

Human Centred Technology Design and Pervasive Technologies

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About this talk

This is not a comprehensive address!

Human centred approaches are concerned with design methods, ethics and *fundamentally* with accountable assumptions about human behaviour and experiences

Discussions of 'pervasive' always seem to start with definitions

It is enough for me to recognise commonalities in how the term is used in everyday life including:

- distributed, connected, adaptive, unobtrusive, always available
- lots of sensors and/or other small devices that interact with each other (generally wirelessly)
- no requirements for *explicit* human interaction
- sometimes interchangeable with 'ubiquitous'

I will focus on one example of the whole design process

About my perspective

Both situated and phenomenological - an approach that broadly assumes that:

- actions are both responsive to and generative of their contexts
- the meanings of any actions are always contingent on the context in which they occur
- design needs to make commitments to actual locations where technology will be used and by whom
- all human actions are embodied and situated in particular material and social circumstances

Bystander background

Bystander is the latest work in *Life After Wartime*, a suite of multimedia artworks created since 1999 by Ross Gibson and Kate Richards assisted by many others.

All works are based on a collection of several thousand photographs of crime scenes in Sydney. These were taken by forensic detectives between 1945 and 1960.

There are also 1500 short texts (by Gibson) and thousands of sound files.

This project (and collaboration between Gibson and Robertson as CIs) was funded by a Linkage Grant with the Australian Centre for the Moving Image as industry partner

Visitors will enter a four-walled environment where each wall is a projection-screen fed by a data-projector connected to a database computer. There will be motion-sensors and surround-sound loudspeakers in the room too, all connected to the computer. Thus the sensor-surveyed, 3-D space of the room will be the interface to the images, texts and sounds. The environment itself, with all its sensitivity and feedback capability, would be both interface and content-display.

The room will behave as if it is hyper-sensitive and 'haunted'. The more agitated the visitors, the more turbulent the artwork. Visitors will learn that they must be composed and attentively still in order to gain the 'trust' of the space, and from there they might be able to develop a 'dance' of intimacy with the images, sounds and texts that surge and retreat in concert with the movement of the people inspecting the space.

Ross Gibson. Grant document



Team

Designers with a background in human-centred approaches and methods for the design of interactive technologies were invited to join an established collaboration of artists to develop and build *Bystander*.

It was hoped we might contribute to the process of designing such a complex environment:

- to reduce the risk of a chaotic and otherwise unsatisfactory user experience of *Bystander*
- to enable the project team to maximise their focus on designing and developing *Bystander* itself while minimising the distractions, blockages or diversions imposed by the complexity and non-routine design challenges of the project.
- to understand how such exhibition spaces are experienced

What is Bystander?

A pentagon shaped room where audience movement is input into the 'behaviour of the room'.

- it is intended to be *experienced* rather than *used*
- it doesn't explicitly encourage or support any particular activities or behaviours

Visitors see a flock of white particles (representing all the images and texts) that is moving around in the room with them. As it moves it reveals sets of images, texts and sounds.

