REEDS - A RESPONSIVE SOUND INSTALLATION

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ABSTRACT

This paper discusses the responsive sound installation *Reeds*. The *Melbourne International Festival of the Arts commissioned the Reeds project* in 2000, for exhibition on the Ornamental Lake at the Royal Botanic Gardens, Melbourne. It consists of twenty-one large floating sculptures[1], modeled to represent clusters of river reeds in immaculate man-made plantings. Each reed pod[2] contained a collection of electronics for either the gathering of weather information or the reception and dispersion of sound. The sound installation gathered data from two realtime weather stations, and produced eight channels of musical output by interpreting the machine unit pulses of the weather data as pulse inputs to Inverse Fast Fourier Transform (IFFT) algorithms. The *Reeds* project focused on a consideration of multiple streams of chaotic and constantly varying sound. I was interested in exploring whether the sonic environment would remain homogenous even though, unlike a musical ensemble, the control inputs varied randomly and independently of each other. The sound installation was site specific, reflecting directly upon the environment it inhabited, both in terms of its visual quality, and aesthetic of the sound.

1. INTRODUCTION

For some years now, my artistic practice has been divided between composition and interactive sound installation work. Within the composition work I have often applied interactive techniques when working with dancers or even seeking material at early stages of composition. Whilst the computer has had a profound effect on the practice of electroacoustic music, I personally feel the greatest paradigm shift has come through the application of the computer as a facilitator in responsive and interactive engagement, and more specifically within this forum, the scope for realtime sonification of behavioral data through the abstraction of the source of sonic excitation from the sounding body. This extraordinary change has led to a new way of contemplating sound installation so that both the content and the temporal form of the work remain in flux, at the mercy, and under the control of the interactive, responsive process.

In 1998, the virtual reality and interactive installation artists Christa Sommerer and Laurent Mignonneau expressed similar thoughts when discussing the development of the interactive digital arts:

. . .the art work . . . is no longer a static object or a pre-defined multiple-choice interaction but has become a process-like living system. [1]

The *Reeds* sound installation explores the potential of multiple, random, continuous control inputs that have an internal chaotic structure. By this I mean that the relationships between the various controllers is in a constant state of flux. In a previous responsive sound installation, MAP2[3], I had used video sensing[4] to create a responsive, interactive sound environment that was driven by the movement and behavior patterns of those within it. In MAP2, I created four independent sensing and sound synthesis zones by dividing the horizontal video sensing field into quarters. The four zone outputs were not interlinked or under the control of a common influence, their relationship was chaotic. Different associations could generate separate audio streams in each quadrant of the space without affecting each other in any way other than the general aesthetic of the combined outcome. The combined sound was not unpleasant to listen to, even though there were up to twelve distinct sound elements occurring together (each zone had three realtime synthesis algorithms, that were dynamically engaged according to the dynamic and position of activity as well as the direction and speed of movement in the space). These sounds were drawing from a common algorithmic pool, and therefore a common aesthetic base, but there were differences in the filter set up for each of the zones, which caused anything from subtle to marked timbrel differences, representing substantially different spectra, which seemed to work together very well.

The sonic outcomes from MAP2 encouraged a further exploration of chaotic multi-modal responsive sound systems. The logical extension was to find a multi-dimensional control source that embodied truly chaotic

1 The sculptural elements were fabricated by Christopher Langton from concept drawings by the artist, see Figure 3 Plan view.

2 The term “reed pod” is used to define the sculptural elements of the Reeds project.

3 Information about MAP2 can be found at http://www.activatedspace.com.au/Installations

4 I have mostly used the Very Nervous System (VNS) see http://www3.sympatico.ca/drokeby/vnsII.html

Figure 1 One of three groups of seven reed pods that made up the Reeds exhibition at the Royal Botanic Gardens Melbourne, Ornamental Lake, during the Melbourne International Festival of the Arts in November and December 2000

inter-relationships, and would change rapidly, slowly and unexpectedly but within a defined overall range.

The weather seemed the most suitable candidate, as:
The conditions can change rapidly, especially in the spring, the season during which *Reeds* was first exhibited[5].

