current traffic landscape with countless independent players. Can the commuting paradigm be augmented sufficiently with a game experience to get drivers and cyclists to play on the same side? Increasing congestion in urban areas means that more predictable behaviour from road users is required, and particularly the development of an increased awareness of other road users' intentions is necessary in order to cope with an increasingly unpredictable landscape [3]. Communicating commuters' intentions clearly helps facilitate progression through this space. However, these intentions are often lost in communication failures that further divide the groups.

Driving or cycling on the road already has many fundamental game elements. Salen's concise summary defines a game as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" [10, p.80]. Juul asserts that within the existing traffic infrastructure key elements exist that constitute a game [7]. Below is an interpretation of these elements according to Salen and Juul:

- *System* – players and their vehicles, the players' relationships with each other and the road architecture makes up the environment, or what Salen calls "context of play" [13, p.51];
- *Players* – all road users are players, and all players are concerned with the quality of the outcome;
- *Conflict* – the conflict arises from players' efforts with divergent methods of achieving similar goals;
- *Rules* – explicit, formal rules such as traffic laws, and complementary implicit, informal courtesy rules;
- *Variable, quantifiable Outcome* – the result of arriving safely (or not) at the destination.

The component that could be further developed is the *artificial*, the separation from daily life that defines the activity as a game. An interesting perspective is that a pervasive game, the *artificial*, could be layered on top of daily life to help invest the commute with significance beyond its functional value.

2. PLAYING IN TRAFFIC

This paper proposes a digital alternate reality game (ARG) that is also a role-playing game (RPG): *Playing in Traffic* (Figure 1). This is the *artificial* component which could be layered on top of the commuting experience as a method of exploring the role of

interactive play in initiating behavioural changes, applying the concept of the *magic circle* [6] demarcating the play space onto existing road systems. Modern roads are clearly marked out with a separate architecture and are definitely spaces of motion.

Playing in Traffic is played using a global positioning system (GPS) capable smart phone, such as an iPhone or the Nexus One. The game aims to build social connections during the potentially dull moments of commuting. The main purpose of *Playing in Traffic* is to incorporate an additional layer of fun into the same activity, cultivating a different experience and exploring how play could invest the commute with more meaning. Through play, *Playing in Traffic* can re-introduce a more social experience by opening the lines of communication between players who inhabit shared physical space. The social experience aims to reduce those asymmetric relationships and support symmetrical reciprocal relationships. By participating in the game, players lose the sense of anonymity of commuting *en masse.* They get a game profile that is recognizable to other players, which leads to a renewed sense of individual identity, and the increased accountability should reduce the antisocial behaviours between commuters [11].

Playing in Traffic targets the emerging demographic of commuters who also engage with casual games. The game is designed to appeal to the technologically savvy who are already engaging with mobile casual gaming in some form. The game is aimed at people who live in or close to cities, and thus is designed to be played in urban environments.

2.1 Game Play

The primary game mechanic is a point-to-point level that players traverse to arrive at their respective destination. The player can see other players within their play space on their smart phone, based on their GPS coordinates and a proximity sensor (Figure 2). The game application on the phone layers simple visual icons on top of a street map. Levy points out the subtle shift that GPS-enabled devices afford us when "our identity isn't a question of 'who, what, where.' It's a question of 'where, what, who'" [10].

The game starts when the player initiates the application and starts his/her journey; a play session tracks the player's physical progress and intersections with other player's journeys through his/her route. The rules of play are simple: first, abide by the standard traffic rules; and score points through courtesy on the road, route exploration and creating social connections.

There is no interaction with the mobile phone during play - the primary interaction with the system is through physical motions tracked by the phone. A proximity sensor is used as a secondary quantitative measuring device, alongside the GPS coordinates, to gauge the amount of space around each player and to measure how close they come to obstacles or other players.

The player's aim is to improve their game character by collecting points through their actions while commuting. Players can score points in three ways:

- Considerate actions towards other players;
- Route deviation from previous routes;
- Considerate points awarded by other players.

At the end of the play session, the GPS coordinates are visualized within a reflective period in the application and player can retrace their journey to note interactions they had during the play session.

This personal cartography encourages exploration for alternative routes as a more creative means of expression through physical motion, and could transform into a collaboration, as players can mark intersections with other players, annotate interactions, or choose to award points to other players; reimagining the landscape as they travel through it. The proposed location for a pilot prototype to be tested will be in Wellington, New Zealand. Wellington has a challenging urban layout which has to contened with a varied topography. The city has a growing cycle commuter community, which adds to a diverse mix of commuters.

The modular nature of the game means that it is playable in any city. The size and shape of the magic circle depends on the number of the players and the general requirement of a generic road system, rather than a specific location with a particular architecture. The multiple character classes also allow for more individual, less socially involved play sessions.

2.2 Character Development

A player cultivates their game character through their engagement with the game. Each player gets to collect specific points that lead to larger achievement levels. This allows players to really focus on the aspects of the game they enjoy. For example, a player who prefers the exploratory aspect of *Playing in Traffic* can increase their Explorer Points by scouting for and using alternative routes each day. Similarly, a socially oriented person can coordinate group commutes and cultivate relationships through play sessions.

Bartle's three archetypes, the Achiever, the Explorer and the Socialiser directly influence the character classes for *Playing in Traffic*. The three archetypes are: the Achiever, the Explorer and the Socialiser. Bartle's neat gamer archetypes, while originally conceived for multi user dungeon (MUD) or massively multiplayer online role-playing game (MMORPG) players, also apply to the casual gamer targeted by this pervasive game. It suits players who prefer to cultivate the ability to achieve more game-related goals such as scoring more points or developing the character further ("Achiever"), explore the city for alternative routes to work and home ("Explorer") and socialise with others through coordinating a group commute ("Socialiser") [2].

Each character class has three levels of achievements, or skill upgrades, and players can choose to travel by automobile, bicycle, or on foot. Players are automatically assigned their character classes through their cumulative actions. A player that consistently scores more Explorer points is assigned the Explorer class, making game play simpler for casual gamers. The character class achievement levels are:

- Explorer: Scout, Adventurer and Trailblazer
- Socialiser: Wallflower, HobNob and Butterfly
- Achiever: SparkPlug, Dynamo and HotShot

These classes are designed to favour active modes of travel, as some aspects of the game play may be easier for cyclists and pedestrians than drivers. For example, it would be easier for a cyclist to explore routes which are not available to drivers, such as sidewalks or shortcuts through a city park.

2.3 Game Reward System

A core ingredient of game play is the reward system [8, p.118] [9, p. 102]. This game has both quantifiable and unquantifiable rewards. On one level, the points gained through considerate actions or new route discovery during play are an instantly quantifiable positive feedback loop, and present achievable targets in the progressive levels of character achievements native to RPGs. A quantifiable achievements system also allows players to compare their performance, against themselves or other players, as an extra incentive for a meaningful engagement with the game.

There is an increasing emphasis on the social aspect of games, such as thatgamecompany's *Journey*. These games seek to create a platform that aids meaningful interactions between players [1]. With *Playing in Traffic*, the social element of the game is part of the reward system [9] that is quantifiable through character development (e.g. "Socialisers") or as less tangible game reward such as social connections via shared routes ("Explorers").

Additionally, there are elements of surprise that are inherent when a player is exploring new routes, be it a new bakery or a city park. There are also further intangible complementary rewards such as the health benefits of more active forms of commuting. These persuasive, unquantifiable rewards could increase investment in the game and help the players develop their own emergent narrative to enhance immersion into the game.

3. PERSUASIVE PLAY

Play has the potential to be a catalyst for a large-scale social initiative to change our behaviour while on the road and remove our stereotypes and prejudices toward other members of the traffic hierarchy. Play has the opportinuty to invest meaning into a chore – turning commuting into a more affective experience [6]. The integrative nature of play brings together people, multiple narratives, and even different motivations for playing; makes gaming a persuasive platform for communicating ideas to players.

Pervasive gaming has huge potential to influence our behaviour through non-game related incentives as it crosses over into reality. "Our technology tools and platforms are highly participatory and social. They take advantage of intrinsic human motivations to contribute in order to be noticed, to share opinions, to be a part of something greater than ourselves" [5]. As the game/life boundary blurs, research into the social power of pervasive gaming is vital.

There is much debate over the social potential of pervasive gaming: Schell [14] conveyed a hyperbolic scenario where behaviour is driven by external game rewards that is monitored through technological convergence. Conversely McGonigal strives to prove that pervasive gaming can impact daily life by building socially-aware, altruistic games. These games harness what Shirky calls the "cognitive surplus" [15] to solving larger issues make an excellent case for pervasive games. The focus on positive outputs from pervasive gaming that are altruistic creates an engaging participatory platform, particularly in games that have larger end goals that may be individually difficult to achieve.

4. CONCLUSION

This paper has explored traffic's game qualities and the potential to develop the *artificial* component as a means of enriching the commuting experience. *Playing in Traffic* is a speculative game proposal, the *artificial,* that suggests using experimental interactive design to encourage intrinsic motivational change. It is played using a GPS-capable smart phone, where the objective is to score points through a combination of courteous commuting, route exploration and establishing social connections.

These points go towards achievement levels within specific character classes, allowing the player to cultivate their characters based on their interests. These reward mechanisms were designed as early engagement hooks towards larger constructionist goals. The achievement advances require investment on the part of the player and complements the reflection at the end of each game.

While *Playing in Traffic* is not a holistic long-term solution to the larger issue of traffic congestion, urban traffic planning, and energy conservation, it is a small step that takes the mundane act of commuting and layers a creative social experience on the utilitarian. "It is by simply letting gamers get on with playing that they really begin to change the world" [9]. Gamers should be allowed the pleasure of a designed experience where their actions lead toward internal reflection without explicit persuasion.

5. REFERENCES

[1] Abbott, M. 2010. All about the Journey. Retrieved from http://www.brainygamer.com/the_brainy_gamer/2010/10/all-about-the-journey.html

[2] Bartle, R. 1996. Hearts, Clubs, Diamonds and Spades: people who suit MUDs. Colchester, Essex: MUSE Ltd. Retrieved from: http://www.mud.co.uk/richard/hcds.htm.

[3] Basford L., Reid S., Lester T., Thomson J., Tolmie A. 2002. *Drivers perceptions of cyclists.* Scotland: Department for Transport, University of Strathclyde. Retrieved from: http://www.trl.co.uk/online_store/reports_publications/trl_reports/cat_road_user_safety/report_drivers_perceptions_of_cyclists.htm.

[4] Bauman A., Rissel C., Garrard J., Ker I., Speidel R., Fishman E. 2008. *Cycling: Getting Australia Moving: Barriers, facilitators and interventions to get more Australians physically active through cycling*. Melbourne: Cycling Promotion Fund. Retrieved from: http://www.cyclingpromotion.com.au/images/stories/downloads/CPF_Hlth_Rprt_08_web.pdf.

[5] Gorbis, M. 2010. We invented social technologies, now let's invent social organizations. Retrieved from: http://www.iftf.org/InventingSocialOrganizations.

[6] Huizinga, J. 1949. *Homo Ludens: a study of the play-element in culture*. London: Routledge & Kegan Paul Ltd.

[7] Juul, J. 2003. The Game, the Player, the World: Looking for a Heart of Gameness. In *Level Up: Digital Games Research Conference Proceedings* (Utrecht, The Netherlands, November 04-06, 2003). DIGRA, University of Tampere, Finland, 30-45.

[8] Koster, R. 2005. *A Theory of Fun for Game Design*. Scottsdale, Arizona: Paraglyph Press. P.110-127

[9] Kremers, R. 2009. *Level Design: concept, theory and practice.* Massachusetts: A.K. Peters.

[10] Levy, S. 2010. How Foursquare Melds Real and Digital Worlds. Retrieved from: http://www.wired.com/magazine/2010/07/pr_levy_foursquare/.

[11] Madigan, J. 2010. Anonymity and Blizzard Forums. Retrieved from: http://www.psychologyofgames.com/2010/07/07/anonymity-and-blizzard-forums/.

[12] Rossignol, J. 2008. *This Gaming Life: Travels in Three Cities.* Ann Arbor: University of Michigan Press and University of Michigan Library.

[13] Salen, K. and Zimmerman, E. 2004. *Rules of play: game design fundamentals*. Cambridge, Massachusetts: MIT Press.

[14] Schell, J. 2010. Design Outside the Box. Presented at *Design Innovate Communicate Entertain Summit 2010* (Las Vegas, United States, February 16-19, 2010). Retrieved from: http://g4tv.com/videos/44277/dice-2010-design-outside-the-box-preentation/.

[15] Shirky, C. 2008. Gin, Television, and Social Surplus. Here Comes Everybody. Retrieved from: http://www.herecomeseverybody.org/2008/04/looking-for-the-mouse.html

Towards the Problem of Maintaining Suspense in Interactive Narrative

Yuliya Khrypko
Victoria University of Wellington
Engineering and Computer Science
P.O. Box 600 Wellington
Yuliya.Khrypko@ecs.vuw.ac.nz

Peter Andreae
Victoria University of Wellington
Engineering and Computer Science
P.O. Box 600 Wellington
Peter.Andreae@ecs.vuw.ac.nz

ABSTRACT
The paper introduces the problem of creating and maintaining suspense in interactive narrative. We argue that by manipulating choice options offered to the audience in suspenseful scenes in the interactive story both when it is read the first time and after it is reread later, is possible to create stronger suspense.

Categories and Subject Descriptors
[**Computer Games**]: Interactive Narrative

General Terms
Interactive Narrative, Suspense.

Keywords
Interactive narrative, suspense, choice, videogames.

1. INTRODUCTION
Suspense plays an important role in creating emotional immersion in narrative and keeping the readers' attention through the story by evoking three main emotions: fear, hope, and a state of uncertainty [5]. In non-interactive media such as film or literature, suspense is predefined and created for the audience by the author of the story; interactive media, on the other hand, allows the audience to contribute to creating suspense right at the moment of reading. Interactive media also allows the audience to reread the story with the expectation of things changing. Therefore, maintaining suspense on rereading is tan additional factor for interactive media. Techniques for creating suspense in non-interactive narrative have been addressed by many scholars [6, 7], but in the area of interactive narrative, creating and maintaining suspense is still a new topic which requires more exploration.

One of the recent studies in this field experimentally demonstrated that suspense is the key element of "video game enjoyment" [4] and suggests that players enjoy participating in suspenseful situations. Whether the enjoyment is a direct result of the participation, however, is not so clear. Another paper [3], which compares the perception of suspense in film and videogames, argues that in videogames, suspense would be much stronger, and thus more enjoyable, if the players are "helpless" and given no choice. Given this question about the source of suspense, it would be helpful to have a clear guidance on maintaining suspense in interactive narrative.

When creating suspenseful scenes in interactive stories, it is important to know how readers perceive suspense and what will contribute to that suspense. A basic question is how much choice to give readers. However, to our knowledge, little research has been done on players' perceptions of interactive stories when they are either passive viewers or active creators of suspenseful situations. One recent study [2], presents a computational model of narrative generation for suspense, *Suspenser*, but it primarily focused on the generation of linear stories and did not take into account the nature of interactive media. With interactive stories, in contrast to non-interactive media, it is possible to change the choices available to readers when they reread the story, but it is not clear how the choices should be changed to enhance suspense. The goal of our research is to provide guidance on these issues based in experimental evidence by proposing techniques for manipulating the choices offered to readers in interactive narrative, taking into account the way readers perceive suspense.

2. THE NATURE OF SUSPENSE
For interactive narrative in the context of a videogame, there will be multiple sources of suspense beyond the narrative itself, particularly from visual and audio effects. For this paper, we deliberately ignore the other components and focus only on the narrative. Note that this is not because we think the other components are unimportant, but to manage the scope of the paper.

For the purpose of this paper, we use the characteristics of suspense proposed by M.-L. Ryan [6]. First, suspense usually arises when a reader is empathizing with a character facing danger where the outcome of the situation is uncertain and the reader is hoping for a good outcome. Second, suspense requires that the reader can see different possible outcomes of the situation even though there will be uncertainty about which of the outcomes will occur. Third, the more potential outcomes the situation presents, the weaker the suspense.

According to Ortony et al. [5] the degree of suspense is governed by the level of hope and fear experienced by the reader in a suspenseful situation, and these in turn depend on how strongly the reader wants the desirable outcomes to occur or does

not want the undesirable outcomes to occur, combined with the chances for the outcome to occur.

The key element in suspense is uncertainty about which of the possible outcomes is going to occur where there is a balance between desired and non-desired outcomes. If all the possible outcomes are desired, the readers will experience anticipation rather than suspense; if all the possible outcomes are undesired they may feel fear or despair instead of suspense. Note that in non-interactive media, the reader has high prior on the hero's survival so that the narrative needs to present possible outcomes that will appear to be undesired in order to balance the assumption of survival and create a sense of uncertainty and therefore suspense. In interactive narrative, where bad outcomes for the protagonist are assumed to be possible right from the beginning, readers need to be presented with both desirable and undesirable possibilities to create suspense rather than despair.

Rereading an interactive story raises additional questions regarding uncertainty as the reader is already familiar with one of the possible outcomes and this may reduce the uncertainty and thus the suspense. The fact that an interactive narrative can present different choices on rereading is a significant difference from non-interactive narrative and can be used in order to maintain suspense during subsequent readings.