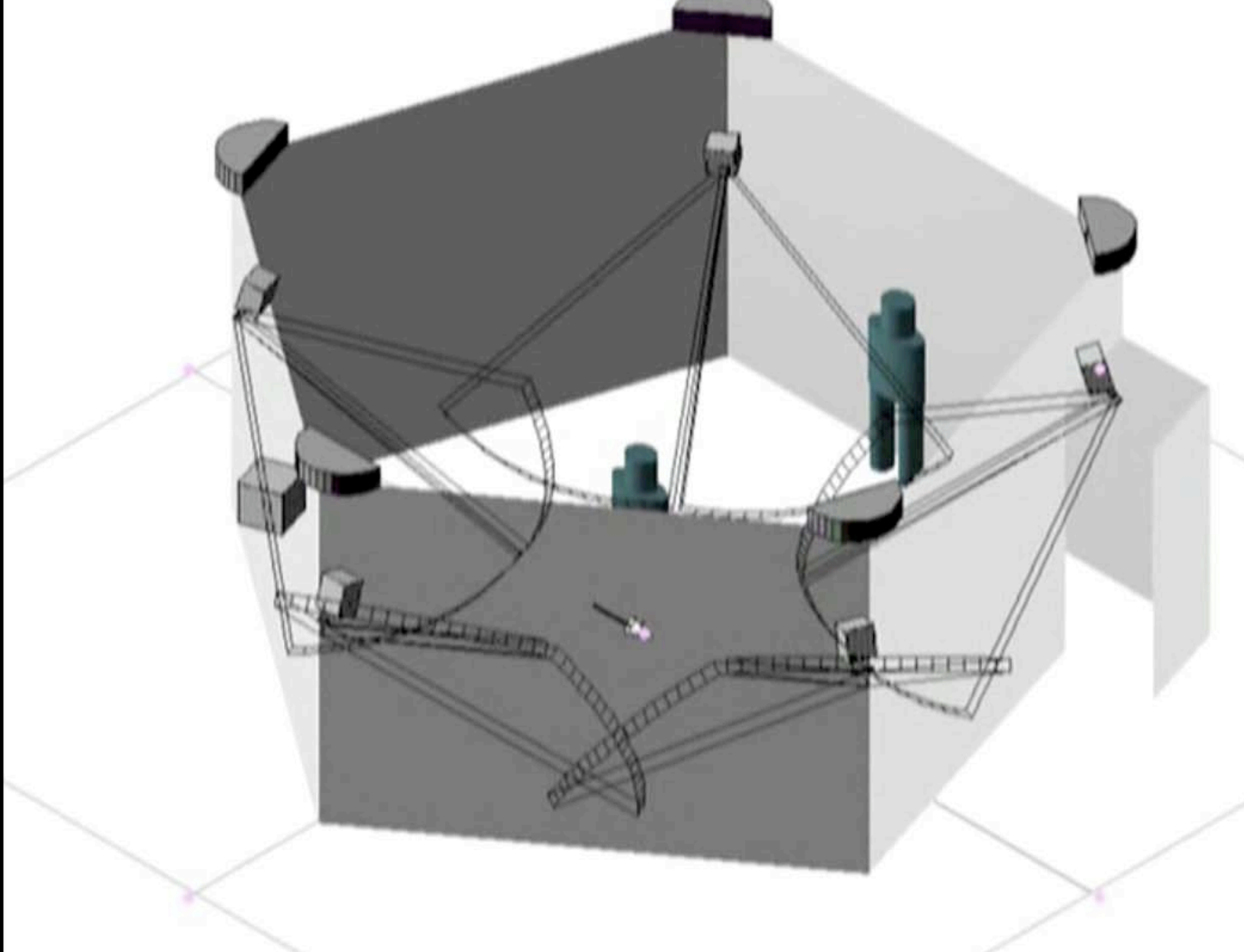
- relationship more coherent, more narrative when the flock is calm; less coherent, more associative when the flock is disturbed
- flock is disturbed by movement and calmed by stillness