1.1. Selection of Sensed Phenomenon

The weather conditions have a natural range (it is unlikely the temperature will exceed 50 degrees Celsius in Melbourne, Australia nor the wind speed exceed 150 mph), so the characteristics of each synthesis algorithm could be developed to respond to a known range of conditions.
The macro and micro level structures of variation would provide diverse possibilities for sonification.

The selected weather parameters revealed inherently diverse temporal structures and distinct overall ranges of activity. The independence of each parameter would provide dynamic orchestration options[2, 3].

These were important considerations when contemplating the generation of musical/sound outcomes[4].

5 Reeds was adapted for gallery showing, resulting in PlantA and PlantB, both exhibited many times in Australia and the UK

Choosing suitable weather characteristics was in itself a difficult task, conditioned by the availability of sensors, their individual cost, and a consideration of the structure of each sensor's data output as discussed above. Sensors for the measurement of rainfall and leaf wetness were of interest but would have proved unstable when installed so close to a large body of water. With the exception of rainfall, I chose to focus on weather phenomena that directly relate to the growth patterns of plants. Two weather stations were installed in reed pods, sensing: wind speed, wind direction, temperature and solar radiation.

The sound synthesis was driven by both the direct input from each of these sensors, and the difference between the two weather stations, which although not far apart (10 meters) often reported markedly different conditions.

1.2. Artistic Context

Whilst the exploration of simultaneous chaotic control inputs, and their mapping to sonic outcomes was the principal motivation for the creation of *Reeds*, my artwork is always contextualized within a broader consideration of the human condition. The *Reeds* project was no exception, exploring the relationship between the weather conditions as the provider of the foundations for biological growth, and the paradox between the apparently static façade of most plants, and their immense power, symbolically expressed by the weed that pushes its way up through a foot path, which to us is impenetrable.

2. PATTERNS OF RELATIONSHIP

In keeping with my humanist perspective, the technological structure of the *Reeds* installation is based on the concept of the organic life cycle. This design approach mirrors the cybernetic principal of the closed causal loop.

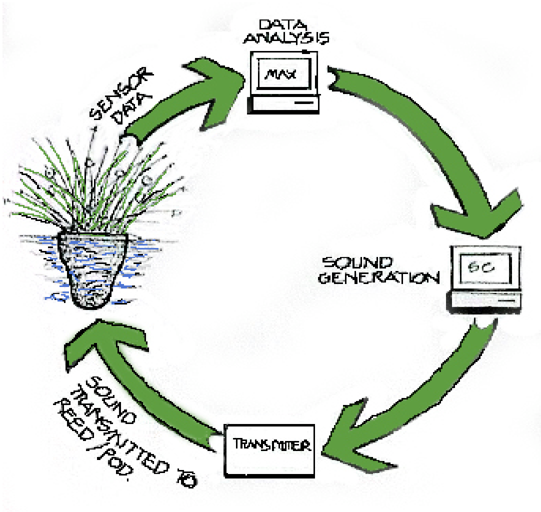

Figure 2 The Reeds *life cycle*

I have taken the liberty of transplanting Norbert Wiener's, principles of social systems organisation [5] into the plant ecosystem. The conceptual and resulting technological design of the *Reeds* installation is fashion around the idea that such a system implements continuous and dynamic cyclical process of communication, feedback and rejuvenation.

I propose that the patterns of relationship in an interactive, responsive sound installation are made explicit and coherent through many iterations of the closed causal loop discussed above, each one rendering the nature of the relationship with greater detail. It was exactly this sense of coherence that I was seeking to test in the *Reeds* project.
Would this soundscape maintain such a sense even though the control inputs would be dynamic and chaotic?
Would the sonic landscape generated by the weather conditions make explicit " a coherent underlying pattern"?
In this sense I was very interested to see whether the cybernetic mantra "the whole is greater than the sum of the parts" would be proven by the musical outcome being both coherent, engaging and perceptibly related to both the current weather conditions, and the momentary changes of the meteorological states in the immediate vicinity of the sound installation.

The sound synthesis software consists of a number of musical algorithms, producing eight channels of digital audio. These eight channels of sound (which diffused from the reed pods) were then broadcast as high quality stereo audio back out to the reed pods. The return of the audio signal to the reed pods, and its dispersion to the listener, observer, spectator completes the life cycle (Fig. 2).

