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# Autopoiesis

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This presentation is in three parts:

## **1. Specification**

My initial specification for the project.

## **2. Progress So Far**

An overview of the work achieved to date.

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The work plan I will be following until completion.

# 1. Specification

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# 1.1. Introduction

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I aim to create an audiovisual artwork that behaves like an autopoietic system and exhibits emergent properties.

The artwork will take the form of a gallery-based installation and be the subject of a live cinema performance.

The installation will involve locating three networked computers in a room-sized space.

Each computer will be connected to a large video screen, a speaker, a video camera and a microphone and will have access to an archive of multimedia material.

Using a specially-written Max/MSP/Jitter patch, each computer will monitor its surroundings using the camera and microphone and respond by playing material from its archive via the screen and speaker.

Once played, or 'released', the multimedia material will become part of the 'environment' and will be available for the other computers to 'collect' for their own use.

# 1. Creating Interdependence

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Through the creation of appropriate rules, and their encoding within the Max patch, my objective is to construct an audiovisual system in which the elements - specifically the individual computers - become interdependent and self-organising through the collection and release of multimedia material.

A simple example of such a system could involve just two computers, both with archives of multimedia material available to them.

One would need to collect green images from the environment in order to release high-pitched sounds from its archive into the environment.

Conversely, the other would need to collect high-pitched sounds in order to release green images.

## 1.3. Viewer Participation

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On entering the installation the viewer would become aware of two 'structures' located within the space.

One structure would consist of a stream of green images on a video screen and the other would involve a sequence of high-pitched sounds coming from a speaker.

What the viewer would not necessarily be aware of is that the two structures would be highly interdependent and a constant exchange of audiovisual material is needed in order to maintain them.

Importantly, upon entering the installation the viewer will become part of the audiovisual environment, enhancing or disrupting the flow of media around the space.

For example, if a viewer in the above example was wearing a green shirt then their image might begin to enter the flow, perhaps leading to an increased release of high-pitched sounds or a triggering an unexpected transformation in one of the structures.

The actual installation would be far more sophisticated, with more 'rules' for the release and collection of multimedia material and more complex audiovisual structures needing to be being maintained by each computer.

## 1.4. Emergent Properties

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It is my hope that the interrelationships between the computers, their environment and the viewers will lead to the emergence of unpredictable 'higher level' structures and behaviours.

Such 'emergent properties' might include repeating sequences of sounds and images, collective responses by the computers to stimuli or other such patterns not immediately obvious by looking at the underlying rules of the system.

## 1.5. The Themes

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Each computer will initially be loaded with multimedia materials based on a single theme.

During the 'lifetime' of the installation, however, this material is likely to be exchanged between computers many times and at any one point in time the resulting audiovisual structures will probably contain material from all three themes.

The themes identified are:

1. the world of micro-organisms;
2. the city;
3. geological processes.

These themes have been chosen to represent real-world systems of differing scales.

Within each theme I aim to collect sounds, pictures and video material that represent the concepts of autopoiesis and emergence.

## 2. Progress So Far

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2.1. Summary

2.2. Media Production

2.3. The Installation

2.4. Maturana and Varela

2.5. Max/MSP/Jitter Programming

2.6. Other Outputs

## 2.1. Summary

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Progress on the project has followed the specification produced earlier in the year. There have been no radical changes in the proposed direction and themes identified.

Two short films have been produced with a third in production.

The technical aspects of the final installation are being considered, although they have not been finalised yet.

The theoretical basis of the project - systems theory and autopoiesis - remains the same but there is now a particular focus on the work of Chilean biologists Humberto Maturana and Francisco Varela.

The Max/MSP/Jitter programming for the project has started.

There have been some additional creative outputs from the project.