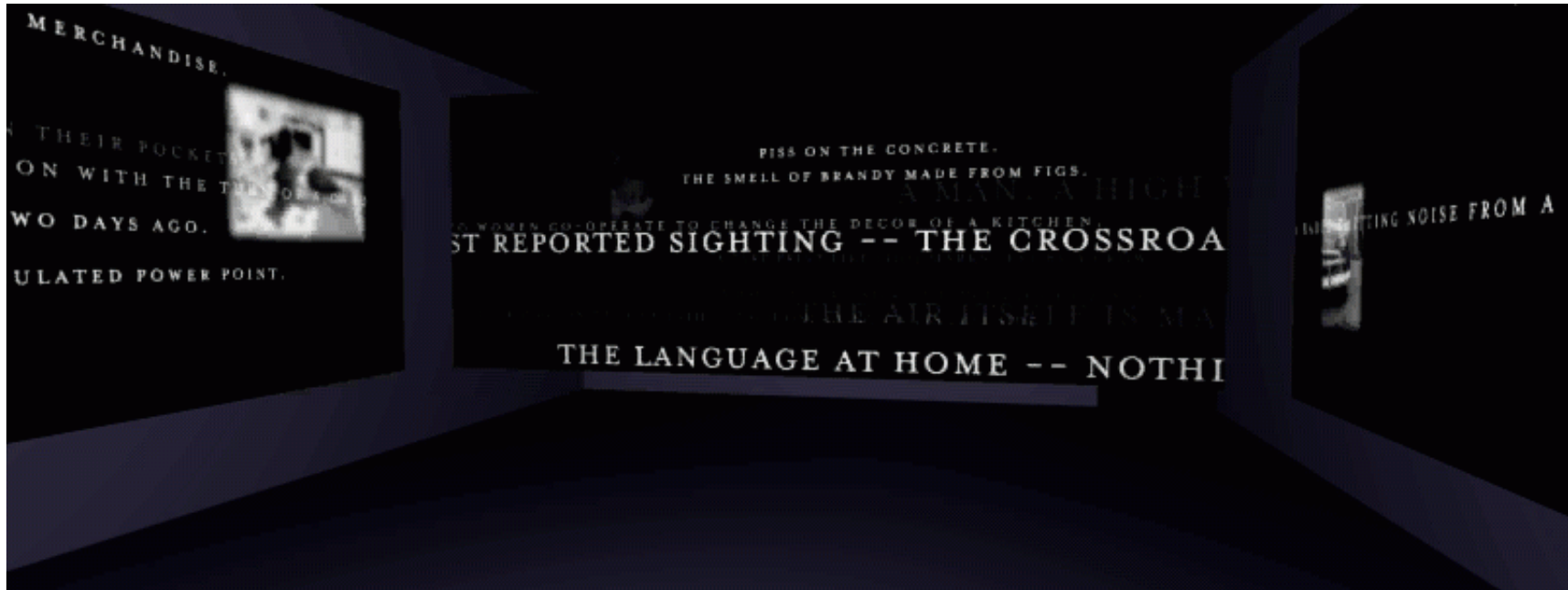
The interface to the room and the interaction with it should not detract from the potential audience engagement with the historical and emotive power of the black/white images

To make visible to the audience the effects of multiple users on the behaviour of Bystander and on each other's experience of it

Interaction design - relationship between audience behaviour and the flock/room behaviour

- audience presence and motion are the input to the system
 - the room behaviour is the output from the system
- 4 states: from calm and divulgent to chaotic and incoherent





Tensions in the media production process

- production process is standard in the working environments where new media works are made
- default appears to be a largely unquestioned assumption that user behaviour is asocial, unsituated, disembodied and *designed* as much as any other aspect of the production
- little awareness of, or interest in (initially), other design traditions and approaches

We needed to both justify and adjust our usual design methods, practices, processes and norms to those of the already established and accepted production process

Tools to think with (1)

involving and representing users in the design process

- user research
- scenarios
- personas
- user interaction script
- immersion in the working prototype

User research

2 separate studies of audience behaviour

- 1 in Sydney, 1 in Paris

We didn't want to know what sort of people went to these spaces so much as how people moved about in them

Traditional museums as well as a range of art gallery environments were included

Audience 'movements'

1. 'headpokers'
2. people who go in stand for a while and then leave
3. 'skimmers'
4. people who engage seriously
5. kids!
6. people in space but attending to other things

All these people move in different ways.

These behaviours were common to each of the spaces studied and to both studies, though the distribution and prevalence of each varied according to specific context.



Audience perspective: User Interaction Script

Schema	Time (M:S)	Scenario	Activity Movement/Stillness	User Perception
1	01:00	<i>Slow-moving, contemplative visitors.</i> Betty and Val enter.	Betty and Val enter room together and stand fairly still looking around with heads turning.	See flock revealing on wall, w2.
2	01:30	<i>Head-poker.</i> Young teenager enters, blocked by Betty and Val, so leaves.	Young teenager enters room, then exits.	What they see depends on whether or not the room perceives the <i>head poker</i>
	02:00	Betty and Val decide to stay and watch more.	Betty and Val walk towards centre.	See flock moving, some images and text unfold.
	02:30 - 04:00	They watch the flock.	Slowly turning to watch flock, taking 1 or 2 steps each way.	See flock moving, more images and text unfold.