2.1 Collection of Weather Data.

As mentioned above, each of the two weather stations report four pieces of weather data:

- Wind Speed
- Wind Direction
- Temperature
- Solar Radiation

This data was collected using custom built weather stations comprising sensors manufactured by Davis Corporation[6], and data processing, transmission and reception units designed specifically for this project by Microscan[7], Australia.

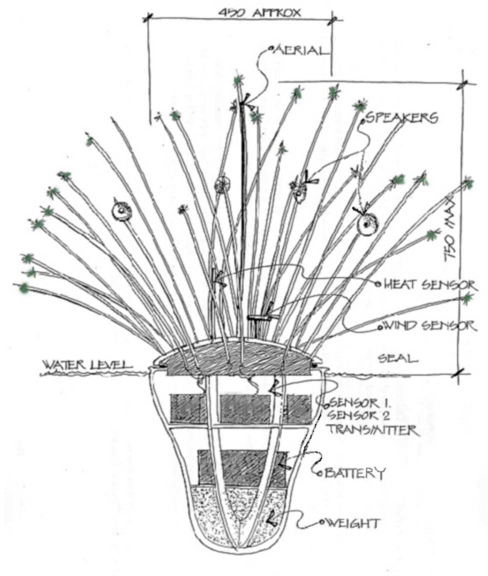

Figure 3 Reed pod plan view

The weather sensors output a sliding voltage scale, representing their current state, with the exception of the wind speed sensor, the output of which is calculated on the basis of the number of rotations per 1.25 milliseconds (one rotation equals 1.00615 meters of air movement). A data processing board, inside the reed pod hosting the weather station, converts this data to an ASCII data set in the form:

6 Davis Corporation weather station and sensor product information can be found at http://www.davisnet.com/weather/products/index.asp

7 Microscan, see http://www.microscan.com.au

Battery Voltage, Temperature, Solar Radiation, Wind Direction, Wind Speed

This data set is transmitted by the weather station once every ninety milliseconds to a land based receiver, which, having performed a checksum to ensure data integrity, pipes the data into a Macintosh computer as RS232[8] data.

2.2 Weather Data Analysis

The weather data is fed into a software application, developed in Max (Fig. 4), that analyses the incoming data and dynamically scales it, before passing the result in the form of MIDI Continuous Controller messages to a SuperCollider patch, containing six audio synthesis algorithms.

A sub-patch of the *Reeds* Max patch polls the serial port every ninety milliseconds to collect the incoming serial data from the weather stations. The weather data is transmitted as machine units, which have a range set by the manufacturers, of 0 to 4095.

The machine units were converted into weather measurements in order to get a clear understanding of the range of weather activity.

It was important to gauge the maximum and minimum range for each weather characteristic in order to scale the synthesis processes appropriately, in this sense the machine units were meaningless. The conversion of the data to standard units of measure (degrees Celsius, wind speed in meters per second, etc.) had the benefit of providing minimum and maximum measurements to the user interface, which were used to make subjective judgments about the timbral quality of the sound synthesis when equated to the dynamic of weather activity. The scripting language Pyrite[9] was used for this purpose.

Having the ranges displayed in the user interface provided an historical view of the day's activity and assisted in setting the range of variation the sound synthesis software should address in order to get the best resolution of change in the audio timbres.

The sound synthesis algorithms were mostly based on Fast Fourier Transform (FFT) and Inverse Fast Fourier Transform (IFFT) algorithms.

8 RS232 was developed in the 1960s and specifies a serial data communication protocol.

9 Pyrite is a scripting language, developed by James McCartney that runs inside Cycling7 MAX.

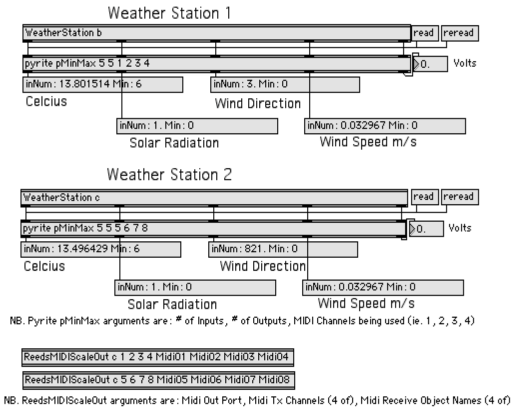

Figure 4 The top level Max patch for the Reeds project.