3. CREATING SUSPENSE

From the above observation of various theories on suspense, we may come to the following conclusions.

First, a suspenseful situation can be created by means of passive witnessing a scene, which evokes in readers the feelings necessary for suspense or by letting the readers contribute to suspense by making their own choices. This means that although choice is essential for making a narrative interactive, choices are not necessary for creating suspense.

Offering choices to the readers may increase the level of suspense if choice gives readers a feeling of control over the situation so that the outcome is a result of their action, and the will therefore care more about the possible outcomes. This will only happen if the choice appears to have real consequences in the story – "fake" choices that appear to only change surface level aspects of the story are much less likely to cause reader's to identify with the story and care about the outcome.

On the other hand, offering choices may decrease the level of suspense if readers believe that taking one of the choices will reduce their uncertainty about the outcome since this will upset the balance between hope and fear. This would happen if one of the choices makes a good outcome appear much more likely or if another of the choices makes a bad outcome much more likely.

In order to increase suspense, the choices in an interactive narrative should be designed so that readers perceive the expected outcome of each choice to be neither clearly good nor clearly bad – all the choices must preserve the readers' state of uncertainty. This does not mean that the choices should appear to have no effect on the outcome, but the expected effect must not be certain, and there must still be a balance of hope and fear. It is also important that each of the offered choices should provide enough fear and hope – taking a choice should not appear to put off risk or opportunity to the distant future.

Note that it is the readers' perception of the effect of the choice that matters most – a given choice may actually lead only to a bad outcome, but if the readers cannot tell this, and are still uncertain about the outcome, then the suspense will be maintained. Similarly, a choice may have no actual effect on the rest of the story, but if the readers believe that it does, then their sense of identification with the story and the value they place on the outcome may not be affected.

All of the above factors should be taken into account in order to create stronger suspense in interactive narrative, both when it is read first time and reread. However, rereading of an interactive story causes extra suspense-related issues that should also be considered; these are addressed in the next section of this paper.

4. MAINTAINING SUSPENSE ON REPLAY

When readers reread an interactive story, they already know which choices they were offered last time and the sequence of the choices they made. If this reduces the readers' uncertainty about the outcome the readers will feel the suspense less strongly when rereading the story than they did the first time. Thus it is vital for maintaining suspense to continue evoke the state of uncertainty by manipulating the choices offered to the reader during each subsequent reading. Below, we propose some techniques by which this can be achieved.

Note that it is not the case that suspense will necessarily disappear on rereading – there is an effect known in psychology as the *paradox of suspense* [1] where some readers of traditional media seem to keep experiencing suspense when rereading, even though they already know the exact outcome of the suspenseful episode of the story. However, this effect does not apply to all readers and the level of suspense on rereading is reported to be lower than it was during the first time.

Let us consider situations where readers are offered two options to choose between: (A) and (B). Assume that neither of the choices appears to lead to a clearly good or bad outcome and thus both options present uncertainty. In one situation, suppose that readers choose one of A or B on the first reading but it is followed by narrative with enough further choices that the user does not strongly associate the final outcome with their choice of A or B. On rereading, readers may have slightly different probabilities of the outcome associated with the choice that they took, but will still have considerable uncertainty about the final outcome and the level of suspense will be not very different from the first time, so there will be no need to change the choices on rereading.

In another situation, suppose that readers take choice B on first reading and then end up in an undesirable outcome after only few further choices (see Figure 1). They are then likely to associate B with a bad outcome. When rereading the story, if they are offered the same choice, they will perceive little uncertainty associated with the B option. However, they will prefer to take the A option anyway, since they believe that B is a "bad" choice, and they will still perceive suspense at this point since the A option has the same level of uncertainty as before. Again, there is no need to change the choices offered, although choice B could be removed with little consequence.

On the other hand, consider a situation where readers take choice A on the first reading, and the narrative is resolved to a desirable outcome after only a few further choices (see Figure 2). As a result, the readers will perceive option A to lead to a good outcome. When rereading the story, if they are offered the same choice between A and B, they will have a reduced sense of

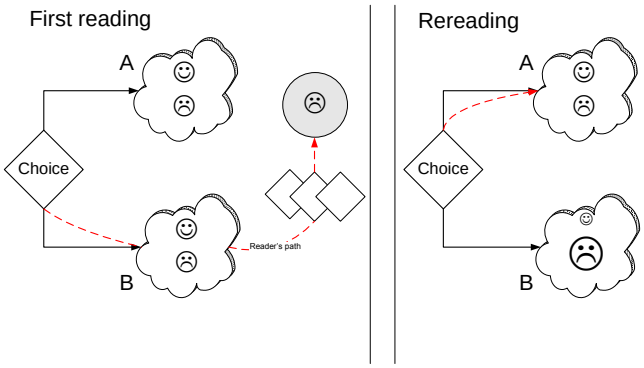


Figure 1. Resolving suspense into an undesirable outcome on first reading.

suspense, because A will be obviously the "right" choice to take, but they will have little perceived uncertainty associated with that choice.

To maintain suspense on rereading, choices that the readers would now believe to be clearly good should be removed or replaced by new choices presenting a new state of uncertainty (for example, the new choice C in figure 2). Another solution would be to replace the choices with a cut-scene with a suspenseful situation creating a state of helplessness and letting the reader witness the suspense.

Note that readers who want to maximize suspense might deliberately choose B (even though they believe it to be the "wrong" choice) just because there is more uncertainty associated with that choice, but their suspense will be tempered by the knowledge that any bad outcome is simply the result of the wrong choice.

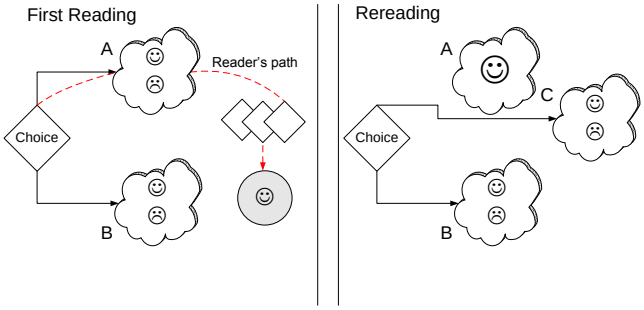


Figure 2. Resolving suspense into a desirable outcome on first reading.

Note that the situations above may arise even if both A and B actually lead to uncertain situations where both good and bad outcomes are possible; the loss of suspense is caused by the readers' perception of certainty about the outcome, not by actual certainty. In this case, it may be possible to replace the form of the choices to make them appear to be different, but let the choices lead to the same set of possible outcomes as the original A and B. Readers may then still perceive the original suspense and be able to explore other paths through the narrative.

Rereading does not necessarily lead to a reduction in uncertainty: if taking the same choices leads to a different outcome on rereading, then readers will increase the level of uncertainty that they associate with the choices. This can be accomplished by having non-deterministic branches in the narrative that the system either chooses at random, or deliberately choose a branch that leads to the opposite outcome from what happened on a reader's previous reading. Such techniques can enhance the level of suspense on rereading in a way that would be impossible for a static narrative. This technique can be combined with the cut-scene technique above to force readers to go through the same branch of the narrative that they chose before and discover that it is less predictable than they thought.

5. CONCLUSIONS

We argue that readers of interactive narrative will still feel suspense strongly if they are given the same options to choose between when replaying the game as long as the consequence of the previously taken choice were neither clearly desirable nor clearly undesirable the reader. In the case when readers will perceive the choice to lead to a predictable outcome, the choice should be removed on replay, particularly if the predictable outcome is desirable.

We also suggest that choices without perceived risk take time and reduce suspense, both when a game is played the first time and when replayed, and should be removed on replay.

These hypotheses are based on the review of different theories on suspense and some research on their implementation in the interactive media. Our next step is to attempt to validate these hypotheses by running a set of user experiments to explore empirically how readers perceive suspense in interactive narrative.

6. REFERENCES

[1] Carroll, N. 1996. The paradox of suspense. In *Suspense: Conceptualization, Theoretical Analyses, and Empirical Explorations,* P. Vorderer, H. J. Wulff, and M. Friedrichsen, Eds. Lawrence Erlbaum Associates. Mahwah, NJ, 51-70.

[2] Cheong, Y., Young R. M. 2008. Narrative generation for suspense: Modeling and Evaluation. In: ICIDS 2008, 144-155.

[3] Frome, J., Smuts, A. 2004. Helpless spectators: Generating suspense in videogames and film. *TEXT Technology* 1 (2004), 13-34.

[4] Klimmt C., Rizzo A. et al. 2009. Experimental evidence for suspense as determinant of video game enjoyment. *Cyberpsychological Behaviour* 12, 1 (Feb. 2009), 29-31.

[5] Ortony, A., Gerald L. C., and Collins A. 1998. The cognitive structure of emotions. Cambridge, Cambridge University Press, 131.

[6] Ryan, M.-L. 2001. Narrative as virtual reality: immersion and interactivity in literature and electronic media. Baltimore, Johns Hopkins University Press, 140.

[7] Sheriff, J. P. 1999. Creating suspense in fiction. London, Robert Hale.

Constructionist learning through serious games

Kah Chan
Victoria University of Wellington
139 Vivian St,
Wellington, New Zealand
kah.chan@vuw.ac.nz

ABSTRACT
The role of gaming in communicating environmental concerns is increasingly important as video gaming and sustainability concerns make parallel ascensions in our contemporary social and cultural vernacular. This paper discusses the evolution of a game design class that adjusted its focus towards exploring the communicative potential of serious games, specifically to stimulate learning in children about sustainability concepts such as energy conservation, deforestation and carbon footprints. The author had a specific interest in the potential of integrating constructionist learning principles with increased ubiquity of video games. The course covered theoretical precedents in play and learning, design processes and methods used in creating persuasive games, and investigated character and level design. This paper will also describe selected case studies of student prototypes.

Keywords
serious gaming, sustainability, character design, constructionism

1. INTRODUCTION
Contemporary gaming is an emerging dominant influence in the entertainment market, with video games sales surpassing box office and DVD sales in the United Kingdom in 2009 [2]. This signals a potentially strong communication scheme for engaging children and younger teens as they spend more time absorbed in this media.

Sustainability-related concerns have also made a similar move to the forefront of our social consciousness. The increasing demand for behavioural changes around domestic energy efficiency, natural resource management and the push for ecologically friendly transportation all reflect the importance we now place on environmental issues.

Gaming, with its increased proportion of consumed media, now holds an important role in continuing to broadcast these sustainability-centric concerns. The corresponding increase in literacy and familiarity with the ubiquitous videogame phenomenon means that games, particularly serious games, are becoming more relevant to newer education methods. Research suggests that game-based learning that allows children to explore the subject on multiple levels is more effective than traditional passive learning in communicating concepts and ideas [8][4][7].

This paper will discuss the evolution of a gaming-focused course that adjusted its focus from experimental game design towards exploring the communicative potential of serious games, covering theoretical precedents, design processes and case studies of specific student work. The class investigated character and level design specifically to stimulate learning in children about sustainability concepts such as energy conservation, deforestation and carbon footprints.

1.1 Learning and serious games
Gaming has great promise as an effective communication method, and has particular importance in evolving our learning and education. Wilson asserts that an interactive education or simulated environment will replace print-based education, emphasizing that some children learn through active engagement, not in an abstract or detached manner [14]. Serious gaming has the advantage of simulation over traditional education, an illustration of concepts through experimentation with multiple actions. This highlights the building of a learning dialogue through play. Serious gaming in this case uses the constructionist framework as prescribed by Papert, but extrapolates it beyond the basic "learning through doing" [8] paradigm to exploring the complex level of engagement that gaming can provide.

When children are playing video games, they get to participate in an active learning [4] environment, where for example, they engage with an interactive visualisation of abstract conditions such as the concept of the carbon footprint. This active process aids the gradual integration of these models, leveraging games' unique persuasive ability [1, p. ix], allowing children to assign their own meaning as they pull the narrative at their preferred pace [12, p.61]. This allows children to build upon their existing internal knowledge to establish a strong basis for this new understanding to become knowledge [10].

The early environmental conversation with children could have wide implications. Children exert major influence on household buying decisions, not just at the low end of the scale such as helping make daily food choices [13], but also higher-end economic decisions, particularly consumer entertainment electronics [5][6]. They increasingly have more knowledge about the technology, and thus are able to wield an influence on these decisions.

The phenomena of children affecting economic decisions has been termed as "transgenerational exchanges": where increasingly technological information is transmitted up the age divide [11]. These "transgenerational" conversations can instigate behavioral changes in adults, and can affect energy consumption habits in the short and long term. Children can affect adults by encouraging better habits, such as turning off lights and influencing purchase decisions towards energy efficient appliances and the like. Serious

games are designed to encourage a participatory culture [9], particularly supporting children's abilities to participate in shaping their environment.

2. GAME DESIGN CLASS

The design students participated in a 200-level game design paper focusing on the communicative potential of games, specifically on sustainability concepts such as energy conservation, deforestation and carbon footprints. The class was comprised of primarily second year media design students completing a Bachelor in Design. The students got to pursue multiple aspects of game production, from programming to character design and animation, in order to develop the visual and technical vocabulary necessary for game designers. They were also encouraged to consider experimental game mechanics for coming up with creative alternatives to the status quo.

The design brief challenged the students to articulate the concerns of a specific environmental or sustainability concern to a younger audience, aged between four and ten, through character design. The class utilised a constructionist framework, both for the game designers exploring multiple angles of sustainability, and creatively communicating that knowledge to their audience.

The design students conducted an inquiry into the details of their chosen environmental issues. They then began experimenting with character designs that could distil these issues into the core concepts, and then present it in a creative and well-crafted manner. The focus was to encourage player interaction through engagement with the character. Anecdotally, the game design class expressed their increased and more accurate knowledge of sustainability-specific details that corrected their assumptions. These motivations became the driving force for the serious game design investigation that the students carried out.

The students designed uniquely communicative characters with a focus on details that support the procedural rhetoric through engagement [1], where the details of the narrative/message are revealed through the actions of the player. Students were encouraged to reflect upon and revisit the clarity of their concepts through an iterative design process of constant refinement.

The class had the additional challenge of working with MiniMonos.com, an online social and gaming website for children, that aims to teach children about sustainability issues [3] without being tediously didactic. Their model for engaging a similar demographic around identical issues made them the ideal industry affiliate for the course.

The most successful design responses included a focus on the interaction between the character and the level, which successfully managed to have both instant character communication, and had the additional depth of narrative exposition through player interactions and engagement. As the player explored the game, the movements of the character through the level would reveal the core concept of the game. The games challenged the players to make their own connections and build their own narrative. The games introduced below were all recently completed playable prototypes. A framework for play testing and comparing communicative efficacy is being developed.

2.1 Case study 1: *Steppen*

Steppen was a character that aimed to communicate the carbon footprint concept (Figure 1.). The game's aesthetic clearly references the popular release *Limbo*, with the simple background that clearly highlights the character silhouette and the level items.

The player interacts with the different elements that represent our daily actions, which literally grow or shrink the size of the character's feet. The player gains understanding about how our daily actions directly affect our carbon footprint. An animated background reflects the player's actions, with the background becoming lighter or darker as the player interacts with the level, supporting the embedded procedural rhetoric of *Steppen*.

This concept is emphasised through engagement with the game and interaction with the character. In this case, not only do certain actions affect the size of the feet, the movement of the character is also slower or faster depending on the actions of the player. This handicap also affects game play. For example, where the character has too many negative pickups he is less agile and not able to collect the positive carbon footprint pickups.

2.2 Case Study 2: *Joules Burn*

Joules Burn aimed to subtly communicate the concept of energy conservation through the action of switching of household appliances. The game aesthetic references the pixelated futuristic ideal of video games from the 1980s and early 1990s.

Joules Burn uses a spaceship as an analogy for the home, with the surprise twist of tying energy conservation to the motion of the spaceship. As the player conserves more energy through their actions, that energy is redirected towards propelling the spaceship faster. Engagement with the character is the key relationship here, as the concept is revealed through playing the game, and is not immediately apparent.

The revelation – "the spaceship goes faster!" – provides an interesting element of surprise and whimsy to the concept. The increase in speed is not immediately obvious: it is communicated through an increase in the ambient audio and a moving background of stars seen through the windows of the spaceship. It is a creative rendition of the traditional "turn off lights and save power": the consequence of saving here is visualised as an active propulsion, which is instant positive feedback for the player rather than an intangible goal. This instant feedback helps the player begin to construct their understanding of power conservation: linking game actions and consequences to applied abstract concepts.

2.3 Case Study 3: *Sprout*

Sprout is a character that discusses deforestation as a wider concept through an interesting reduction in the different factors of deforestation. In this game, there is only *Sprout* against the chainsaw enemies, with the other trees as background objects. *Sprout* has only one defense mechanism – avoid the chainsaws – but it is only a matter of time before the chainsaws negatively affect him.

The pessimism of the narrative is juxtaposed against the cheery aesthetic style designed for young children. The aesthetic is distinctively animated: the entire game seems to always be in motion, even without player interaction. The final effect is a visual style that captivates the player's attention, persuading them to participate in the process of exposing the implicit rhetoric.

Sprout has no win state; the end of the game always culminates with the chainsaws cutting *Sprout* down. The game could have been inspired by what Bogost terms as the "rhetoric of failure" [1,

p.85]. It is also arguably an indexical reflection of deforestation, where the scale of deforestation is increasing.