Inspired by Suchman's analytic framework, 1987

Room perspective: User Interaction Script

Time Min:Sec	Machine Perception	Room State	Flock/Sound behaviour	Design Questions
01:00	Detection of 2 figures, some motion.	State 1.	Flock coherent presentation on wall, w2.	What is considered 'still'? Standing still may realistically translate to slow, peaceful, gentle body movements and locomotion within a very small area.
01:30	Ingress of 1 figure.		Flock coherent presentation.	Has this person been detected? May want dead zone at entry.
02:00	Detection of 2 figures moving towards centre.	State change?	Does it change?	Is this sufficient movement to trigger a state shift to state 2?
02:30 - 04:00	Detection of 1-2 figures at centre.		Flock behaviour depends on answers to design questions.	Does position matter to the room?

Movement schemas

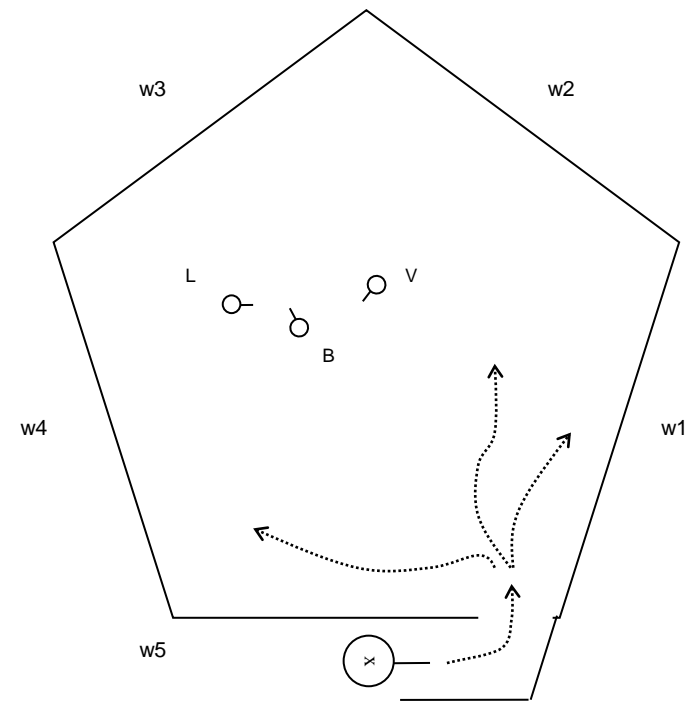
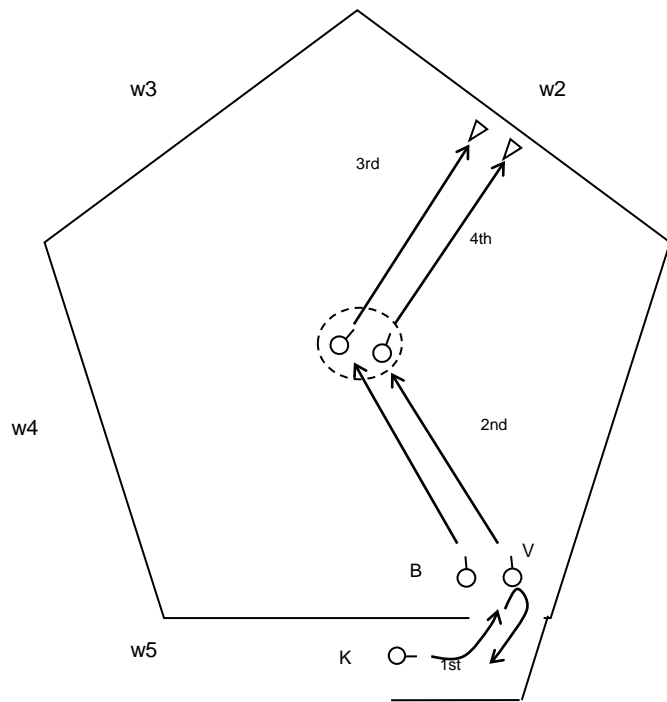
Visual representations of multiple users' presence, activity and social interaction. (Loke et al. *Ozchi* 2005)

Developed using Labanotation for group choreography

- Spatial paths
- Position
- Orientation
- Movement

Functioned along with the script as a guide for the enactments.