2.3 Sound Synthesis

As mentioned above, the realtime sound synthesis was achieved using a SuperCollider patch[10] that directly mapped the machine units from the weather sensors as pulse inputs to Inverse Fast Fourier Transform (IFFT) and Fast Fourier Transform (FFT) techniques.

Each of the instrument algorithms in *Reeds* is allocated one or more of the weather data streams (eg. instrument one uses wind speed and solar radiation from weather station number one) that control variables within the algorithm, thereby changing the pitch, texture or intensity of the sound. Instruments one and two (sig1, sig2) produce a stereo signal that is dynamically panned across the installation, whilst the other four instruments (sig3, sig4, sig5, sig6) produce a single audio channel. The audio is directed to the eight analogue audio outputs of an ASIO[11] compatible multi-channel digital audio interface[12].

Each of the sound algorithms produces differing timbres. They are designed to augment one another, and to produce a range of timbres from gentle, water drop like sounds to roaring wind like sounds. The sound is generally mapped to make the density of sound follow the wind speed, and the weight of sound (pitch for instance) follows the solar radiation readings, with filter settings varied according to the wind direction and temperature characteristics.

The relationship between the momentary weather conditions, and the sonic outcome is crucial. The system must preserve the nuance of each meteorological gesture. It is my view that this can

10 Developed with assistance from Graeme Gerrard

11 ASIO (Audio Stream Input/Output), developed by Steinberg, is a cross-platform, multi-channel audio transfer protocol ASIO is a trademark of Steinberg http://www.steinberg.net/en/

12 Such as the Digidesign DIGI001 - http://www.digidesign.com/products/digi001/ or MOTU828 http://www.motu.com

only be done by using realtime synthesis. The triggering and collaging of pre-recorded material may be able to represent the macro level meteorological activity, but it cannot enunciate the intricate nuance of unique moments, for surely the exact combination of multiple weather parameters is unlikely to be repeated. How then can a finite sound pallet suffice as a true expression of momentary phenomena? Two other installations approach the sonification of weather data. Owain Rich's WeatherPlayer[13] generates a RealPlayer audio stream twenty-four hours a day, seven days a week. The audio stream is made algorithmically by mixing pre-recorded audio samples in accordance with current sensor readings. Similarly, Natasha Barrett's Displace:Replace II[14] generates its score by triggering four and eight channel audio files for playback in an ambersonic cube. The audio files are mapped in intensity to threshold bands, but serendipitously, these mappings are augmented by the control computer if the weather does not change for four minutes, and completely recomposed if there is no change for thirty minutes.

Conversely, it was clear when observing the *Reeds* installation, and even more so in the gallery installation *PlantA* (which uses the same technology) that what appeared to be static weather conditions established a deep listening opportunity. There was always some variation, no matter how small, in the solar radiation or one of the other sensors. These micro-scale variations, whilst they may not be sufficient to create changes in Owain or Barratt's score, are reflected in the realtime synthesis output of *Reeds* and *PlantA*, and in fact it becomes increasingly seductive to listen on a more and more subtle level, delving increasingly into the microscopic plant domain.

More detail on the sound mapping approach will be given later in this paper.

2.4 Broadcast

The audio signals produced by the SuperCollider software were fed to four Sennheiser EW300 In-Ear Monitor[15] transmitters. The EW300 transmitters each broadcast stereo audio of high quality. Sennheiser EK300 stereo receivers, installed in six of the reed pods receive the broadcast signal (each receiver has its own reception frequency matched to one of the four broadcast frequencies (each carrier frequency hosting a stereo signal)). The stereo signal of each receiver is then separated into its two mono components, which are fed to the two adjacent reed pods. See Figure 5 below for details of the channel allocation and spatialisation.