## 2.2. Media Production

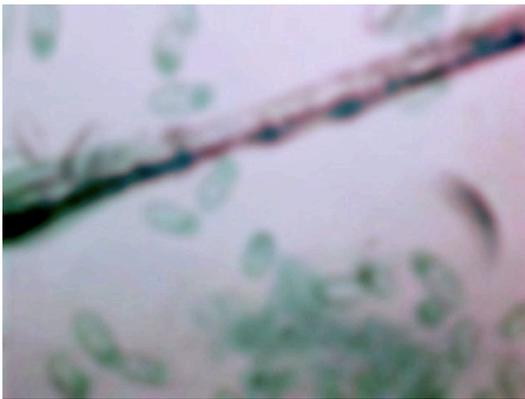
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The installation will be ‘driven’ by three pools of multimedia material. Each pool will be based around one of the themes identified earlier. At present materials for the ‘micro-organisms’ and ‘city’ themes has been produced.

### 2.2.1. Micro-organisms

This material is based on footage I obtained from an amateur biologist. It has been edited into a short film with a number of layers and loops. A heavy blur has also been added. The film can be seen at: [www.youtube.com/watch?v=3\\_z04pgg6IE](http://www.youtube.com/watch?v=3_z04pgg6IE)

A series of 27 stills have also been taken from the video:



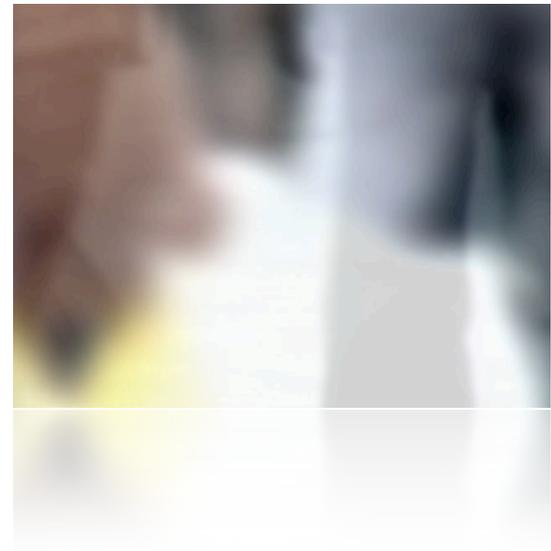
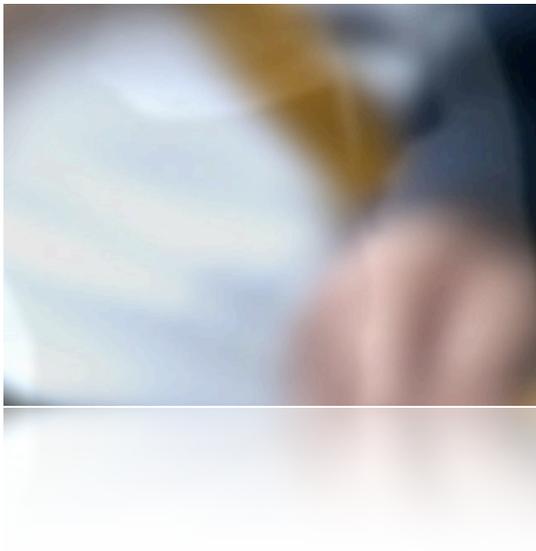
## 2.2. Media Production

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### 2.2.2. The City

The city footage is the latest in a series of studies I have made of 'movement' in the city. Multi-layered and heavily blurred, it aims to capture the colours and patterns of people going about their daily activities. The film can be seen at: [www.youtube.com/watch?v=cNjGBCV8Mnw](http://www.youtube.com/watch?v=cNjGBCV8Mnw)

Again, a series of 27 stills have been taken from the video:



## 2.2. Media Production

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### 2.2.3. Geological Processes

I haven't taken a broad interpretation of the term 'geological processes' and am focusing on cloud formations. I felt that this gives a good balance to the systems I am representing - microscopic, human scale and macroscopic.

Cloud footage is also easy to obtain and visually it should work well with the other two sets of material.

I will be using the same 'blurry' visual treatment. This enables me to zoom in to the video material via the Max/MSP/Jitter without altering the visual style - especially if I 'interpolate' the resulting image (i.e. when you zoom in to a blurry image and make it blurry you don't notice any image degradation!).