Through the player's exploration of *Sprout*, he/she gets to digest the implications of deforestation on a reduced, more empathic scale. As *Sprout* inevitably loses, the application of this manner of argument quite succinctly highlights the urgency of deforestation. The message could prove to be a catalyst for motivating young children to learn more about deforestation.

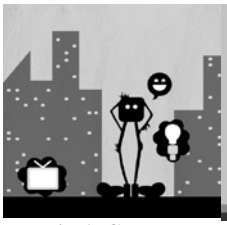


Fig 1. *Steppen* (Carew, S., 2010)

Fig 2. *Joules Burn* (Smith, L., 2010)

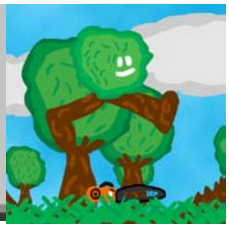


Fig 3. *Sprout* (French, R., 2010)

3. CONCLUSION

All three case studies aligned closely with the theoretical principals for constructionist learning through serious games. *Steppen*, *Joules Burn* and *Sprout* present strong character design that provide the initial clue to the narrative. Player engagement is required to reveal the depth of the message. The representation of these environmental concepts in games is an important part of this engagement: be it the literal representation of a carbon footprint as an extension of our anatomy, or energy savings translated to increased propulsion.

The games implemented an active learning framework that highlighted their use of Papert's recommendation of an active multi-modal engagement mechanism to encourage learning. In this case, the games highlighted learning through active play, using the ability of games to present a simulation of intangible concepts. The constant supportive feedback loop [12] is a central engagement mechanism, with the players' ability to see instant positive or negative feedback based on their actions. Environmentally motivated actions often are not able to present such as instantaneous response. A play testing framework is being developed to begin quantitative and qualitative evaluations of these games.

Piaget's theories on the construction of knowledge supported this framework, as the game designers first distilled the concepts that the players then would unfurl, building their understanding of it on top of their internal mental model. The player's immersion and progression, as Bogost's argument of persuasive modes of play through the revelation of a procedural rhetoric, creates a more stimulating and communicative learning experience. However, Bogost [1, pp.339-340] cautions that the potential of serious games is really in their capacity to encourage players to consider the pros and cons of their actions, and that gaming as a genre still needs to mature.

It is important that we continue to explore the potential for serious games not only as educational games, but also perhaps as reflective tools that inspire learning. The engagement that designed games afford us is important to constructive learning and even instructive education [7][4]. Central to that engagement is the notion of constructing abstract models of reality to conduct experiments that are reflective and stimulating.

4. REFERENCES

[1] Bogost, I. 2007. *Persuasive Games: the expressive power of video games*. Cambridge, Massachusetts: MIT Press.

[2] Chatfield, T. 2009. Video games now outperform Hollywood movies. *Guardian.co.uk*. Retrieved from: http://www.guardian.co.uk/technology/gamesblog/2009/sep/27/video games-hollywood

[3] Chiang, O.J. 2010. Games that can change the world. *Forbes.com*. Retrieved from: http://www.forbes.com/2010/05/04/farmville-minimonos-mangahigh-technology-video games.html

[4] Falbel, A. 1991. The Computer as a Convivial Tool. In I. Harel & S. Papert (Eds), *Constructionism: research reports and essays, 1985-1990 by the Epistemology and Learning Research Group* (pp. 29-41). Norwood, New Jersey: Ablex Publishing.

[5] Flurry, L. 2007. Children's influence in family decision-making: Examining the impact of the changing American family. *Journal of Business Research, volume 60(*4), 322-330. DOI=doi:10.1016/j.jbusres.2006.09.029

[6] Götze, E., Prange, C., and Uhrovska, I. 2009. Children's impact on innovation decision making: a diary study. *European Journal of Marketing, volume 43*(1/2), pp. 264-295. DOI=doi:10.1108/03090560910923328.

[7] Kafai, Y. B. 2006. Playing and making games for learning: Instructionist and constructionist perspectives for game studies. *Games and Culture, volume 1*(1), pp. 36-40. DOI=doi:10.1177/1555412005281767.

[8] Papert, S. 1991. Situating Constructionism. In I. Harel & S. Papert, Eds., *Constructionism: research reports and essays, 1985-1990 by the Epistemology and Learning Research Group* (pp. 1-13). Norwood, New Jersey: Ablex Publishing.

[9] Peppler, K., & Kafai, Y. B. 2007. From SuperGoo to Scratch: Exploring creative digital media production in informal learning. Learning, Media, and Technology, volume 32(2), pp. 149–166. DOI=doi: 10.1080/17439880701343337.

[10] Piaget, J. 1973. *To Understand Is to Invent: The Future of Education*. New York: Grossman Publishers.

[11] Raymond, M. and Lacey, H. 2003. Agenda: Sunshine Teens. *Viewpoint, Issue #1*4, p.16.

[12] Salen, K. and Zimmerman, E. 2004. *Rules of play: game design fundamentals*. Cambridge, Massachusetts: MIT Press.

[13] Thomson, E.S, Laing, A.W. and McKee, L. 2007.Family purchase decision making: Exploring child influence behaviour. *Journal of Consumer Behaviour, volume 6*(4), 182-202. DOI=doi: 10.1002/cb.220.

[14] Wilson, E.O. and Wright, W. 2009. *Ant Lovers Unite! An Open Mic Discussion Of Life And Games*. Retrieved from: http://www.npr.org/templates/story/story.php?storyId=112203095

Pets and Play: Do they have fun?

Inosha Wickrama
NUS Graduate School for Integrative Sciences & Engineering (NGS)
Centre for Life Sciences (CeLS), #05-01
28 Medical Drive
Singapore 117456
+65-81475269
Inosha@nus.edu.sg

Denisa Kera
National University of Singapore
Communication and New Media Program
Faculty of Arts & Social Sciences
Blk AS6, #03-41
11 Computing Drive
Singapore 117416
+65-65165768
denisa@nus.edu.sg

ABSTRACT
This paper describes the current research done to in the area pet-pet owner interaction, and the possible area that could be looked into to improve the current human-centric interfaces to optimize the pets' enjoyment with the system and to make them less anthropocentric.

Categories and Subject Descriptors
H5.m. [**Information interfaces and presentation (HCI)]:**Misc. - *prototyping, technological probes, experimental design*

General Terms
Documentation, Design, Human Factors, experimentation.

Keywords
Prototyping, human-pet interaction, Species-appropriate interfaces, cross-species interaction.

1. INTRODUCTION
Humans have been domesticating animals for over 12,000 years, from the time they were living as hunter-gatherers in caves. [1] However, the social trend of keeping animals as pets or rather companion animals, instead of as beasts of burden or as tools for improving human conditions is a modern phenomenon.

While the total number of worldwide pet owners has not been accounted for, it has been estimated that, at present that most households have two or more pets. Among them, the most popular are dogs and cats. In the United States alone there are a staggering number of pet owners. In a recent study conducted by the American Pet products Association, it was discovered that the number of pet owners are on the rise. The National Pet owners survey 2009-2010 revealed that roughly 71.4 million households with at least one pet; there include 77.5 million dogs and 93.6 million cats. [2]

Modern day pets do not play an active role in earning their 'pay'.

Instead, they are pampered, fed, groomed, provided with medical attention and treated with the same level of respect a family member would receive. As with any family member with special needs, pet owners adjust their lifestyles to fit that of their pets on many occasions.

The importance of human-animal interaction is reflected in some technological facets of human lives, from advances in technology that have been influenced by animals to innovative applications designed to improve human and animal interactions. As stated by Adrian Franklin, "for some reason people have sought new and intense forms of contact with animals" [3] and with the introduction of new media and technological advances the nature of the relationship between pet owners and pets; the way they interact with each other have changed. Social media, internet and wireless networking have opened new doors to interactive communication. Donna Haraway, in her book [4] states that we live in a technological age where our actions about the way we treat our animals are reflected upon by how we treat the technology around us.

While playing with pets is an important aspect of being a pet owner the limitations imposed by time and space has constrained the time spent together has brought forth a variety of pet-owner interaction methods which connected them over a distance.

2. EXISTING RESEARCH
Human-animal interaction is a widely researched field and in this section, I will be describing the research that has been done in this area. The existing research can be broken down into several sections, each concentrating on a different aspect of the interaction. There are various approaches discussed in the literature to provide a solution for cross-species interface design for human-animal interaction. These solutions span from monitoring systems, haptic, audio and visual interaction to pure fun in the form of games played between humans and their pets in novel environments all made possible by the introduction of new media.

2.1 Monitoring systems:
Work by Silver D. L. et al.,[5] deals with an interface known as the Human Dog Computer Interfaces (HDCI) which allows dog owners to monitor their pets over the internet when they are away. Similarly, Mikesell, D. et al. [6], introduces Hello Kitty and Young, J., et al., presents Feline Funpark [7] both of which

allows cat owners to play, feed and interact with their cats over the internet using a system of webcams, embedded Ethernet device and microcontrollers. Mankoff, D. et al [8] has introduced the Pack Activity Watch System: Allowing Broad Interspecies Love In Telecommunication with Internet-Enabled Sociability (PAWSABILITIES) for help support remote awareness of social activities between canines and their owners.

2.2 Fun:

Metazoa Ludens, the research by Tan, R.T.K.C et al. [9] deals with the fun side of human-computer–animal interaction in the form of a game, played between a human and a hamster using a computer interface and a mechanical arm.

2.3 Art:

Many artists have been inspired by the prospect of human animal interaction and how different humans are in comparison to animals. Two artists, Lisa Jevbratt[10] and Colin Ives[11] have worked on introducing animal point of view into human beings. This encourages humans who want to know the world from the view point of the animal to be immersed in it without disturbing their rhythm.

She calls this "non-explicit collaboration" since there is no way of directly communicating with the animal the human is collaborating with. Jevbratt does not expect animals to alter their behaviour or wear heave equipment for the sake of the humans. Instead, she expects humans, who have the need to 'communicate' with the animals by observing and interpreting the animals to adjust the human behaviour to form collaborations.

2.4 Interface design:

The works by McGrath, R. E.[12] brings to light the questions that need to be addressed when building interfaces which help animals interact with computers in a manner similar to humans, without the most basic human interfaces such as keyboards or mouse controls.

In Mankoffs' [8] work, there is a very clear distinction between the interfaces used by the human and the animal (dog). Human User Interface (HUI, pronounced "Who?"), and a Dog User Interface (DUI, pronounced "Doo") are distinct, with the HUI being comprised of ordinary peripherals such as a keyboard and screen where as the DUI comprised of videos to track the dogs movements and dog treats to entice it to stay within the parameters of the experiment.

The Animal-machine interface [13] project aims to extend traditional human-machine interfaces and their advantages to other living beings. The work includes mounted computers for dogs which enable to person to guide a dog through a series of obstacles without being present in person which was made in conjunction with the University's' zoological and engineering departments.

The CAT (Canine Amusement and Training) by Wingrave et al., [14] is a cross species computer application that deals with the training of dogs and their human owners. The owner is able to give and receive information of the movements of his pet and to train the dog.

3. DESIGN ADDITIONS

What most prototypes overlook is that pets, even those of the same species have different personalities. [15] In addition, most pets cannot speak out for themselves and cannot express their levels of physical wellbeing or enjoyment of a game. Since an important aspect of any game designed is to ensure the participant is actually enjoying the game it is necessary to monitor the pet (animal) during play. For this, it is possible to use wireless sensors placed on the body to measure just one or few key vital statistics such as heart rate or blood pressure.

The level of enjoyment of the pet can be monitored by a simple comparison of data that were collected before hand when the pet engaging in various everyday activities.

Online games designed to be played with the pet owner When using monitoring systems for the observation of pets and the complex system of CCTV cameras such overlook the most simplest of solutions. Real time video streaming via a social networking media platform such as Skype can be used to monitor the pet at all times via a webcam. This is possible with off the shelf hardware such as an inexpensive notebook with a webcam connected to a wireless coverage. This enables a cheap real time video streaming there by allowing the pet owner a chance to view stream live videos of the pet engaged in an activity to over the internet almost instantaneously, and in good quality. Most importantly, this sets up a two way communication system allowing not only the owner a chance to see and hear the pet in action but also for the pet to hear (and see) the owner if necessary.

4. CONCLUSION

Even within the HCI community, there have been some research that has looked into the particular area of human animal interaction but most of the design interfaces fail to note that this association between humans and animals changes, not just with the passing of time but also with the ideologies and technologies of the people who live it that time.

One of the questions to ask is not what the human or the pet benefits from the interaction but do they enjoy the interaction.

5. ACKNOWLEDGMENTS

We are grateful for the insight from various people in different fields of research from Prof. Milagros Rivera to Dr. Connor Graham who have helped us throughout the way.

6. REFERENCES

[1] Young, M. S., "The evolution of domestic pets and companion animals", 1985, Veterinary Clinics of North America - Small Animal Practice, v. 15, p. 297-309.

http://www.anthrozoology.org/the_evolution_of_domestic_pets_and_companion_animals

[2]National Pet owners' survey

http://www.ohmidog.com/2009/08/11/american-dog-population-rises-to-77-5-million/

[3] Franklin, A., "Animals and Modern Culture", Sage Publications, 1999

[3] Companion animals and us: Exploring the relationship between people and pets by Podberscek, A.L., Paul.E.S, Serpell, J. A., Pg. 90 – 108

[4]Haraway, D., "When Species Meet", Pg. 275 – 301.

[5] The human dog interface

http://iitrl.acadiau.ca/hcdi/

[6] Hello Kitty;

http://www.meatbot.com/portfolio/networktoy.htm

[7] Young, J. E., Young, N., Greenberg, S., Sharlin, E., "Feline fun park: a distributed tangible interface for pets and owners", (Video plus 4 page paper). Adjunct Proc. Pervasive 2007 - 5th Intl Conf on Pervasive Computing, (May 13-16, Toronto, Canada). Duration 1:13

[8] Mankoff, D., Dey, A., Mankoff, J., Mankoff, K., "Supporting Interspecies Social Awareness: Using peripheral displays for distributed pack awareness", UIST '05 - Proceedings of the 18th annual ACM Symposium on User Interface Software and Technology, Adjunct Proceedings, Seattle, WA, USA (2005)

[9] Tan, R. K. C., Cheok, A. D. and Teh, J. K. S., "Metazoa Ludens: Mixed Reality Environment for Playing Computer Games with Pets", Netgames'06, October 30–31, 2006, Singapore.

[10] Interspecies Collaboration:

http://www.interspeciescollaboration.net/

[11] Nocturnal, http://colinives.com/

[12] McGrath, R. E., "Species-Appropriate Computer Mediated Interaction", CHI 2009, April 4 – 9, 2009, Boston, Massachusetts, USA

[13] Savage, J., Maylo, R. A. S. G. M., Arce, L., Hernandez, A., Brier, L., Martinez, F., Velaquez, A., Lopez, G., "Animal-Machine Interfaces", Proceedings of the 4th IEEE International Symposium on Wearable Computers, Page: 191, 2000.

[14] Wingrave, A., C., Langton, T., Rose, J., LaViola Jr., J., J., "Early Explorations of CAT: Canine Amusement and Training", CHI 2010, Atlanta, Georgia, USA.

[15] Grandin, T., and Johnson, C., "Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior", 2004

Exhibitors

In alphabetical order

Playing the Museum: towards a rationale for games in exhibition design

Anton Berndt
Victoria University of Wellington
Wellington, New Zealand
antonberndt@yahoo.co.nz

ABSTRACT
The research, that this paper is a summary of, explores the potential of games to assist in the improvement of visitors' immersive engagement and in the reduction of didactic modes of knowledge transfer in museums. It will test the hypothesis that in spite games already being present in museum exhibitions, theoretical understanding of the function and value of play and games is currently lacking in the curatorial teams that produce exhibitions. The study will contribute to the field of museum studies by identifying current obstacles limiting the incorporation of games into the fabric of an exhibition's concept and design.

General Terms
Management, Design, Human Factors.

Keywords
Museums, Games, Exhibition Design, Play.

1. INTRODUCTION
Museums are shifting away from exhibiting positivist views of knowledge. Instead many museums begin to present constructivist perspectives that are non-didactic and that accommodate multiple perspectives on history (Anderson, 2004). Also challenging museums is the task of attracting visitors in the face of increasing leisure options available to the public. Consequently the goal for institutions is to identify modes of presenting content non-didactically and in ways that offer valuable experiences to their visitors.

This thesis takes the position that by designing museum exhibitions to operate as games the occurrence of "top down" presentations of knowledge can be reduced and the visitor experience of museums can be made more rewarding. Despite there being significant research already conducted in to the value of games as engaging and socially valuable activities there has so far been little attention paid to games within the field of museum studies.

This research looks broadly at game based interactivity and does not limit its scope to focus solely on either digital or analog interaction. This research holds that the principles of play and games are consistent regardless of the context in which they are enacted. As such this study views the spectrum from digital to physical engagement as a palette from which to select the appropriate mode given the requirements of a project.

2. OBJECTIVES, TOPIC AND RESEARCH CONTEXT

OBJECTIVES

- To identify factors that inhibit museum exhibition content being presented through games
- To identify the merits of choosing to produce an exhibition that incorporates game-play.
- To construct a new model of museum exhibiting practice that incorporates games as an integral mode of presenting content.