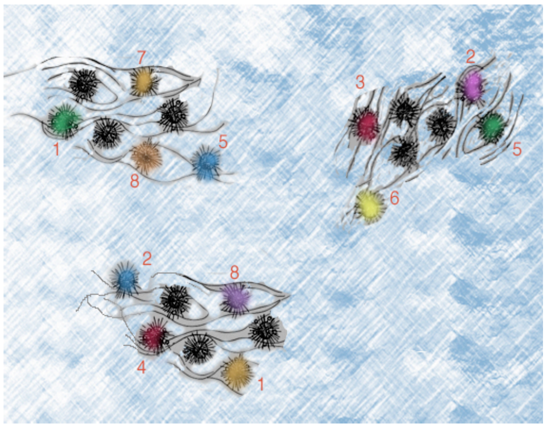

Figure 5 The sound diffusion audio channel allocation for Reeds

2.5 Diffusion

Each sounding reed pod contains a battery powered 40-Watt amplifier. The amplifier feeds five loudspeakers: one ten inch full range (20Hz – 20KHz) Misco waterproof loudspeaker, (built into a hat on top of the reed pod) and four small 40 mm speaker drivers (clipped to the reed stems) which are fed via a crossover, to ensure they only receive signals over 2000Hz. The main speaker carries the full range signal, whilst the smaller 40mm drivers carry the high frequency material that give the crisp edge to the sound. The speakers are placed in a position that allows the sound to bounce across the water surface.

The eight channels of sound were dispersed across the reed pods so that panning either of the stereo signals (sig01, sig02) would cause the sound to travel across the installation space. This was achieved by allocating these audio channels to loudspeakers in different reed pod clusters, spreading the stereo signal across the installation, which created a sense of movement, of sound journeying across the installation space, and also helped to establish homogeneity of the sonic landscape of the entire installation. The other four synthesis instruments output mono channels. They were grouped according to their timbrel quality so that the texture of the soundscape varied as one walked around the shore from one side of the installation to the other.

The numbered dots in Figure 6 show a bird's eye view of the sounding pods, and their audio output allocation, and Figure 7 indicates the allocation of synthesis and audio channels.

13 See http://www.weatherplayer.com for further information

14 See http://www.notam02.no/~natashab/dr2/displacedII.html for further information

15 The Sennheiser EW300 is designed to transmit foldback signals directly into the ear of a musician for the purposes of stage monitoring. See http://www.sennheiser.com

Sig01	Output 1, Output 2	1, 2
Sig02	Output 3, Output 4	3, 4
Sig03	Output 5	5
Sig04	Output 6	6
Sig05	Output 7	7
Sig06	Output 8	8

Figure 6 Synthesis and Broadcast Channels.

Given the cybernetic, social and ecological context within which this piece was designed, it was important not only to set the amplitude of the sonic outcomes so that the installation became part of the landscape[6, 7], but it was equally important to develop synthesis algorithms that reflected in some way an extension of the sounds that already existed within the environment. The natural soundscape for the lake in the Botanic Gardens, Melbourne, consisted of a wide range of bird sounds (calls, landing on water, fighting etc), the sounds of people at the cafe and walking around the lake, children playing, trucks and cars on the expressway on the other side of the Yarra river, small boat horns, overhead aircraft, and other less frequent momentary sounds.

These considerations left me with two almost irreconcilable intentions:

1. To directly convert the machine unit outputs from the sensors into musical material using FFT and IFFT techniques, and
2. To create sonic timbres that reflected the existing sonic landscape of the site.

This conundrum was resolved through careful adjustment of the way in which the sensor data was mapped to the sound algorithm parameters, as discussed below. Additionally, I applied various filtering approaches to make sure that the timbres of the sounds were rich and engaging whilst never becoming harsh or repressive.

Two trials were undertaken at the Botanic Gardens over the six months prior to the exhibition, involving single reed pods. A further trial was undertaken with one group of seven reed pods on site for a week, approximately six weeks prior to the final exhibition in order to test the scale of the sculptural elements and the sound spatialisation principles I had developed. The trials provided an opportunity to test the sound material in situ, and created an occasion to test the weather patterns on site (i.e. the range of variation), and the way in which these weather characteristics could best be scaled to create engaging and perceivable variations in the sonic landscape. One particularly interesting outcome of the trials was the discovery that sound algorithms developed in the studio did not carry well in the outdoor context. It was clear that whilst a great deal of design and testing work could be done offsite, the final sound algorithm development and the refinement of the mappings of the weather data to the sound synthesis algorithms would need to be done on site.

In consideration of the needs of the wildlife for which the Botanic Gardens' lake is home, each reed pod that contained audio equipment was fitted with light sensitive switches so that they turned on at dawn and off at dusk, thereby conserving battery power, and allowing the wildlife the tranquility of the night.