I will, again, produce 27 stills from the resulting video image. This will give me a pool of 81 images to use as well as the three videos. Notice that these numbers are all powers of three, meaning that I can explore 'trptych' arrangements of images and video materials.

## 2.3. The Installation

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So far I have allowed the exact nature of the final installation to evolve as the project has progressed. However, I am now starting to close in on a technical specification.

I envisage that it will consist of a single computer connected to three high resolution screens, plus a video camera, a microphone and three speakers.

Each 'organism' Max/MSP/Jitter patch will control a screen and a speaker and have access to the microphone and the camera. On the screen it will show a 'live mix' of visual materials based on: 1) what is currently available in the shared 'pool'; 2) its response to what it 'sees and hears' through the camera and microphone; and 3) its response to the activity of the other two 'organisms'.

The physical space will be dark and cool and there will be coloured ambient lighting running on 'daily' cycles (a day may only be half an hour or so). The lighting will also be controlled by the computer. The light will illuminate the viewer, which will in turn affect what the organisms see via the camera.

The nature of the sound in the environment has yet to be confirmed, but I would like it to have the feel of 'chattering' in a jungle!

## 2.3. The Installation

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In relation to my previous work, I would the gallery space to feel similar to how it did during in the piece 'Flow':



## 2.3. The Installation

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I also see it as a development of the audio visual environment created for the piece [A Choreographer's Cartography](#):



## 2.4. Maturana and Varela

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The term 'Autopoiesis' was first coined by Humberto Maturana and Francisco Varela to describe 'self-creating' systems such as living organisms. Together with work by Gregory Bateson and Fritjof Capra (and less so James Lovelock) it has inspired my work for a number of years.

In essence, all of these 'systems thinkers' operate in domains where they understand that the connections between 'things' are as important as the things themselves.

I had intended to use my MA to bring as many views on systems theory together as possible. However, the more I research the more I find I keep being drawn to the work of Maturana and Varela.

I plan to focus my research on their ideas for the remainder of the MA. In particular their concepts of a 'unity', 'structural coupling' and, of course, 'autopoiesis' itself.

I will be going in to this further as part of my research paper for the PGPD module.