TOPIC

Modern museums collect, manage, and exhibit culturally significant objects and knowledge of traditions. This study focuses on the area of exhibition design in current museum practice. Although they appear in museum exhibits, games often hold a peripheral position in the schema of an exhibition's curation. Seemingly "tacked on" to the central concept of a show, as something of a popularity oriented after-thought, the play of museum games frequently bear little relevance to the content that they are trying to communicate. Existing museum games seem also to achieve low success in engaging audience members of varying ages and abilities. By closely analyzing existing instances of games in exhibitions this study seeks to identify obstacles that inhibit the incorporation and development of games into museum exhibitions.

RESEARCH CONTEXT

Within the study of museums, there has been minimal inquiry into the use, value or implementation of games

despite museums periodically employing game-play to enrich their exhibits. Arguably the use of games will increase given their contemporary popularity and the greater availability of the digital media synonymous with their current form. Research into play and games in museums has been conducted within the field of computer science, specifically concerning human to computer interaction, but this research seems to have made little impact on academic perspectives on museums. Based on existing research on games, this study will examine how games are socially, personally, and intellectually beneficial. This perspective will be developed into the context specific argument that games are an important part of a museum's activities catering for adults and youth alike and as such should receive greater consideration by museum curatorial staff.

The museum industry has recently seen a major effort to democratise the transfer of knowledge. Over the course of the twentieth century, the academic understanding of knowledge has shifted from a positivist toward a constructivist model (Hooper-Greenhill 2007). Correspondingly this trend has been picked up by the museum sector and is reflected in an aspiration to reduce the level of didacticism in exhibits. Never the less, the predominant method of presenting content within museums remains a "set and forget" approach in which the exhibition producers create "static" exhibits which visitors are then supposed to aesthetically "appreciate".

3. RESEARCH DESIGN

This research uses a mixed method and qualitative approach to conduct the research, which is common in interdisciplinary, work in the humanities. The research will be divided into three parts. The first part has been an exploration of current theory identifying the potential for producing exhibitions as games. The second part will be to conduct case studies that enquiry into the current attitudes of museum professionals towards the use of games in exhibitions. And the third part will be a synthesis of the identified potential and the current attitudes. These three stages are designed to bridge the current gap between contemporary thinking on games and contemporary museum practices of exhibition production.

4. INFLUENTIAL THEORISTS

A significant obstacle faced when embarking on a study of play and games is the process of finding an appropriate definition for both these terms. This study draws greatly from the work of educationalist **Brian Sutton-Smith.** Sutton-Smith (1997) asserts that existing definitions of play can be categorized according to the social function that the play fulfills, these he calls the *seven rhetorics of play*. These social functions are *progress, fate, power, identity, imaginary, self* and *frivolity*. Sutton-Smith points out that each of these categories do not encompass the breadth of the play concept but states instead that theorist tend to 'prove' the aspects of play that support their pre-existing agenda. For example psychologists and educationalist tend to prove that play is for progress, where as anthropologists tend to see it as being for the engagement with ones identity (Sutton-Smith, 1997). The value of this theory has been in negotiating the indefinable nature of the play concept. It can also be seen to hold potential as a design tool to help identify which mode of play is appropriate for a given body of knowledge when designing exhibitions.

Understanding what visitors may gain from a game based exhibition is key to its justification and production. In contemporary museum theory it is suggested that by engaging a visitor's existing body of knowledge, insight can be gained by the visitor on their own perspective on a topic. This embrace of the visitors pre-existing state has resonance with the theories of **Mihaly Csikszentmihalyi.** In his research Csikszentmihalyi outlines how a state of *flow* may be achieved through a balance between the skill level of the participant and challenge presented by an activity (1975). This state of *flow* is experienced as a perceptual immersion into the activity and is epitomised by a sense of competence, satisfaction and a temporary unawareness of being aware (Csikszentmihalyi 1975, 36, 38,50,). It can be seen that *Flow* theory represents a design tool in the production of engaging interactivity (Polaine 2005), which I see to be the basis of games in museum exhibitions. *Flow* theory also has the potential to be an evaluation tool in the assessment of the enjoyment of a game (Sweetser and Wyeth 2005).

The third pillar in the theoretical framework of this study is **Johan Huizinga** for his perspective on play being the basis of the institutions of culture. Huizinga views the provenances' of law, art and politics as being founded on play forms. To view play as having such centrality to the fabric of culture, lends weight to the argument for play, and therefore games, to be significant in the representation of culture.

5. THE NEXT STEPS IN THE RESEARCH

The next phase in the research is to conduct case studies of existing museum exhibitions that incorporate some aspect of game play. In these case studies exhibits will be critiqued for their conformity to the principles of *flow* theory and for their consistency with the *seven rhetorics of play*. As part of these studies the preparatory documentation for the exhibits will be analysed, interviews with significant stakeholders will be conducted and assessments of the final exhibit will be made. These studies aim to indentify the level of awareness and commitment to producing engaging, immersive games that communicate the content of the exhibit. Attention will be paid to identifying moments in the production process where game-oriented choices could have been

made to produce more 'playful' results and consequently enhance the visitor experience. The final stage in this study will be to synthesize the findings from the secondary research with the findings from the case studies to demonstrate how an exhibition can be conceptualized and structured to function as a game environment.

6. REFERENCES

1. Anderson, G. 2004. *Reinventing the Museum: historical and contemporary perspectives on the paradigm shift* AltaMira Press, Walnut Creek, CA.
2. Barker, Emma. 1999. *Contemporary Cultures of Display.* Yale University Press, New Haven.
3. Csikszentmihalyi, M. 2000. *Beyond Boredom and Anxiety: the experience of play in work and games*. Jossey-Bass, San Francisco, CA.
4. Huizinga, J. 1955. *Homo Ludens; a study of the play-element in culture*, Beacon Press, Boston, MA.
5. Marstine, J. (Ed.). 2006. *New Museum Theory and Practice: An Introduction.* Blackwell Publishing, MA.
6. Mäyrä, F. 2008. *An Introduction to Game Studies: games in culture,* SAGE Publications, London.
7. Polaine, A. 2005. *The Flow Principle in Interactivity*. in Second Australasian Conference on Interactive Entertainment Sydney, Australia
8. Salen K. and Zimmerman E. 2004. *Rules of Play: game design fundamentals,* MIT Press, Cambridge, MA.
9. Spariosu, M. 1989. *Dionysus Reborn: play and the aesthetic dimension in modern philosophical and scientific discourse*. Cornell University Press, Ithaca, NY.
10. Sutton-Smith, B. 1997. *The Ambiguity of Play*. Harvard University Press, Cambridge, MA.
11. Sweetser, P. and Wyeth, P. 2005. *GameFlow: A Model for Evaluating Player Enjoyment in Games*. In ACM Computers in Entertainment, Vol. 3, No. 3, July 2005. Article 3A.

Proposal for an Installation of Four Games

Daniel Cermak-Sassenrath
Interdisciplinary Unit
Faculty of Design & Creative Technologies
Auckland University of Technology, New Zealand
dace@aut.ac.nz

Charles Walker
Interdisciplinary Unit
Faculty of Design & Creative Technologies
Auckland University of Technology, New Zealand
charles.walker@aut.ac.nz

ABSTRACT
An installation of four games-in-development produced by students in the new transdisciplinary Bachelor of Creative Technologies degree at Auckland University of Technology in 2010.

1. INTRODUCTION
In 2005, Auckland University of Technology drew together four existing Schools (Art & Design, Communications & Media Studies, Computing & Mathematical Sciences, and Engineering) into one new Faculty of Design and Creative Technologies. In 2007, the Faculty formed the Interdisciplinary Unit, a 'virtual 5th school' to develop new experimental alliances, research collaborations and learning experiences across these overlapping disciplines.

A new Bachelor of Creative Technologies degree was established in 2008 as one key component of this larger transdisciplinary project. The program is conceived as a 'postgraduate program for undergraduates' or a 'liberal education for the 21st century' which recognises that pervasive (and often – but not always – playful) technologies lie at the heart of any cultural enterprise.

Informed by research into physical, virtual and networked studio-type environments, the project-organised BCT curriculum draws on philosophical notions of play and interaction to playfully transcend normative disciplinary boundaries and pedagogical practices.

The proposed exhibition will comprise an installation of four games produced by students in Semester 2 2010. Of the selected games, three were produced as part of a program in *Simulated and Immersive Environments*, and one was developed in a studio project.

To complement the theoretical explorations of simulation and play, students were asked to design and implement three games. The first was a *Tron*-style game with one special feature of their choice that is not normally found in *Tron* games, the second a ten-player *Tank Wars*-style real-time artillery simulation game, and the third a car racing game with a number of simulation features.
The game that was developed as a studio project by year two students explores the social behaviour of players in a MMOG (Massively Multiplayer Online Game). Players search for natural resources on different planets, trade or steal them, form alliances, and build up their home planets.

Figure 1: *Home* title screen

The games are multiplayer action games in real time. To have complete control over the interaction and to have the students' understanding go beyond modelling objects and using ready-made physics engines, game makers or high-level programming libraries, three of the games are coded from scratch using *C++* with the *SDL* library. One game uses a game engine but all important interaction features are scripted.

2. *HOME*
Home (Figure 1) is a MMOG in which players collect and trade natural resources, protect them on their home planet by building a (round) jump n' run level (Figure 2 (right)), and try to steal other player's riches from their planets. It explores the social interaction in Internet play: Will players work together, how will they organize, what size will their groups have, when will they break up?

Figure 2: Planet design and in-game screen shot

The game is set in a simple universe which is made up of player-created planets, referred to as *Homes* (Figure 2 (left)). These homes orbit the main market planet called *Prime*. Players are given the freedom to design their *Home* in the style of their choice in order to defend their 'gems' (currency) from other players who are out to steal them. Players can spend most of their time on cosmetics but the idea of the game is to invade, manage your home, achieve and grow in power.

3. *CUSTOM LIGHT CYCLES*

The *Custom Light Cycles* game is a four-player *Tron* clone in which players can switch the trail they are leaving behind on and off (Figure 3 (left)). This is quite an effective feature as it changes how the game is played while still remaining loyal to the original idea. In this way, it extends the game with a strategic component not found in most *Tron* implementations.

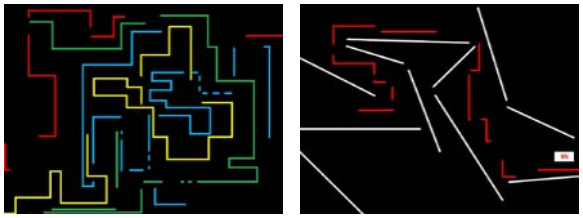


Figure 3: *Custom Light Cycles* in-game screen shots four players and one player

Another feature is a one-player mode in which the player has to navigate through a map or maze without touching walls (Figure 3 (right)). The game is controlled with old-school, digital joysticks.

4. *CUSTOM TANK WARS*

The *Custom Tank Wars* game is modelled on the popular *Bomb/Tank Wars/Scorched Earth* games in which little artillery stations that sit on a hilly mountain range shoot at each other by choosing the angle of their cannons and adjusting the shooting power.

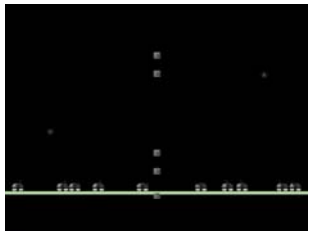


Figure 4: *Custom Tank Wars* in-game screen shot

The classic versions of this game are round-based, and in multiplayer matches the players have to take turns shooting and waiting. This implementation can be played by ten players in real time, i.e. all players can aim and shoot simultaniously. It takes some time to reload after each shot to avoid chaotic matches and a random outcome. The game is played in two teams. A wall that is made up of pixel blocks along the centre of the screen which is different every time the game is played, forces the players to accurately aim their shots in order to make it through the wall into the opponent's side. The tanks can move left and right to get into a good shooting position or to avoid being hit (Figure 4).

5. *C.A.R.S.*

The *Completely Accurate Reality Simulation* game (Figure 5) is set in 1950s North America. Garage gangs of Rock n' Roll people are racing each other with hot rod cars.
Players choose their cars, drive freely around the streets of a city, organize their own races and customize their cars. They can buy and trade different types of motors, brakes, aerodynamics, armour and tyres in various shops around town. Since cars get damaged by collsions, players can also have them repaired and (re-) painted. A high score is reached by driving as fast as possible without hitting other cars or buildings.

Figure 5: *C.A.R.S.* in-game screen shots

Unity 3D is used as a game engine, and up to 20 players can take part in networked play. The simulation features are scripted, and do not use *Unity*'s *PhysX* engine. They are based on the real data of different cars (acceleration, braking, steering and sliding on different surfaces and in different weather conditions) and include collision response, and explosions and smoke. The game is controlled with steering wheels.
The Macintosh and PC versions of *C.A.R.S.* can be downloaded at `www.novoalias.com/wordpress/cars`.

6. INSTALLATION

The installation consists of four computers and screens/projectors; a number of *Competition Pro* (re-issue) joysticks, joypads, steering wheels and speakers/headphones (Figure 6). The screens and the input devices are placed on tables or on purpose-built cabinets. The *Home* game requires a network connection. Students are on location to explain and discuss their work and to show design documents.

Up with the Play: TUI prototype design for retail experiences

Stuart Foster
Massey University
PO Box 756
Wellington, New Zealand
0064 4 801 57 99 extn 6157
s.t.foster@massey.ac.nz

Sven Mehzoud
Massey University
PO Box 756
Wellington, New Zealand
0064 4 801 57 99 extn 6668
s.a.mehzoud@massey.ac.nz

Rodney Adank
Massey University
PO Box 756
Wellington, New Zealand
0064 4 801 57 99 extn 62287
r.g.adank@massey.ac.nz

ABSTRACT
With the increasing popularity of online shopping environments there is an emerging trend to augment the physical retail shopping experience with digital technologies. However, engagements with digital technologies in retail environments typically suffer from a disconnect between two different modes of behavior; the physical engagement with products and that of online shopping activities. This paper discusses the prototype of a digitally interactive retail environment and explores how the desirable qualities of physical and online retail experiences and brand encounters can be combined to create more playful, meaningful, interpretive and experience focused environments.

Categories and Subject Descriptors
H.5.2 [**Information Interfaces and Presentation**]: User Interfaces - graphical user interfaces (GUI).

J.5 [**Computer Applications**]: Arts and Humanities - architecture

General Terms
Design, Experimentation

Keywords
Tangible User Interface; Play; Product Interaction; Experience Design; Retail Design and Entertainment; Social Media.

1. INTRODUCTION
The disconnect between physical engagements and digital based behaviour is particularly evident in the case of retail environments. A product is typically engaged with physically and sensorily, but the products on display are also often supplemented with graphic images to provide a user with a product's context. This is usually displayed through digital means such as touch screens, projections and monitors. These different form of media result in different modes of behaviour, belonging either to physical or online retail experiences.

The proposed design and prototyping of a Tangible User Interface [TUI] seeks to blend the physical and digital product engagements, or modes of behaviour, to result in a more meaningful product interaction. By applying product interaction and communication models to describe the user experience, it is speculated that the prototype engages the consumer in a playful, entertaining manner and provides motivation for sustained interpretation and enquiry. The act of play then becomes the common element / factor that unifies the behaviours of digital and physical engagements. The applied communication model acknowledges such an active interpretation of a user, and links it to the dynamic relation between brand controlled information, self generated information and the knowledge and emotion a consumers bring prior to engaging with retail environments.

2. PLAY AS SHOPPING
The purchase of goods can be considered to be incidental to the experience of shopping. Consumers buy so they can shop, not shop so they can buy [1].

Shopping can be considered an experience that goes beyond a mere functional task completion that involves the purchasing and acquisition of goods. The notion of Play can serve as a critical factor that gets a consumer involved in the pursuit of fantasies, feelings and enjoyment [2, 3]. In fact, the purpose of a consumer's action can be both, and end in itself (as in the autotelic actions of play) and a means to a specific end such as the acquisition of goods [4].

The act of play within consumerism is nowhere more evident than in the realm of internet shopping environments. Internet auction environments for instance, allow for consumers to vet themselves against each other in the pursuit of consumer products. Bidders interact playfully with each other and the seller, through the bidding process, reserve thresholds and online conversations. Furthermore, buying of product through online stores have become common place and together with auction sites, have shaped new consumer behaviours as well as expectations about dynamic delivery and access of product information.

Within physical retail environments on the other hand, there exist two distinct opportunities of engagement with products and brands. The first opportunity consists of actions that result in a direct engagement with products (object actions). The second opportunity involves the interaction with other people in which products become the focal point and catalyst for the discussion and dissemination of information.

The resulting prototype design blends the playful, dynamic and interactive delivery of product information online, with a haptic

engagement of the physical product in a retail environment. This takes place concurrently and offers the user a unified sensorial product experience.

3. PROTOTYPE DESIGN

The prototype design is applied to the context of an outdoor clothing and equipment retail store which seeks to communicate the product's many performance attributes. The technologies of Radio Frequency Identification (RFID), proximity sensors and computer vision are utilized to deliver interaction with the products and to communicate information about them.