Movement schemas





Immersion/Enactment

- Members of design team plus a varying number of ‘potential users’
- 40 minute script
- Audience ‘stress testing’
- Lived experience + Immersion
 - Physical and social aspects of user experience
 - Aesthetic and kinaesthetic qualities of the work



Tools to think with (2)

experiencing and interrogating the developing design

- simple looped mockup
- dynamic mockup
- exploratory single screen mockup
- distributed rendering prototype
- 'working' prototype

71.89_wn2k...

calb_desk...

Shortcut to
bystanderFl...

Shortcut to
bystander ...

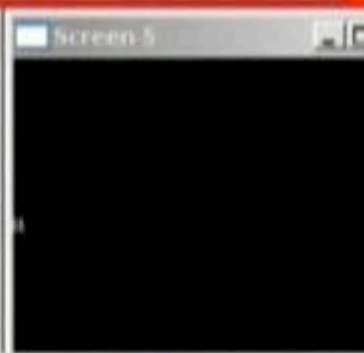
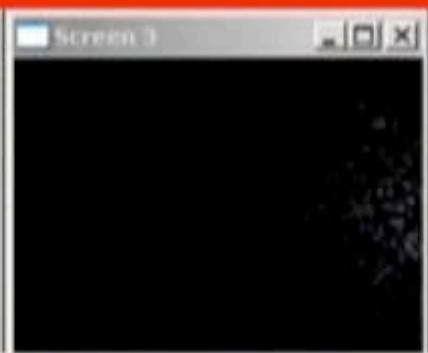
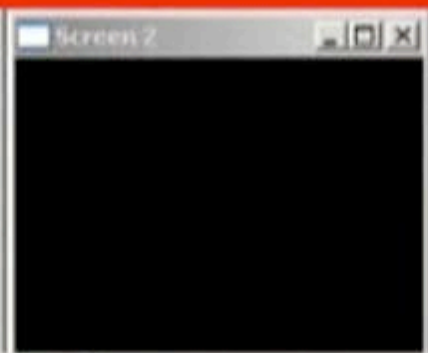
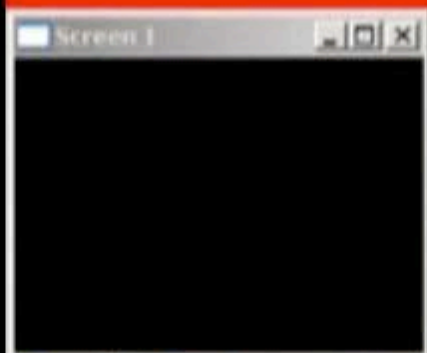
Shortcut to
BystanderIn...

My Computer

BPStates-20...



Properties			
World	Flock	Path	Logic Database StateManager
hakuIntervalIn	1	-	J
hakuIntervalOut	0.4	-	J
hakuNumberMean	1	-	J
hakuNumberVariance	0		J
hakuSpacingGrid	1 0.75 1		
hakuSpacingJitter	0.5 0.25 0		
imageDelay	3	-	J
imageFadeIn	4	-	J
imageFadeInType	3		
imageFadeOn	15.6	-	J
imageFadeOut	0.5	-	J
imageFadeOutType	4		
imageIntervalIn	4	-	J
imageIntervalOut	0		J
imageNumberMean	1	-	J
imageNumberVariance	0		J
imageSpacingGrid	1 1.75 -1		
imageSpacingJitter	0.2 0.2 0.1		
revealMaximumDistance	8	-	J
revealMinimumDistance	2	-	J
revealDelay	0	-	J



Resistance to “tools to think with”

- initial resistance almost always reflected unfamiliarity with the design approach
- this was often (wrongly) interpreted by us as resistance to participative approaches and a focus on use as such
- ‘tools’ used only in as much as they fitted artists interests at the time
- so value of ‘tools’ needed to be proven over and over while we also tried to convince the artists that their interests might ‘need to be rethought’
- ie. seriously engaging with the potential users’ experiences of *Bystander* could be considered ‘a good thing’ within their working environments too!

Take aways

- initial assumptions of ‘pervasive’ solutions needed reconsideration
- reconsideration was enabled through the use of human centred methods:
 1. to involve and represent users
 2. to experience and interrogate the developing design
- these methods enabled us to indentify and demonstrate more *appropriate alignments* between human perception and system responses
- from the perspective of use by actual people, more ‘pervasive’ is not necessarily better