3 DATA-SONIC MAPPING

The weather data was mapped to the six sound synthesis algorithms in such a way that the incoming high-resolution pitch bend MIDI data could be re-scaled to suit the sound synthesis parameter to which the weather characteristic was being mapped. This flexibility provided the opportunity to quickly and easily alter the response patterns of the synthesis algorithms dependant on the range of weather conditions being experienced, which could clearly alter from site to site and from season to season. It also provided the opportunity to experiment on site with different mappings of weather characteristics to synthesis parameters, which proved invaluable when finalising the synthesis algorithm design. These mappings were achieved within Supercollider as follows:

```
// weather station 1: temperature; mapped to sig3: src1
in1Args = [1, 10, 2000, 'exponential', 1];

// weather station 1: solar radiation; mapped to sig1: centerFreq;
in2Args = [2, 100, 8000, 'exponential', 1];

// weather station 1: wind direction; mapped to sig1: clockRate;
in3Args = [3, 1, 200, 'exponential', 1];

// weather station 1: INVERSE wind direction; mapped to sig2: amp3 - varies amplitude envelope
in3Args1 = [3, 20, 1, 'exponential', 3];

// weather station 1: wind speed; mapped to sig2: src1
in4Args = [4, 2, 1000, 'exponential', 1];

// weather station 2: temperature; mapped to sig3: src
in5Args = [5, 10, 100, 'exponential', 1];

// weather station 2: temperature; sets the amplitude in sig3 in inverse proportion to impulse frequency
in5Args1 = [5, 8, 4, 'exponential', 1];

// weather station 2: solar radiation; mapped to sig4: src
in6Args = [6, 10, 10000, 'exponential', 1];

// weather station 2: wind direction; mapped to sig5: src
in7Args = [7, 20, 160, 'linear', 1];

// weather station 2: wind speed; mapped to sig6: Impulse.ar(freq);
in8Args = [8, 0.2, 2.0, 'linear', 1];
```

All of the sound algorithms used FFT or IFFT synthesis methods. The idea was to auralise the time domain information coming from the weather stations, i.e. current wind speed, solar radiation, wind direction and temperature. This mapping converted the changes in weather conditions into the impulse rate used as the source for the IFFT stage. The impulse rate is the main characteristic in defining the IFFT output. It is defined as follows in sig3 (the third instrument):

```
// inverse transform
   out = IFFT.ar(fftsize, 0, cosineTable, nil, window, src, 0);
```

where *src* is provided by the temperature sensor on *weather station 2*.

The weather characteristics were chosen both for their importance to plant life (they are the main characteristics that define the growth rate of plants, with the exception of rain), and for their compositional value.

Wind speed and wind direction change dynamically over large ranges in very short periods of time. Small gusts can swing through 360 degrees, and range widely in speed.

Solar radiation changes in a much more gradual way. I had expected the solar radiation to be the most docile variable, changing very gradually over the duration of the day, remaining high during the peak sunshine hours and then diminishing. I had thought that the solar radiation would define the form of the entire day, creating a kind of pedal point for the other more dynamic variations. During the testing periods, I was greatly surprised to find that the solar radiation was in fact one of the most dynamic variables. Clearly the human eye constantly adjusts for variations in solar radiation, something a scientific sensing instrument does not do. Cloud movement, and other changes in the weather saw the solar radiation constantly sliding up and down its range. Obviously, some days were sunnier than others, and therefore the range of movement was generally higher on those days than when the skies were overcast, but the dynamics of change were consistent in all weather conditions. Unlike the wind characteristics, solar radiation never jumped from one point to another, it moved smoothly up and down in a step like manner.

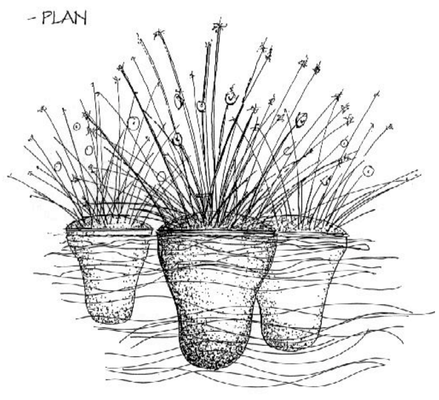

Figure 6 One of the original concept drawings for Reeds.