These interactions within the store environment are divided into four distinct levels of engagement (see Figure 1):

Level 1: The initial in store encounter is with displayed products, supplemented with a wall surface displaying digital media (media wall). The media wall displays live information, which contextualizes the products in intended end use environments. This information consists of selected twitter feeds, weather information and live camera feeds of typical geographical user locations, mountains, fiords , etc(see Figure 2).

Level 2: Level 2 interactions allow for a consumer to interact with the media wall through engagement with physical product and their body. Products are RFID tagged (see Figure 3) and upon entering, a defined zone activates product relevant information into this immediate zone. The initial information delivered is general to the specific product (price, colourways, brief description).

Level 3: Level 3 interactions allow the consumer to further engage with the product specific information. This interaction is created through the use of bodily gestures facing the media wall. The choices of information that can be accessed in this manner are divided into two categories:

1) Technical information relevant to the product's design and performance.
2) 'Out in the World' information of relevant product being used in intended situations. This information consists of consumer-generated content solicited from social media sites.

Level 4: Level 4 interaction provides the opportunity for the consumer to contribute information to the media wall through social networks such as Twitter, Flickr, YouTube.

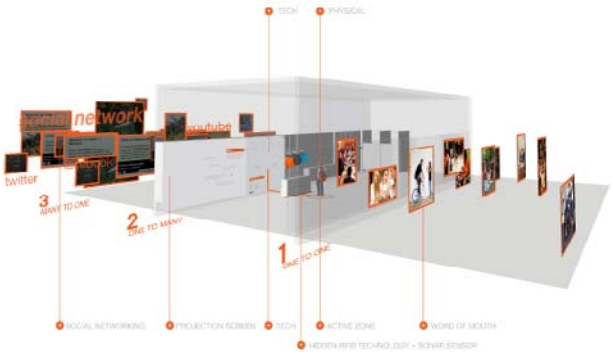


Figure 1. Interaction levels

Figure 2. Prototpye: Media wall

Figure 3. Prototype: Product tags

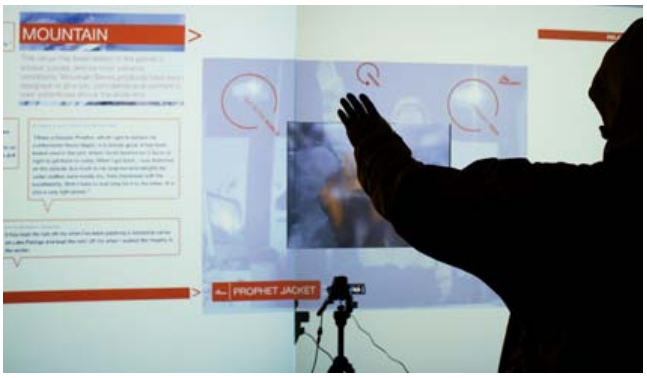


Figure 4. Prototype: Gesture interaction

4. OUTCOME

4.1 Product interaction and appraisal

The fundamental mode of product interaction is through our senses. Adank & Warrell [5] suggest the sensory experience that arises through product interaction, displays a range of characteristics including intimacy, subjectiveness and temporality:

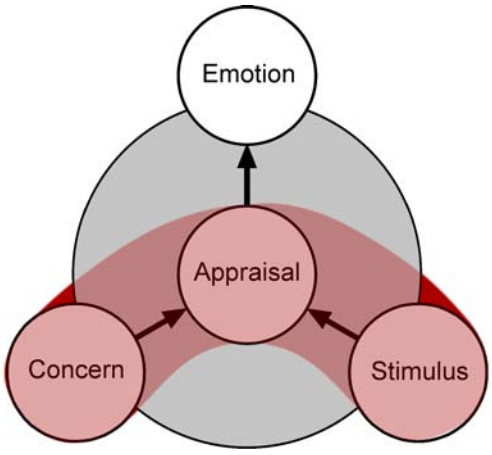
-Intimacy: as the product experience moves closer in proximity, other sensory organs participate, informing and building the intimacy of sensory experience through sensory immersion.

-Subjectiveness: where assessments of taste are at issue, the subjective perception of sensory information may be strong, as it is not mediated by an objective measure.

-Temporality: over time initial assessment of the product may be modified by subsequent interaction.

In concert, Desmet's [6] model of product emotion, illuminates the nature of product interaction and the development of affective emotional response, stating that emotions are a result of our assessment or appraisal of the product in light of our experience and concerns related to it (see Figure 4). This links the affective response evoked by the appraisal developed from the combination and interplay of product stimuli (through sensory experience) and subjective concerns (that are brought to the interaction by the individual).

Figure 4. Desmet's basic model of emotion



By understanding these characteristics of product and sensory experience and the interplay of factors that affect this experience, we can develop retail environments that engage with the end user, stimulating play and deepening the depth of aesthetic experience prior to the decision to purchase a product.

Our approach to achieving this has been to collapse the digital, spatial and product experience with the end user. This is undertaken through a series of digital encounters within the physical space and in contact with the product. The following table describes the levels of interactions achieved (see Table 1).

Table 1. Level interactions

Level 1-Engagement	
Objective:	To draw the end user into a more intimate space which allows for an engagement with a broader range of sensory modes.
Activity:	Initial in store encounter (TUI). Use of selected twitter feeds, Flickr, YouTube, weather information and live camera feeds of typical geographical user locations, mountains, fiords , etc.
Outcome:	Validation of appropriate product range for end user to further investigate.
Level 2: Experience	
Objective:	To engage the end user directly with the product.
Activity:	Exploring touch, feel, balance and fit between physical product, supplemented with streaming digital information (TUI).
Outcome:	The development of an informed experience of the product.
Level 3: Appraisal	
Objective:	To develop an appraisal of the product in relation to the concerns of the user, and informed through physical and digital interaction.
Activity:	Interaction with choices of information delivered (gesture/screen) Technical information to supplement the sensorial experience of the product. 'Out in the World' information of product being used by consumers in intended situations.
Outcome:	An informed, grounded decision on the appropriateness of the product for the end user's needs.
Level 4: Brand Value	
Objective:	To engender community with others.
Activity:	(Loops into levels 1,2,3). Opportunity to independently participate via Twitter, Flickr, YouTube, Loyalty Club.
Outcome:	Development of brand loyalty.

4.2 Interpretation based communication

As described above in detail, the prototyped retail environment provides an active engagement with digital and physical information through the notion of play. This is aided through an interaction with a TUI, encouraging gestural and physical activity. Furthermore, the TUI links to social media sites which allow for the creation of content by the user, and which is then blended with content provided by the brand itself. While Desmet's model of emotion accounts for a product appraisal experience, a semiotic communication model can further elucidate on a user's interpretive engagement with the prototyped retail environment.

The 'receiver' is recognised as an active maker of his or her own meanings for experiences, an interpreter with previous knowledge, attitudes and values which will inform any interpretation; and the 'medium' is reconceptualized as the middle ground between the communicators and the interpreters where many, varied and possibly conflictual meanings will constantly be made and remade [7].

This quote by Hooper-Greenhill, applied to our prototype experience, suggests that a customer is the receiver and interpreter of information and that the mediating element, the medium as middle ground, is not entirely controlled by the communicator or brand environment. The fact that varied and possibly conflictual meanings are being created through the process of interpretation, offers a potential for this project. If this fact is acknowledged, then a focused and guided encouragement of the dynamic relationship between communicator and receiver as interpreter can be created. The medium, as understood by Hooper-Greenhill, then becomes the retail environment with products on display and the TUI that allows for its contextualization. It functions as the middle ground between communicator and interpreter. 'Conflictual meaning' suggests that a degree of power and control over the communicated information is handed over to the receiver. But this sharing of information control allows the consumer to gain a satisfying sense of ownership over content creation. The consumer so becomes an active maker of meaning. And yet, while control over, and generation of the content by the consumer is achieved, clear and concise information about the product's technical, research, material and other related knowledge is also accessed and communicated. This servers as a good foundation for a product's appraisal. This understanding of communication and interpretation acknowledges that people will make their own sense of an experience, not the least because they bring with them their socio-cultural background, their desires, values, aspirations and behaviour characteristics.

5. CONCLUSION

This paper has described the design of a TUI prototype that seeks to blend physical retail and online consumer behaviours. It led us to speculate on the interactive experiences and through the application of product interaction and communication models, it allowed us to scrutinize in more detail what these experiences might mean for a user's understanding of the retailed products. We believe that play as a form of entertainment and inherent part of shopping will bring the two modes of behaviour closer together. They effect a more satisfying product interaction and appraisal experience. Consumers are empowered through the opportunity to be actively involved with the creation of product stories.

Further studies could involve the deployment of this TUI in a live retail environment to test the level of adoption of such online shopping and social networking behaviours.

6. ACKNOWLEDGMENTS

Our thanks to MacPac Ltd., Christchurch, New Zealand, for allowing us to access their image library and for providing us with MacPac outdoors equipment and clothing in order to create the TUI propotype. We would also like to acknowledge the support from Affect, 'The Centre for Affective Product Design', at Massey University, Wellington, and the help from our research assistants Emma Jepson and Katie Bevin.

7. REFERENCES

[1] Langrehr, F. W. Retail Shopping Mall Semiotics and Hedonic Consumption. *Advances in Consumer Research,* 18 (1), 1991, 428-433.

[2] Hirschman, E.C. and Holbrook, M.B. Hedonic Consumption: Emerging Concepts, Methods and Propositions. *Journal of Marketing*, 46 (3), 1982, 92-101.

[3] Babin, B.J. Darden, W.R. and Griffin, M. Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value. *Journal of Consumer Research*, 20, March 1994, 644-656.

[4] Holt, D. B. How Consumers Consume: A Typology of Consumption Practices. *The Journal of Consumer Research*, 22 (1), 1995, 1-16.

[5] Adank, R.G. and Warell, A. (2008). "'Five Senses Testing': Assessing and Predicting Sensory Experience of Product Design." In P.M.A. Desmet, J. van Erp and M. Karlsson (Eds.), Design & Emotion Moves. Newcastle upon Tyne, UK: Cambridge Scholars Publishing, pp35-58.

[6] Desmet, P.M.A. (2002). "Designing Emotions." Doctoral thesis. TU- Delft.

[7] Hooper-Greenhill, E. (1991). 'A new communication model for museums' In Kavanagh, G. (Ed). Museum Languages: Objects and Texts. pp.49-61

Interactive memories within museums

Tanya Marriott

Institute of Communication Design
College of Creative Arts
Massey University
Buckle Street, Wellington

New Zealand

Email: T.marriott@massey.ac.nz

ABSTRACT

This exhibition will discuss the museum visitor; and the need to record and make available, memory testimony and artefacts of Bomber Command Veterans. Storytelling Memories provides the framework for the user to synthesise a physical relationship with the memories and artefacts, which informs an emotional connection. Memory testimony is a reflective narrative, visually and emotionally rich within the mind of the contributor. This project suggests that if this richness of memory could be provided within a visual context, which is substantiated by the unique situation of each memory, it could foster an engaging understanding and relationship between the museum visitor and the memories.

Keywords

Memories, Storytelling navigation, Interactivity, Tangible Navigation, Human memory access museum, interactive memory.

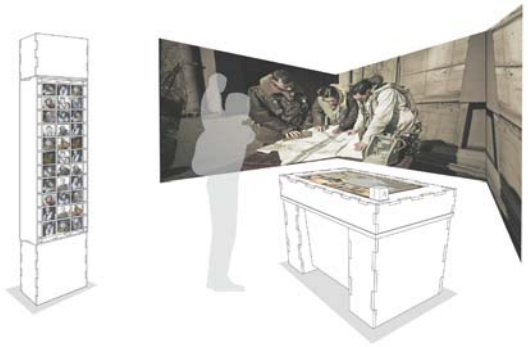
1. INTRODUCTION

As we pass the 6oth anniversary of the end of World War Two (WW2) historians are diligently collecting the memoirs of veterans to preserve for future generations. Public archives of memorabilia, letters, photos and artefacts, in the process of digitisation are complimenting the stone memorials of the past. Through the use of a tangible navigation controller, the user is able to "unlock" memories contained within a memory box. "*By means of information technologies, we can empower the interaction between the physical tangibility of a museum piece, its current interpretation, and its future meaning, and we can attribute them different functions and degrees of importance according to the characteristics of what needs to be (re)presented.)* "Giaccardi, 2006) [1]

Documentary drama series such as "Band of Brothers" [2] by HBO have been popular with the public as through the character journey the series paints a picture of the individual, alongside the experiences of the many. A museum, which traditionally houses large quantities of representative artefact in their archives, will often fabricate a "unanimous voice" for the genre- curated by the archivist, in an effort to recreate history. This method however tends to diminish the testimony and substance of the individual.

Too often in a museum environment an object is expected to speak for itself, long after as Knell argues *The meanings an object had in use, are allowed to be forgotten* (Knell, 2004, p. 118) [3]. It's heritage, purpose and connection to humanity if not recorded can easily be lost or misrepresented rendering any tangible memory simply an object. The visual context used in Storytelling

Memories creates a memory place or Loci for the artefacts [4]. It is the placement of the memory into the visual loci, which gives the memory or "artefact" substantiation, context and meaning.



2. PROJECT DESCRIPTION

2.1 The Cube

Nathan Shedroff states “Data is fairly worthless to most of us, it must be organized, transformed, and presented in a way that gives it meaning.-”(p.270)[5] The cube controller is the top of the memory hierarchy and acts as a tangible controller for the interface. Each cube is a separate tangible memory box representing an individual veteran. Reminiscent of old shoeboxes stored in cupboards and under beds containing physical mementos from the past. Each of the six faces on the cube corresponds to a different turning point within the veteran’s life. When one cube is replaced by the next another set of memories is accessed, specific to each person. The data is effectively packaged according to different periods of time within the veteran’s life, which gives an opportunity for the memory voice to vary its tone and opinion.

When the cube is brought into proximity to the table, the RFID (Radio Frequency Identification) tag communicates with the RFID reader located in the table as indicated in figure 2. An Arduino [5] physical computing device interprets the signal and acts as the bridge between the digital and physical world.

Figure 3. The six interfaces- before the War(Childhood) during the War Squadron Life, On Operations and Designation and after the War(reflection)

2.2 The Table and Peripheral Screens

The table is a physical window to memory presentation. The interface itself is segmented into two sections relating to a different hierarchy of memory as indicated in figure 3. Memory display within the bottom half of the table contains the memory testimony of the veteran as shown in figure 4. The memories are placed at the closest proximity to the user so they are easily accessible. The second tier of information is contextual or environmental and relates to the locations that are discussed within the veterans’ memories. The third tier located in the peripheral projections; is the most distant from the user. It utilises collected memories which do not belong to any veteran in particular, but which contains information which substantiates veteran testimony and the context of the memories.

This third tier includes technical or related stories. The sections that correspond to the icons illustrated on the side of the cube are Childhood and Growing up, Squadron life, Inside the Aircraft, On Operations and After the War. Turning the cube activates a new interface. A digital representation of an old drawer contains images and artefacts, reminiscent of mementos packaged away in an old shoebox under the bed. Each image utilizes a set of tools, a magnifying glass for closer inspection, and an old bakelite switch that controls sound. Set into the drawer is a digital window into the past; a detailed visual with subtle movements that narrates the environment relating to the memories.

3. CONCLUSION

Storytelling Memories utilizes a collection of interactive hardware and software in an innovative configuration of memory discourse within a museum context. Although none of the technology used is new, it is the way the components are used together which enables the project to be sensitive to the memory content. The hierarchy of content management used within Storytelling memories is based on substantiation of memory through contextual placement. This hierarchy enables the user to differentiate between what is personal to the veteran and what is “background” displaced but related artefact. The Storytelling Memories system can efficiently utilise within the interface displace but related artefacts already collected within the museum.

Figure 4. Storytelling Memories installation.

4. REFERENCES

[1] Giaccardi, E (2006) Collective Storytelling and Social Creativity in the Virtual museum: A Case Study. Design Issues, Summer 2006, Vol 22, No.3, pp 29-41.

[2] Band of Brothers (2010) Band of Brothers HBO mini-series *Retrieved 17th November 2010 from* *http://www.hbo.com/band-of-brothers/index.html*

[3] Knell, S.J (2004) Museums and the future of Collecting, Ashgate Publishing

[4] Carruthers, M, Ziolkowski J (2004) The medieval craft of memory, University of Pennsylvania Press

[5] Shedroff, N (2001)Experience Design 1, New Riders

[6] Arduino (2008) Arduino Physical Computing and RFID system. *Retrieved 8th August 2008 from* *www.arduino.cc/en*

Face to Face: Meeting Histories on the Street

Caroline McCaw
Otago Polytechnic, School of Design
Otago Institute of Design
Dunedin, New Zealand
Caroline.Mccaw@op.ac.nz

Morgan Oliver
Otago Polytechnic, School of Design
Otago Institute of Design
Dunedin, New Zealand
Morgan.Oliver@op.ac.nz

Leyton
Otago Polytechnic, School of Design
Otago Institute of Design
Dunedin, New Zealand
Leyton.Leyton@op.ac.nz

ABSTRACT
In this paper, we describe collaborative processes for developing interactive design solutions for the Otago Settlers Museum. Design School staff and students working within an Otago Institute of Design project team describe the concept development stages of a temporary exhibition and develop scenarios for participation in ways that challenge traditional Museological experiences.