## 2.5. Max/MSP/Jitter Programming

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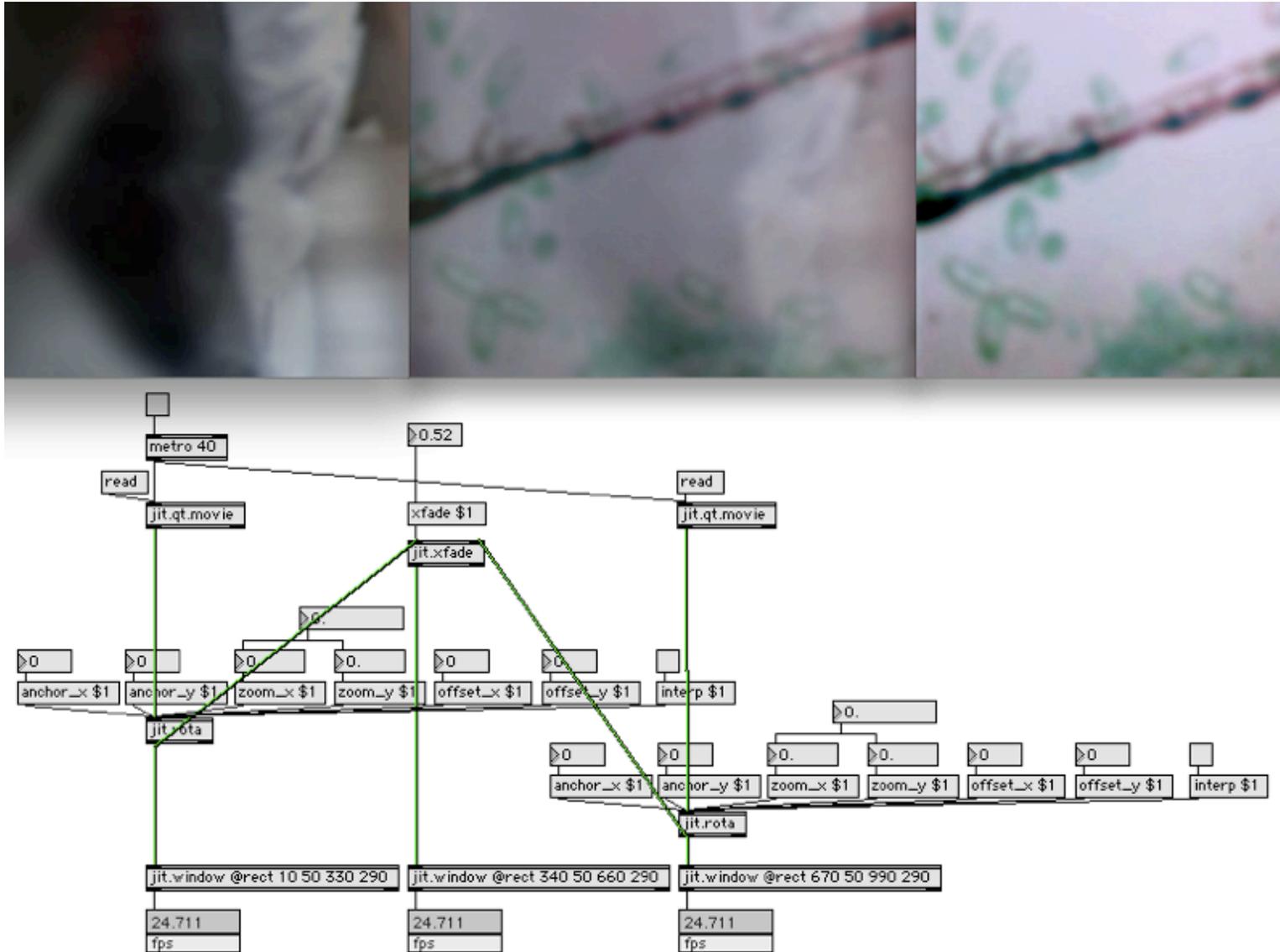
I have also begun the development of the Max/MSP/Jitter patch that will control each 'organism'. In essence the patch needs to monitor the environment, process this in such a way that the organism maintains a defined structure and return unused materials to the environment. What appears on the screen will then be a representation of the internal structure of the organism.

The starting point for my programming has been to explore different ways of mixing the visual material. The following slide shows an example patch that allows me to cross-fade two video streams, which can in turn be panned and zoomed in to by various controls. I imagine that these controls will be used by the organism to find the visual material needed to maintain the rules of the structure.

For the processing of the camera stream I will be using the cv.jit image processing library and for processing the sound from the microphone I expect to use the various frequency analysis tools that are in Max/MSP.

The 'ambient' light in the environment will be controlled by an auxiliary patch that will use the DMX extensions to Max/MSP to control an 8 pod lighting rig I will be purchasing shortly.

## 2.5. Max/MSP/Jitter Programming



## 2.6. Other Outputs

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A number of opportunities to present the work achieved so far have presented themselves:

- The city and micro-organisms footage were used in conjunction with other materials I have produced as part of a visual set for the band Low at the Summer Sundae festival. Pictures from the performance were posted to [Flickr](#).
- I had a image composed of the 25 video stills from the city video sequence accepted for the [Artober](#) exhibition in Leicester.

I rarely produce printed materials of my work, the latter success (and the fact that I felt the image worked well) has made me consider producing a limited print of images from the three videos as part of my final exhibition.

I also now intend to produce a short booklet about the work that will be available in printed form wherever the installation is shown.

# 3. Next Steps

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I am pleased with my progress so far but am aware that there is plenty to do. My current 'activity' list is:

- I need to complete the clouds short film.
- I need to develop the Max/MSP/Jitter patch that will drive each organism
- I need to create an initial prototype of the installation in my studio.
- I need to think more about the audio side of the work.
- I need to write my project and research essays.
- I need to start contacting galleries about showing the work in Summer 2008.