Temperature, as I had expected, changed gradually, moving up and down in small sequential steps. Temperature was the most graceful of the weather characteristics being sensed for the *Reeds* project, generally forming an envelope shaped by cool evenings, cooler nights, followed by rising temperatures during the day as the sun heated the earth, followed by a reduction in temperature leading towards dusk and into the night.

As indicated above, the weather characteristics were selected in the hope that they would have differing temporal structures, the compositional intention being that the more gradual, step like features (temperature and solar radiation) would provide a gradually varying underscore on which the faster changing features (wind speed and direction) would add points of interest and orchestration dynamics. An audio sample of the installation sonification can be heard on the Internet[16]

4 CONCLUSION

Reeds continued my exploration of organic, natural controllers for interactive sound installations[8], providing a platform for the testing of multiple, chaotic controllers[9-12], working simultaneously to generate a soundscape which continued to draw on the dynamic orchestration principles I had developed in my previous interactive environment installations, MAP1 and MAP2.

Reeds also illustrates an ongoing interest in making the technology invisible. I went to great lengths to develop battery-powered amplification and broadcast systems, so that the reed pods were entirely self-contained, displaying no obvious source (except for the weather stations and the small high-frequency loudspeakers) for the sounds they emitted. My motivation was to ensure the aural experience was the primary outcome, and not to display the technical wizardry, computer programming and hardware development that had made the project possible. In keeping with my intention to reflect on the human condition, I believe it is important to hide the pragmatic achievements inherent in realizing an interactive work like *Reeds*, and indeed the challenge of writing articles like this is to go beyond the technological developments and communicate something about the artistic intention.

I visited the *Reeds* installation at the Melbourne Botanic Gardens every day, and as the exhibition occurred during the season of spring, observed a wide range of weather patterns. I noted, for instance, situations where the sunshine and temperature were high, but the wind speed was almost non-existent; by contrast, there were similar temperature and sunshine

16 http://www.activatedspace.com.au/Installations/Reeds/ReedSound.html (04/05/04)

levels on days when the wind contained strong gusts and violent changes of direction. All of these provided very different sonic outcomes. It was obvious, if one sat and watched the installation for even a short time, that the changes in the weather stations (you could easily see the anemometer) caused variations in the musical output; pitched notes became more noise like as the wind increased, and/or the pitch rose with increased solar radiation intensity. Many of the relationships were very subtle, but were nevertheless perceivable if one spent sufficient time observing the installation.

From the perspective of musical composition, it was useful to consider the different temporal structures associated with each of the weather characteristics in *Reeds*. The different rates of change of each of the weather inputs helped create homogeneity in the soundscape. It was aurally pleasing to have some elements that changed rapidly and others that evolved slowly. I started to consider how this approach might be applied in combination with dynamic orchestration techniques[17] to generate a more richly evolving soundscape within interactive, responsive environments.

On my many visits to the installation at the Botanic Gardens, I often discuss the public's reaction to the *Reeds* installation with the Botanic Gardens staff, and on occasions discussed the work directly with members of the public. Many people enjoyed the work as a novelty, but some visited it regularly, observing, as I did, the changing weather conditions and the subsequent variation in the sonic landscape. For these people the repeated experience did seem to provide a point of contemplation, a catalyst for thinking about their place in the world, the beauty and splendor of the organic environment that surrounded them, and more immediately, the noises that surround the site; the appropriateness of the freeway on the far side of the Yarra river at the bottom of the Botanic Gardens, the incessant noise of aircraft overhead, or the sounds of the different bird calls, the splashes of the ducks and waterfowl landing on the water, the squawks of the birds fighting for pieces of bread that children fed them from the shore, or, on a peaceful afternoon the shear tranquility of the environment, the stillness, the sense of suspended animation as the twilight settled into dusk. These outcomes, unquantifiable as they are, and by no means empirical evidence, suggest that my artistic intentions had been met. They also hint at the potential for sound installation works to act as a conduit to consider and re-evaluate the nature of the world of which we are part.

17 Paine, G, "Interactivity, Where To From Here", Organised Sound 7.3, 2002

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