Key words
Interaction Design, Experience design, Museums 24/7, design thinking

1. INTRODUCTION
Interaction Design is a subject taught to year 3 B.Des Communication Design students at Otago Polytechnic. The degree programme emphasizes both literacy with a wide creative skill range and the application of these creative skills through client-based projects. The Otago Settlers Museum was the 'client' for Interaction Design students in 2010, with the broad brief of making existing exhibits interactive. The results were so successful that students were employed to develop, through the Otago Institute of Design, further concepts and full exhibition designs, for a 2year exhibition at the Otago Settlers Museum. This short paper details the highly creative interactive and playful concept solutions that have evolved through these ongoing collaborations.

2. The Brief
The Otago Settlers Museum is a regional history museum in Dunedin, New Zealand that was founded in 1898. It is New Zealand's oldest social history museum, located in the heart of the city. Extensive additions will close all but two rooms of this large Museum site during a refurbishment programme that will last 2 years. The brief is to design an exhibition to represent the larger collection for this 2 year period, based on three stories: The Story of Scottish Settlers, the NZR bus station and visualization of the current Museum redevelopment project.

Only two rooms of one building (in the former Otago Road Services bus station, designed by architects Miller and White) will remain open to the public, while the extensive building additions will be underway. The Otago Road Services bus station concourse (opened in 1939) is a fine example of Art Deco architecture, and is a category 1 historic site. This means that absolutely no fixtures can be adhered to floor, walls or ceiling. As it has very recently been returned to its original state, the Museum needs to be able to empty the room for functions from time to time. Behind and connected to the bus station concourse, is an additional, and less historic room of much smaller dimensions. The main entrance to the Bus station (figure 1) connects to the street, and Entrance and Exit doorways (originally connecting the concourse to bus platforms) now connect the site to additional Museum housing, but are to be closed for the period of this exhibition.

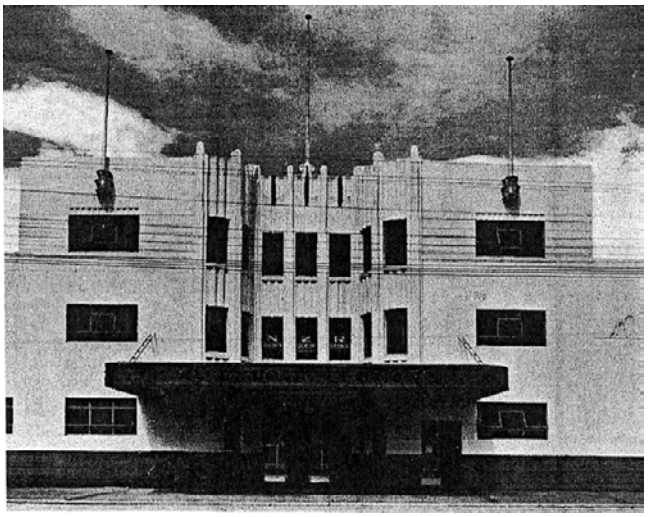


Figure 1: NZR Dunedin Bus Station Front Entrance 1940

The collections at The Otago Settlers Museum are extensive and range from household appliances to vehicles that usually form the basis of the Museum experience, however the brief for this exhibition was to be object-free.

The design challenge of working with a space that had neither wall space, nor objects to fill that space was posed to a team of students, teaching staff and Otago Institute of Design project managers. With only a short time frame and low budget the team developed numerous concepts and scenarios. Three concepts were selected and presented to the Settlers Museum exhibitions team. Aspects of these three concepts were selected by the Museum for further development. This short paper will discuss the three concepts, as the final exhibition is still under development.

3. DESIGN CONCEPTS

3.1 Concept 1: Museum as a viewfinder

This concept considered using the NZR bus station site as a viewfinder for seeing traces of Otago history in contemporary Dunedin: "Learning does not respect institutional boundaries…In a very real sense the knowledge and experience gained from museums is incomplete; it requires enabling contexts to become whole…These subsequent reinforcing events and experiences outside the museum are as critical to learning from museums as the events inside the museum". (Falk and Dierking 2000, cited in Anderson (2004) p142)[1]

The visitor experience described in this concept is shifted. Rather than the Museum as the site of the visitor experience the focus becomes the identification of city-wide and domestic experience of history. Different scales of identification can be selected according to a visitor's time scale and preferred level of engagement.

3.1.1 Walking Bus

A geographically close approach to engagement may be facilitated through a "walking bus". In this scenario visitors may form a group and take one of, or several, connecting journeys. Through a combination of online and printed publications trail maps encourage these visitors to adopt this 'Museum as Viewfinder' approach, with particular historic journeys profiled. For example the story of horse and cart, includes passing by the locations of water troughs and sites where horses where tied up in the city, and describe their expected journeys and stopping points throughout Dunedin suburbs. Another trail might trace the original urban coastline, before reclamation changed the scope and scape of Dunedin. This journey may include the stories of early settler ships and the named landmarks that are a result of key characters. A third trail could create a scattered menagerie for children, based on animal figures carved in local masonry. Lions, deer and unicorn abound, all introduced or mythical to this environment, one that originally had its own mythical creatures for settlers to discover. Along with a physical trail blazed through the layered landscape, visitors would be encouraged to (imagine, look, consider) through this approach.

3.1.2 Technologically augmented

Technological augmentation could lend a separate layer to this style of engagement, and the development of iPhone applications combining Google map/earth flagged locations, and Augmented Reality (AR) applications, could connect photographs, text and audio to these locations, and with additional web-based content. This is best used by the Museum of London in their recent Streetmusuem iphone application. The map leads you around London to various locations and once there the 3D View button, allows the app to recognize the location and overlay the historical photograph over the live video feed of the real world, giving you a brief glimpse into how that site looked in the past. "Hundreds of images from the Museum of London's extensive collections showcase both everyday and momentous occasions in London's history, from the Great Fire of 1666 to the swinging sixties" claims the Musuem's website.[2]

On the far end of the technological scale we recommended an alternative method for seeing history through the lens of the Museum. "Windows" made out of printed transparent paper, offer a low-tech equivalent of an iPhone app, and encourage visitors to learn to see the potential historic layers of a site, using a combination of historic photography and their imaginations. Though somewhat flippant, these images themselves leave physical traces, and encourage ongoing story telling beyond a digital experience. Like the content of the Museum, stories of Dunedin can be traced through remaining objects, and lasting tales told over time through remembering and retelling.

3.1.3 The comfort of your home

While these trails provide a close look at the city, another more domestic range of activities or 'recipes' are proposed within this concept framework. These recipes are a suite of domestic activities focused on encouraging individuals and groups to try a range of home-based chores as their forebears may have, and include some simple practical instructions (eg: try doing this activity in this way, or try making your own laundry powder using these simple ingredients). These activities encourage visitors to embed their museum-based learning as a practice grounded in their everyday experiences.

Recipes requiring very low household technology and use of locally sourced ingredients offer Museum visitors a potentially transformative experience in the context of their own home environment. These kinds of immersive interactions are low cost to the Museum and yet provide engaging and rewarding visitor engagement strategies while the Museum's own collection is inaccessible.

3.2 Concept 2: The Story of Otago Settlers

In its existing format (to be closed late 2009) this story is told through two separate exhibitions. The Smith Gallery is a large room full of almost 1000 foreboding original photographic portraits of early European settlers. These images document the wealthy and well-regarded, often in their latter years, grim faced as they wait for the required shutter speed. The 'Scottish Story' is a separate series of panels describing the early development of the township and its development. The photographs and didactic panels currently include no interactive elements.

This exhibition has been reconceived by student designers, as an audio visual experience, that brings the photographed forebears alive. The students, through researching these characters via the Museum's own historians and archives, as well as the nearby Hocken Archives, have developed stories for 25 of the profiled ancestors. The original gallery is to be photographed, and projected onto the walls of the newer room, adjacent to the NZR Bus Station's main concourse. Activated by Museum visitor's entering the room, one by one, 25 of these characters will tell a short reflective tale of their journey, arrival or lives in early

Dunedin. These stories however will be retold by a younger characterization than that represented, and all set during the early years of the city's settlement. The age of those arriving in the emerging city were generally much younger than the photographs taken. Using local Scottish voices to tell these tales, the settler's stories are able to reach a much wider audience. The students (all aged around 21) found the range of histories fascinating to research, and were able to contextualise their own research in the writing of dramatic scripts of characters their own age, rather than the ominous older figures in the photographs. Through a combination of archive research, script writing, audio recording, visual light cueing, and simple interactive triggers and choreographed media, these static photographs are developed into contextualized narratives that are able to tell stories that encompass a wide range of experiences. Needless to say the stories reflect an appealing and meaningful design engagement, for the students, and propose an evocative experience for the Museum visitor.

Figure 2: Otago Settlers Museum director Linda Wigley and Otago Settlers Association president Dorothy Page among the portraits of some of Otago's early settlers on display in the Smith Gallery. Photograph by Craig Baxter courtesy ODT

3.3 Concept 3: The clamor of the Bus Station

Site visits to the NZR Bus station main concourse during its renovations provided the inspiration for the third concept presented to the Otago Settlers Museum. This concept proposes a set of 2D figures in 1940's costume populating the once busy transport hub. The bus station concourse will be filled with relevant sound effects, simulating the din of a busy bus station. Each character will be based on a traveler likely to be travelling by bus in this era. While 2D, these characters will come with discrete audio devices and speakers, and will be able to offer short statements about their situation to visitors. Visitors will need to get close to hear the characters talk, and this will encourage a personal and detailed inspection of each figure. Each area of the bus station will be populated, with rear-projected video characters working in the luggage room and former tobacconist. Even the generous toilets will be populated, with a 1940's perambulator and baby. Outside of the bathrooms, the characters will be moveable, and can be relocated in order to appear to be talking with each other. The emphasis of this concept is to create an ambience and template for understanding a variety of people in Dunedin, on the brink of World War 2. The stories of particular people once again come alive, not through significant settlers and their stories of arrival, but this time through the clamor and relationship between ordinary people and their journeys.

4. DISCUSSION: The Place of Social Histories

The concepts outlined in this short paper share a number of characteristics. Each concept, aims to develop a personal engagement through visitor experience. They respond to a range of visitors' engagement thresholds, and activities can vary from a sustained visit through to a website download, for a walking trail that could be enjoyed over time with visits taking as little as 10 minutes at a time, encouraged to be completed over a week of lunchtimes. The concepts reflect the interdisciplinary team based approach, with the inclusion of students and staff designers, and with designs will be developed further through interdisciplinary student projects. The involvement of students in these teams encourages a fresh look at literally old material, and the perspective of an audience that usually is not considered as a primary one for this musuem. While the current focus of the Otago Settlers Museum is on the many and varied collections of everyday objects, and the ability to understand social histories through the stories they tell, this exhibition proposes a significant shift in the role of the visitor, and one that has political as well as social affects. In the words of Mike Wallace (1995)[3] regarding the role of a Museum's potential role in forging a community of public discourse "I urge museums to seek not simply customers but constituents, …and to become partners with communities in effecting change; to continue to think imaginatively about new ways of saying things, and boldly about new things that are worth saying." The 2 year exhibition reflects Shedroff et al's model of Experience Design. Shedroff defines experience with reference to Pine and Gilmore's term "the experience economy".[4] "To experience something requires that we recognize an alteration to our environment, our bodies, our minds, our spirits, or any other aspect of ourselves that can sense change" (Diller, Shedroff and Rhea 2005 p18) [5] Interactive elements within these contextually specific designs contribute to the significance and meaning of the visitor's experience. Objects in this sense, are moved from passive and potential containers of narrative, to active and interactive triggers for ongoing, and meaningful visitor experience.

The exhibits aim to reach Shedroff's three inner core emotional engagement rings, namely a value or identity driven sense of participation in order to create a meaningful experience. Visitors can make direct connections to their own identities, and position themselves in a more developed sense of community, that spans time as well as locale. According to Shedroff "design is the process of evoking meaning" (Whitbread 2009). Concepts 2 and 3 aim to script rather than merely evoke meaning, and involve visitors in the more lively stories of objects and images. In this sense the Museum becomes a site for experiences to happen, and much like the bus station's original purpose, the site takes on the role of transport hub, this time taking visitors through time travel. Recontextualised, this travel creates storytellers from these historic figures, but requiring visitors to be physically present.

Concept 1 in contrast takes a more provocative view of the role of the Museum as a single site, and incites visitors into imaginative reflection, and action. Action-based engagement, from taking part in walking trails to trying home-based recipes, allow visitors an immersive and thoughtful reflection back in time, through their own actions.

While the former design concepts activate people and objects, and propose a noisy and more contextualized Museum site, the latter concept takes the visitors body as the site of the Museum's story,

and articulates a world that revolves around that body, with layers of historical possibility to be discovered, recovered, seen and practiced. As well as the potential for digital augmentation the Museum as Viewfinder approach, appeals to that sense of emplacement in history, both urban and everyday. Just as the physical objects in the Museum tell their stories, so too our own physicality contributes to the story and histories of the cities we inhabit.

5. ACKNOWLEDGMENTS

Our thanks to The Otago Settlers Museum for the opportunity to present concepts, and further develop and reflect on the collections. Much research and support has been provided by Sean Brosnahan, Linda Wigley, Bronwyn Simes and Jennifer Evans. Thanks also to the Mark Miller at the Applied Design Research Centre of the Otago Institute of Design for project management and support in hosting this collaboration. The exhibition is due to open in the first week of December 2010

REFERENCES

[1] Falk and Dierking, 2000 'The Contextual Model of Learning' in Anderson, Gail (ed) Reinventing the Museum, Alatamira Press, 2004, Walnut Creek CA, USA.

[2] http://www.museumoflondon.org.uk/MuseumOfLondon/Resources/app/you-are-here-app/index.html

[3] Wallace, M. 'Changing Media, Changing Messages' in Hooper-Greenhill, E (ed) Museum, Media, Message, London/New York Routledge 1999, p123.

[4] Pine J. and Gilmore J., (1999) The Experience Economy, New York Harvard Business Press, p123.

[5] Diller, S., Shedroff N., and Rhea, D., (2006) Making Meaning, (Berkeley) New Riders Press

[6] Shedroff, Nathan (2006) as cited in Whitbread, David (2009) The Design Manual, Sydney Australia, UNSW Press, p2

Figure 1: NZR Dunedin Bus Station Front Entrance 1939, "Bird's Eye View" Published in Home and Building, Feb 1940, pp14-15

Figure 2: Otago Settlers Museum director Linda Wigley and Otago Settlers Association president Dorothy Page among the portraits of some of Otago's early settlers on display in the Smith Gallery. Photograph by Craig Baxter courtesy Otago Daily Times newspaper, printed 15 April 2010

Solving Preadolescent Anti Socialism Through Play

Danielle Millar
Graphic Designer
2/187 Vivian Street,
Wellington, New Zealand
+64 212564585
D.Millar@hotmail.co.nz

Roshan Patel
Animator
18 Puketotara Street
New Plymouth, New Zealand
+64 210484235
Rossnaki@gmail.com

Amber-Jean Hornsby
Interactive Designer
78 Owen Street, Newtown
Wellington, New Zealand
+64 211571412
Amberjean89@gmail.com

ABSTRACT
Anti socialism within preadolescents comes from feeling bad & distress derived from social problems. This project is designed to help 8-13 year old children's social development by providing them with a product and game, where through play they can learn valuable social skills and can express who they are creativity. This helps to relieve them from the everyday stresses caused by anti socialism and low self-esteem. The exhibition piece of 400 level of Bachelor of Design will demonstrate how this will support this issue.

KEYWORDS
Interactive Bracelet. Children. Social development. Creativity. Self-expression. Digital Media.

INTRODUCTION
Anti socialism within preadolescents comes from feeling bad & distress derived from social problems. This project is designed to help 8-13 year old children's social development by providing them with a product and game, where through play they can learn valuable social skills and can express who they are creativity. This helps to relieve them from the everyday stresses caused by anti socialism and low self-esteem.

1. CONTEXT
Lewis and Siegal said that distress from children's relationships with peers' accounts for 23% of the causes related to them being unsociable. This comes from "dynamics of inclusion & exclusion" (Adler, 1995) of preadolescent cliques, which directly affects children's self esteem. Cliques are circles of power where in leaders attain and wield followers by cyclically building them up and cutting them down, first drawing them into the elite inner circle and allowing the leader to bask in the glow of popularity and acceptance, and then reducing them to positions of dependence and subjugation buy turning the group against them.

(Adler, 1995). This leads to children being isolated from their Peers made to seem "different and undesirable" from others leading to symptoms of anti socialism and low self-esteem. The preadolescent children are seen to at a stage where they are intellectually developing and learning about action and reaction, and cause and effect (Piaget, 1972), the lack of this knowledge gives rise to exclusivity, status stratification & differential power in their social realm (Adler, 1995).

Figure 1. Flossin game components including the bracelet charms

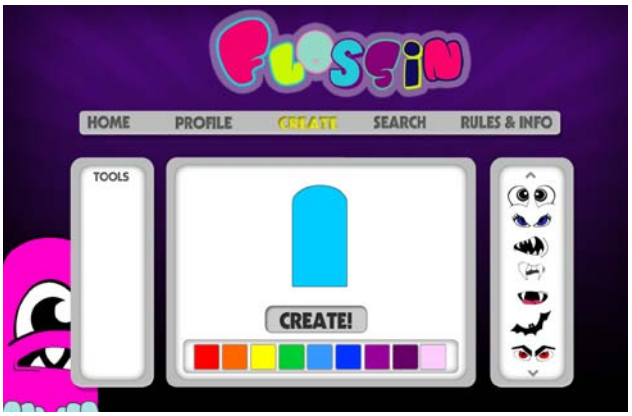


Figure 2 Flossin Website

2. GAME AND PLAY METHOD
We are creating a game that involves social and transformative play. It will be a method of play and a game based around the product of a digital interactive charm bracelet that will encourage physical social interaction and creativity with preadolescent

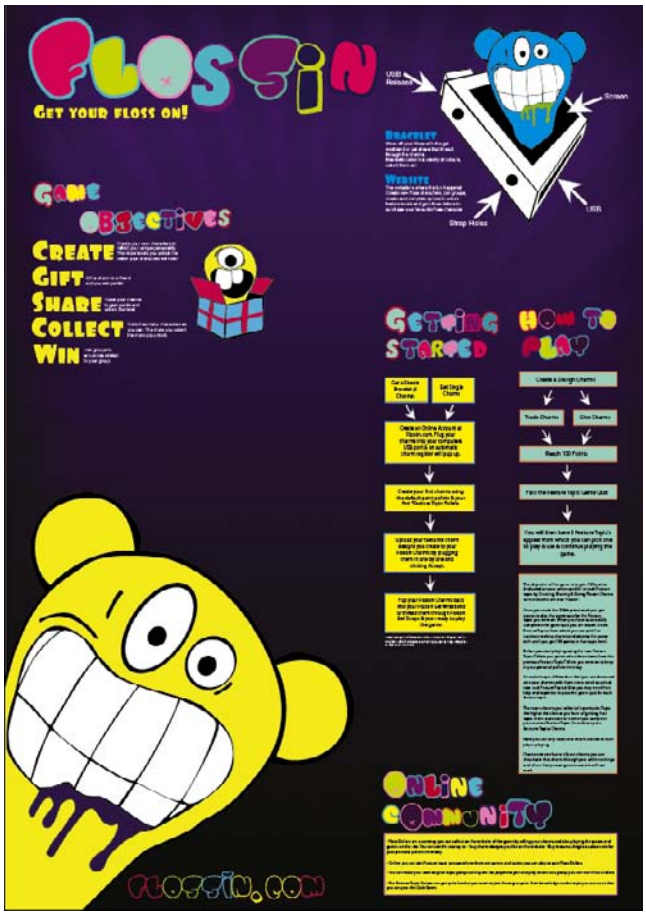


Figure 3. Flossin Introduction poster

children. The game will be designed to achieve the break down the social structure of preadolescent cliques, enabling children to learn how to socialize in a positive environment and develop key social skills that are valuable in later life. This enables children a chance to learn about each other beyond a superficial level, providing opportunities to build new friendships and personal connections. The bracelet and game will also offer a chance for them to also express who they are through creating a visual identity by designing their own charms and encouraging creative flare. From creating the charms children will then learn by sharing and trading with.

CONCLUSION

By developing this product and game we plan to create and archive a possible method of play that will help break down the social structure of preadolescents cliques and stop children from being isolated leading to anti social behavior and low self-esteem issues. This will lead the way for healthy relationships to be formed and will equip children with beneficial social skills that will help them to be self-confident and content throughout their present and future lives.

WEBSITE

Http://prd.posterous.com

REFERENCES

[1] Adler, P & Adler, P. 1995. *Dynamics of Inclusion and Exclusion in Preadolescent Cliques.* Social Psychology Quarterly.

[2] Lewis, C, Lewis, M & Siegel, J. 1984. *Feeling Bad: Exploring Sources Of Distress Among Pre-Adolescent Children.* American Journal of Public Health.

[3] Piaget, J. 1972. *Intellectual Evolution From Adolescence to adulthood.* Human Development

Roopadhyana

Roshan Patel
Digital Media Student
Massey University

+6421 048 4235
rossnaki@gmail.com

ABSTRACT
Hindu devotees in this current day and age are experiencing difficulty in connecting to their God. This research project investigates how experiential design can be used to educate Hindu devotees on the key characteristics of Bhaktiyoga (loving devotion) to help them connect with their God Krishna, and achieve their ultimate aim in life

Categories and Subject Descriptors
Exhibition Submission

General Terms
Digital Media Design

Keywords
Hinduism, God, Devotional Practice, Interactivity, Emotive Connection, Experience Generation.

1. INTRODUCTION
The aim of life in Hinduism is to attain eternal bliss – God. The way to achieve this is to practice devotion, purify the heart, surrender and become deserving to attain God's grace, His bliss. Bhaktiyoga is the name of the most recommended form of devotion to God in Hinduism. It is comprised of 5 main characteristics [figure 1], and 9 different forms of devotion [figure 2] which are stated in the Bhagavat Puran Hindu scriptures, these are both in an ascending level of practice. Roopadhyana, mental visualization is the 5th and most significant characteristic of Bhaktiyoga. It assists all levels of devotion, and is essential for the higher levels, allowing the devotee to create a personal intimate connection.

A survey designed specifically for this research showed that devotees have most difficulty in connecting and visualizing God (graph 1) and reaching the seventh, eighth and ninth forms of devotion in Bhaktiyoga. These are internal forms as opposed to sensory, therefore problematic to initiate. Through the study and investigation a conclusion was derived that the devotees are experiencing difficulty in connecting to their god Krishna due to the lack of the teaching of Bhaktiyoga, specifically Roopadhyana.

Figure 1. Nine forms of devotions within Bhaktiyoga

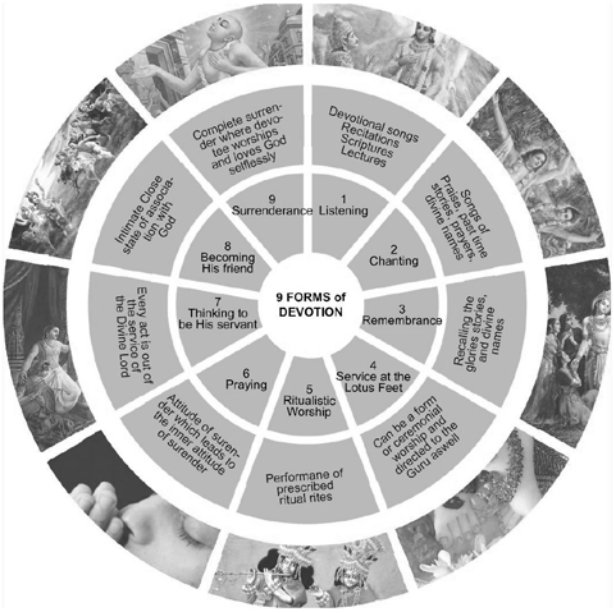
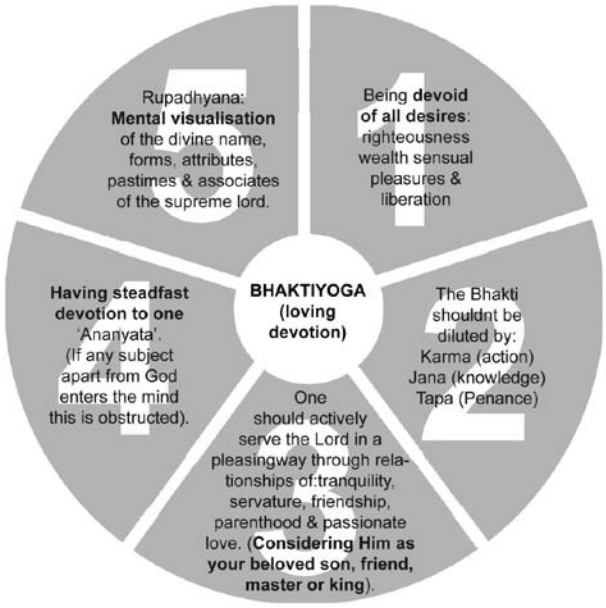
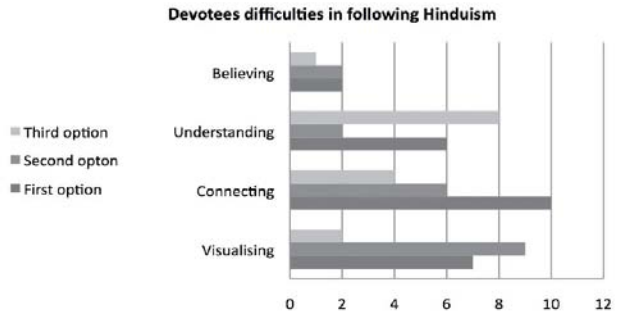
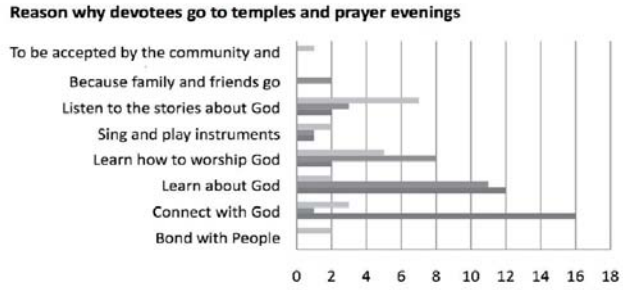


Figure 2. Five main characteristics of Bhaktiyoga





Graph 1. Devotees difficulties in following Hinduism



Graph 2. Reason why devotees go to temples and prayer evenings.

2. THE PROJECT

Experience design has been employed to create an engaging immersive installation, called Roopadhyana, for the devotees to learn about Bhaktiyoga, visualization, and to create a loving connection with their God - Krishna. The resolution brings to life Krishna, using 3D modeling and animation, as an interactive hologram in a Hindu prayer evening themed installation, and will subliminally teach devotees how to visualize Him, whilst also teaching them the essence of Bhaktiyoga. An interplay of information, interactive and sensorial design disciplines, a Nathan Shedrof concept, has been applied to create a successful experience. It enhances worship practice by teaching the devotees to practice Rupadyana instead of the commonly practiced statue or photo deity worship whereby people generally "feel the presence of God before them or in their hearts only while they are engaged in devotional practice" (Maharaja, 1996, p265). Bhaktiyoga involves practicing devotion with the consciousness that the God is always present with you everywhere, and Rupadyana facilitates this remembrance and consciousness as mental visualization can be done 24 hours a day. Devotees can visualize Krishna eating, sitting, walking, and talking with them wherever they are.

The interactive aspect of the experience design is essentially about storytelling and creating, through communication and play, which is both an ancient art and can be done through a new technology. "Media have always effected the telling of stories and the creation of experiences, but currently new media offer capabilities and opportunities not yet addressed in the history of interaction and performance" (Poggio, 2004).This project experiments with holographic technology to portray the intense love Krishna has for his devotees. Jeff Allen an author and consultant for interactive entertainment and education said "by incorporating a hologram with themed environments, props, and dioramas, the content of the hologram is expanded to create a three-dimensional, life-like experience of any size". When the animated interactive 3D Krishna is projected as hologram in the prayer evening installation, devotees are able to interact and play with him, and he is able to react and show loving gestures to them. The personal encounter induces emotions within the devotee, creating a connection. This emotive connection is not felt through other representations of Krishna (statues, dolls, and illustrations) as they are not engaging at a sensory level; this is a facet of experience design.

The temple installation is comprised of: A prayer room, an interactive holographic Krishna, sound, tangible objects of worship and an information design brochure.

3. CONCLUSION

Once devotees have experienced the installation and interacted with Krishna, the induced emotions felt establishes the loving connection the devotees of Krishna are seeking. The knowledge of the main characteristics of Bhaktiyoga and developing ability to visualize Krishna, gained from the installation, helps strengthen the devotee's connection with God. This allows them to get closer to achieving their ultimate aim of life of attaining the eternal bliss of God through his grace.

4. REFERENCES

[1] Maharaja, K. (1996). Philosophy of Divine Love. India: D.K. Fine Arts Press (P) Ltd

[2] Poggio,N. (2004). Theory: The design of experiences. Retrieved may 18, 2010 from: http://users.ices.utexas.edu/~natacha/CATTt/theory.html

University culture and community building

Joel Schroyen
Massey University
21 Resolution St
6022, Wellington
+64 (0)27 466 5607
joel.schroyen@gmail.com

Mellissa Hartwick
Massey University
Wellington
+64 (0)21 550 453
missy.hartwick@gmail.com

Jo Anne Tay
Massey University
299 Mitchell Street, Brooklyn,
Wellington
+64 (0)22 025 4454
somedaysomehow@gmail.com

1. INTRODUCTION

Currently, there is a lack of university culture and community at Massey University Wellington. Our project is a real-world-based game that uses a mysterious narrative and play theory, combined with Massey's campus, to create community and culture within it. Traditional fraternities and school-based Houses have a long-standing history of creating community and culture. They offer a genuine sense of belonging that derives from playful exclusivity. The Massey University campus will become Huizinga's (1938) Magic Circle.

The core of our game is to focus on first-years' start into university life. This group is largely 18-19 years old, with many having just left home for the first time and bombarded with all the associated changes. The heart of the project is take this group and, not only introduce to them to university culture and community, but also create it.

1.1 Project Description

Game Structure: A narrative is created that describes an event that causes tension between existing teams in the Massey University campus. Hints and mood of the narrative are discreetly introduced at the start of the university year and slowly progresses into detailed events and games.

The first part of the game is the Induction or "recruitment" - it draws its players in by generating mystery and intrigue and sense of exclusivity. During orientation week and for the first half of semester one, the game's narrative and mood is introduced subtly and progressively becomes more intense. By implementing various sorts of media in form of curiosities throughout Massey museum building, non-players are intrigued, and players recognize this as the beginning stages of a new game.

The players' generation has a strong digital literacy, understanding of cell-phones, internet, social networking and video-games. Therefore our curiosities will be in the form of QR codes, hidden notes, and abstract posters that have individual codes that direct the player to the game's website. This is the Recruitment phase.

A meta-game controls each team's ranking throughout the year as they achieve, or fail, inter-team games, smaller location and event based games, and other 'happenings'. These cross-team games all relate to the given narrative, and each team plays a role within the story. Games start slower, such as small scavenger hunts for clues, to then snowballing towards the end of the year into climatic games such as assassin.

Senior players are also involved in the scope of this project and play an important part to encourage new players. They have already been recruited and are familiar with the system. They can take on more responsibility and agency in the game. They are also given "mood-setting" tasks, or "mini-games" conducted during each game's build-up, to generate more awareness and curiosity. These tasks include activities such as flash mobbing, wearing particular team branding, and speaking in team "language" or sayings.

2. EXHIBIT

2.1 Description

The exhibition will be designed to fit within the game narrative itself and will provide some of the curiosities mentioned above. Because of the playful nature of the project the exhibition it will contain not only a description and visual display of the overall project, but it will allow for the possibility of interaction. Within the limitations of the exhibition space this exhibit will have a small game that will mirror the project's intended game design. There will be take-aways available at the display embedded with clues. To the committee's discretion, clues are able to be hidden/embedded around the exhibition space, without interfering with other exhibits. Whoever solves the mystery is eligible for a prize to be decided at a later date.

The intention is to mirror the sense of mystery for the intended university-based game, into the exhibition space.

2.2 Requirements

A panel will be required for a visual display to be placed on, and a table or stand for a computer display and input devices (mouse, keyboard). Approximately 1mx2m floor space will be needed for the panel and table.

3. CONCLUSION

Our project is a real-world-based game that uses a mysterious narrative and play theory. With our target audience's strong digital literacy background, our form of curiosities will be implemented using QR codes, hidden notes, and abstract posters that have individual codes that direct the player to the game's website. The project of this game is specifically designed to build a community among the University campus with delegated games and tasks for each squads to be involved with such as flash mobbing, speaking in team languages to mini games.

Therefore our aim for this project is to take our target audience and, not only introduce to them to university culture and community, but also create it.

Figure 1. Game narrative: Photo of man at foundation of the National Museum (1926).

Figure 2. Courisitiy: Introductory package.

Figure 3. Courisity: QR Code.

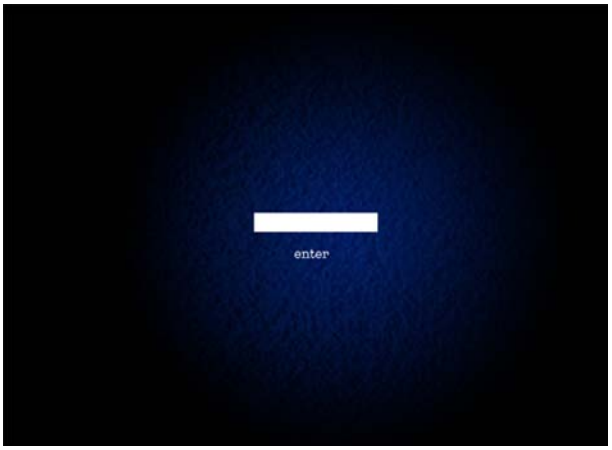


Figure 4. Website welcome page.

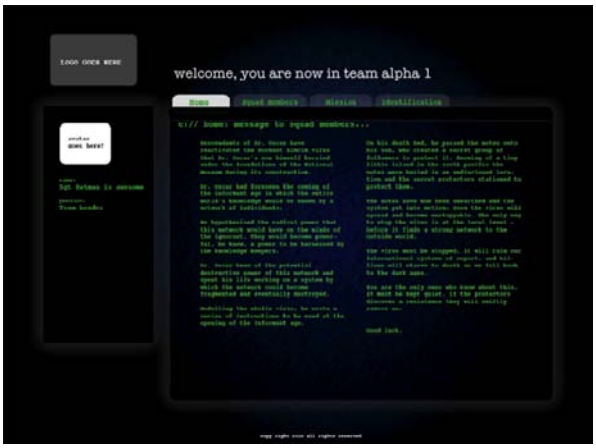


Figure 5. Website user page.

4. REFERENCES

[1] Huizinga, J. 1938. Homo Ludens. Beacon Press, Boston.

Expressive Video Games

Joel Schroyen
Massey University
21 Resolution St
6022 Lyall Bay, Wellington
+64 27 466 5607
joel@joelschroyen.co.nz

ABSTRACT
This research project investigates the communicative power of game play in video games in informing social attitudes through Dynamical Meaning. Dynamical Meaning, as Jonathan Blow (2007) termed it, is the semiotics of game play; the meaning the player interprets from the way the game system responds to their agency within the game world. Contemporary game design often focuses on a narrative as the main source of meaning, but Dynamical Meaning stems from the core interactive nature of games and can be more meaningful to the player.

1. KEYWORDS
Dynamical meaning, game design, social, interactive game, play

2. INTRODUCTION
Players construct Dynamical Meaning through the action of play. Playing a game allows players to experiment and experience the game system from many different angles. The result is that the player obtains a deep understanding of how the game system works creating a mental model from their experience.

A video game was developed in response to this research in which players manipulate the social interactions between characters that are part of a community. The Dynamical Meaning expresses character and social interaction through game rules and mechanics, in the context of an Art [video] Game. Players have to deconstruct the attributes of each character by experimenting and observing actions and reactions of the characters, and then choose an appropriate action to take in response. Through this experience, players construct and modify their interpretation of the game system as a mental model. The mental models can then be explored in, and compared to, the real world - encouraging the possibility for related behavioral changes in the player.

Despite their popularity, the popular perception of video games is that they have little real value to offer. In addition, there remains the concern that the levels of violence in video games contributes to aggression causing countries such as Australia and Switzerland to ban explicit titles. Noted game designer Raph Koster (2005) contends that "too much sex and violence isn't the problem, the problem is the shallow sex and violence."

In a recent study on the Millennial generation by the Pew Research Centre (2010) findings reveal that two-thirds of the 18-29 year-olds interviewed are wary of others and claim they can't be too careful when dealing with other people. The study also shows that two-thirds of Americans, regardless of age, believe that older adults have better moral values and are more respectful of others than young adults.

The intention of this project is to generate debate that leads players to attaining a wider understanding of their own, and others, social attitudes. Through experimentation and exploration players will grow empathetic to the game scenario and construct mental models to use in the real world.

3. PROJECT DESCRIPTION
The game-play itself gives the player the agency of a boy in a park inhabited by several unique characters. The player has opportunities to interact with the characters in various ways. Each character has their own personality and reacts as they see fit, encouraging players to learn their characteristics and react appropriately. Over time, relationships can cohere together to form a community, or drift apart, depending on the player's choices.

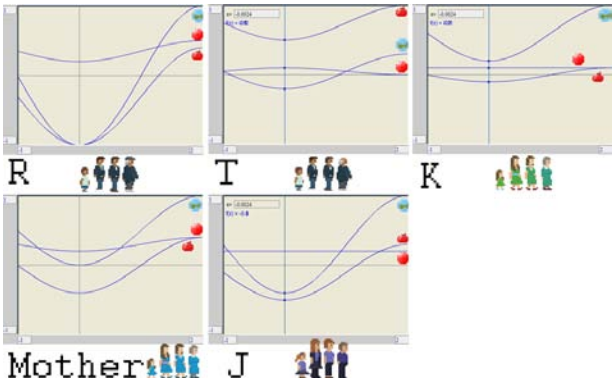


Figure 1. Character response graphs

Each non-playable character (NPC) has several attributes that describe them and biases with, or against, others' attributes. There are 3 unique objects that can be thrown in this game. Each NPC has a response graph (see fig. 1) that describes how they respond to certain objects passed to them, and decides (using weighted random selection) which object they will pass back. The result of this is that all NPCs treat each other (including the player) differently, and express, through this procedure, varying social interactions.

This system allows for a tactic that mirrors a tactic for effective social interaction with real people, one of imitating the rhetoric of those you are conversing with – showing empathy. In this game throwing same type of object to and NPC that they threw at you has a positive outcome.

A feedback mechanism for the social level of each of the characters, in relation to the player, is represented by a level of pixellation. If the NPCs-player relationship is at a low level, the

NPC will be an ultra-low resolution version of itself, and will gradually refine as the relationship improves, by the interaction described above.

Each round, or level, represents a passing of a stage of life, represented as seasons: starting from a child in spring, to an old man in winter.

4. EXHIBITION DESCRIPTION

Figure 2. In-game screenshot.

The piece to be exhibited is a small and short video game. While the game is intended for audiences aged 20-30, it has been designed with accessibility in mind, requiring little dexterity, and is playable by most any age. Each round of game play is very short, about 30 seconds to a minute so while the whole game should take about less than 10 minutes to play, players are able to get a good sense of the game in a short period.

5. CONCLUSION

The main interactive element of this game came out well and achieved the intention of exploring this area of meaning in game mechanics. The inter-character relationships were strongly designed, and they mostly convey the intended meaning. However the game itself stumbles on several aspects, which reflect on my current skill as a game designer.

This project was the result of work for my Bachelor of Visual Communication Design degree, and for that it has achieved its purpose. It represents my initial foray into game design, both in practice and theory.

REFERENCES

The Pew Research Centre. (2010). The Millennials: Confident. Connected. Open to Change.

Retrieved from http://pewresearch.org/millennials/

Koster, R. (2005). *A theory of fun for game design*. Paraglyph Press.

Blow, J (2007). *Conflict in Game Design.* Lecture.

Exhibition: “More Than A Craze: Photographs of New Zealand's early digital games scene”

Melanie Swalwell
Flinders University
Screen & Media Dept, GPO Box 2100,
Adelaide SA 5001, Australia
+61 8 8201 2619
melanie.swalwell@flinders.edu.au

ABSTRACT

"More Than A Craze" is an online exhibition consisting of 46 photographs of New Zealand's early digital games scene, in the 1980s. The exhibition includes the work of some of New Zealand's best known documentary photographers – Ans Westra, Christopher Matthews, Robin Morrison – with images from the archives of Wellington's *Evening Post* and Auckland's Fairfax newspapers. These photographers captured images of games, gamers and gameplay in the moment when these were novel. These images are significant in that they offer insights into the early days of digital games. They are an important primary source material for researchers interested in the history of play and interactive entertainment.

The exhibition has been curated by Melanie Swalwell and Janet Bayly. It is an online exhibition, hosted by Mahara Gallery, Waikanae (http://www.maharagallery.org.nz/MoreThanACraze/). It is one of the outcomes of Swalwell's research into the history of digital games in New Zealand, in the 1980s.

Categories and Subject Descriptors

K4.m [Computing Milieux]: Computers and Society - Miscellaneous

General Terms

Human Factors, Theory.

Keywords

Games history, photographs, early digital culture, arcades, Space Invaders. New Zealand.

1. EXHIBITION BACKGROUND & JUSTIFICATION

> *My two sons don’t smoke or drink or take drugs. But they are victims of an addiction just as powerful and insidious… My sons, Williams (12) and Tom (13) and thousands of other youngsters all over the world, are mainliners, hooked on electronic games. It’s the craze of the 80s. Against it, all other teenage activities pale into insignificance.*
>
> -- text accompanying Black & white 8 O’Clock image dated 23rd January 1982. In Swalwell & Bayly, “More than a Craze”.

“More Than A Craze” is an online exhibition consisting of 46 photographs of New Zealand’s early digital games scene. The exhibition includes the work of some of New Zealand’s best known documentary photographers – Ans Westra, Christopher Matthews, Robin Morrison – with images from the archives of Wellington’s *Evening Post* and Auckland’s Fairfax newspapers. These photographers captured images of games, gamers and gameplay in the moment when these were novel. These images are significant in that they offer insights into the early days of digital games. They are an important primary source material for researchers interested in the history of play and interactive entertainment.

Of course, digital games were (and are) much more than a craze. But the term ‘craze’ captures something of the excitement with which this new leisure activity was received, the intensity of response generated by the games. As journalist Stefan Herrick writes, recounting the moment when “Space Invaders” arrived in his small town:

> The invasion happened on a Friday afternoon in 1980. A van rolled up outside Snowdon's milk bar and takeaway in the main street of Takaka. The invader lurked in the back under a sheet.
>
> […]
>
> The beast was wheeled into the shop and placed between Computer Breakout and the 10c Cascade. Off came the sheet. In went the plug. The invasion had begun.
>
> The kids stopped licking [their icecreams] and stared. Instinctively, they knew this was something amazing and that the world would never be the same again. [2]

This arrival also marks the beginning of an everyday digital culture.

Given that most remaining arcades have been incorporated into larger retail premises (cinemas, shopping malls, theme parks), these photographs recall a moment when the arcade was a destination in its own right. Many photographs record the spatial layouts of early arcades, and the great breadth of

environments in which people played early games (including a rare shot of digital gaming in domestic space). Clearly, some arcades – or 'Spacies parlours' as they were more commonly known – were more salubrious than others. Of course, videogames were not only found in arcades, but also fish and chip shops and at swimming pools and dairies, as in Robin Morrison's photograph of the Wellington Street Dairy, Freemans Bay. The images are significant in that they show how people played games and what they did in these spaces when they weren't playing games. They remind us just how much of a spectator sport gaming was, in the 80s. They also attest to the fact that the transition from electro-mechanical to digital entertainments was neither neat nor immediate.

The imperatives of news photography require remarkable images, and so where news images are included in the exhibition, we might want to wonder at the role of press photographers and the degree to which they are actively arranging and inventing images (stand here, do this), and the degree to which they are documenting an existent social reality. These photographs offer a little bit of each (is it possible people actually held hands while playing "Space Invaders", as in one *Evening Post* image?). Nevertheless, these archival news images are valuable historical references, particularly because of their placement. Published with informative titles, adjacent to current news stories, and reasonably contemporaneously, many provide a witty commentary on the ways in which gaming was so much more than a craze. Games were business, *big* business. They existed in a wider popular cultural field, which was both spectacular and everyday. Games served as a lightning rod for a range of anxieties. Gaming was a 'scene', with its own emergent culture and mores. And gaming was about skill, prowess, and virtuosic play.

These themes find a counterpoint in the photographs that focus on the people who visited the arcades. Some were regulars, like the people we see in Christopher Matthews' photographs, taken in and around a single arcade, Christchurch's infamous Doghouse. Matthews spent time getting to know his subjects, in the winter of 1978 (see Figure 1). By contrast, Ans Westra's peripatetic eye and camera roam across numerous sites and environments. In many of her photographs we see groups of people whom we assume to be friends, simply 'hanging out' (see Figure 2). We see that girls and women were a presence in the arcade, congregating, playing, watching while their friends play, and gazing at things we can't see (cf. Guins [1]).

Figure 1 Christopher Matthews, No. 13 from the series "The Doghouse". Copyright Christopher Matthews.

Figure 2 Ans Westra, Untitled, proofsheet 1205-2. Alexander Turnbull Library. Copyright Ans Westra.

This exhibition has been curated by Dr Melanie Swalwell and Janet Bayly. It is an online exhibition, hosted by Mahara Gallery, Waikanae (http://www.maharagallery.org.nz). It is one of the outcomes of Swalwell's research into the history of digital games in New Zealand, in the 1980s. Other outcomes include traditional [5,8] and interactive journal articles [9], book chapters [3,4,6], a monograph (in preparation), an online, community database of early NZ software [7], as well as software preservation initiatives as part of the NZTronix team [9].

2. REFERENCES

[1] Guins, Raiford. "Intruder Alert! Intruder Alert!". *Journal of Visual Culture*, 3, 2 (2004), 195-211.

[2] Herrick, Stefan. Space Invaders. *Evening Post*, 21 March 2001, 19.

[3] Swalwell, Melanie. 2010. Hobbyist Computing in 1980s New Zealand: Games and the Popular Reception of Microcomputers. In *Return to Tomorrow: 50 years of computing in New Zealand*,

Janet Toland. Ed. New Zealand Computing Society, Wellington, 157-169.

[4] Swalwell, Melanie & Michael Davidson (forthcoming) Malzak. In *Ludologica Retro: Volume 1: Vintage Arcade (1971-1984)*, Matteo Bittanti and Ian Bogost. Eds. Online at http://nztronix.org.nz/malzak.php

[5] Swalwell, Melanie. Towards the Preservation of Local Computer Game Software: Challenges, strategies, reflections. *Convergence: The International Journal of Research into New Media Technologies*, 15, 3 (August, 2009), 263-279.

[6] Swalwell, Melanie. 2008. 1980s Home Coding: the art of amateur programming. In *Aotearoa Digital Arts Reader*, Stella Brennan and Su Ballard. Eds. Clouds/ADA, Auckland, 193-201.

[7] Swalwell, Melanie. 2007-. Early New Zealand Software Database. http://nztronix.org.nz/main.php

[8] Swalwell, Melanie. 2007. The Remembering and the Forgetting of Early Digital Games: From novelty to detritus and back again. *Journal of Visual Culture*, 6, 2, 255-273.

[9] Swalwell, Melanie & Erik Loyer. 2006. Castoffs from the Golden Age. *Vectors: Journal of Culture and Technology in a Dynamic Vernacular*, 3 (April), http://www.vectorsjournal.org

Frightful Realities

Karl Johan Thiart

Massey University
4/368 the Terrace
Wellington
0273277253, NZL

karl.thiart@gmail.com

ABSTRACT

This project utilises interactive animation to create a new form of narrative media which is directly dependant on the participant. It deals with an idea that everyday discriminative behaviour we subtly partake in, affects minority groups negatively. It explores the idea of a caged animal in a zoo. The idea that we as a society put it there, and its characteristics and lifestyle are directly affected by our actions.

INTRODUCTION

Any form of discrimination tends to negatively affect the people it is aimed towards. It is the small things that build up within the mind of the victims of discrimination. I have used this idea to portray a character that has been negatively affected by discrimination. Within my research I further identified the everyday discriminative conduct that manifests itself within societies and how it may lead to possible dominance between groups.

Through research into racism, I have that discriminative behavior exists through a sense of fear. It is the fear of the unknown; we need to be taken outside our comfort zones. Racism manufactures itself through protecting oneself. Every- day racism displays the many forms in which we subliminally contribute towards a racist landscape.

“Behavior which is mundane, routine, and taken for granted tends to escape the notice of the more dramatic macro histories”

Keywords

Interactive, Animation, Experience, generation, live-feedback, discrimination

1.1 Project description

This project utilises interactive design and animation as a means to create a new form of narrative media which is directly dependant on the participant, and their participation within the characters environment. I explore the idea of a caged animal. The idea that we as a society put it there and its characteristics and lifestyle are changed by our actions.

- The main method and practice I have been working with is interactivity as an experience which dwells in the area of dealing with participants sensorial actions. Here the participant is a crucial part of the design and without his/her interaction no content is gained.

- Hiding sensors within the installation of the shack. Fulfilling an illusion of reality. Full immersion of participation.

- To evoke a sense of change, and question the audience’s ideals and beliefs.

- Present two sides to every story

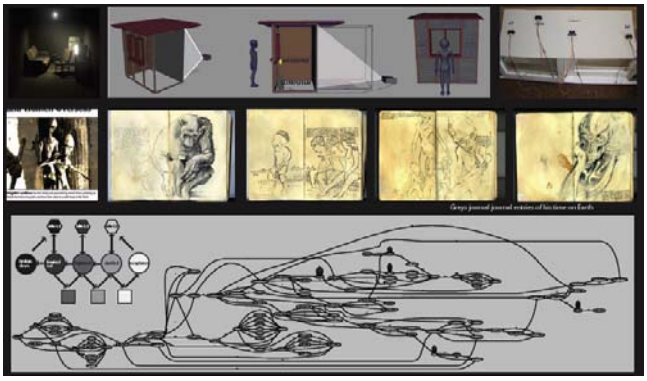


Figure 3 : The Shack and the projection

1.2 Exhibition Description

The exhibition is set up as a life-size shack which allows participants to investigate and experience the alien's lifestyle on an emotional level. Using computer processing and sensors I was able to create a history for the character as participants explore and interact within the alien's environment. The character is affected by the way we treat it and with this his tolerance towards future participants is affected by previous participation.

CONCLUSION

A sense of ignorance and fear towards openly acknowledging diversity within society effects the way we deal with difference. I have displayed my exhibition piece through an interactive museum experience where the audience's participation is paramount for the outcome of the message. By using processing technology I have created an experiential piece of work, which uses a game format to reveal a hidden history directly related to the character and the message about discriminative behavior.

ie2010

The 7th Australian Conference on Interactive Entertainment

22-23 November 2010

Massey University, Wellington, New Zealand

ieconference.org