Compositions
for
Voice and Technology

Submitted by
Donna Hewitt BSc. BA(mus) Hons

As partial requirement for
Doctor of Philosophy by Research, July 2006

University of Western Sydney
Statement of Authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

........................................
(Signature)

..............
(Date)
Acknowledgements

Principle Supervisor: Dr Garth Paine
Copy editing: Sara Haddad

I would like to thank my supervisor, Dr Garth Paine, for his wonderful guidance and encouragement in getting me through this very challenging task. I am very grateful to the kind way you pushed me in the right direction when I needed it. Thank you to my family, Julian, dad and my beautiful mum for putting up with me through these past years. Ian Stevenson deserves an extra special thanks for his invaluable input into the eMic project. Thank you also to Jim Franklin for his assistance in the early stages of my candidature. Finally, thank you to my cats for their faithful companionship and the many hours they spent beside me at the keyboard, reminding me of the simple things in life.
# TABLE OF CONTENTS

**LIST OF FIGURES**  

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>CONTEXT</td>
<td>5</td>
</tr>
<tr>
<td>2.1</td>
<td>INTRODUCTION</td>
<td>5</td>
</tr>
<tr>
<td>2.2</td>
<td>DEVELOPING AND IDENTIFYING THE COMPOSITIONAL VOICE</td>
<td>5</td>
</tr>
<tr>
<td>2.3</td>
<td>COMPOSITIONAL INFLUENCES</td>
<td>5</td>
</tr>
<tr>
<td>2.4</td>
<td>LISTENING AND RECEPTION</td>
<td>6</td>
</tr>
<tr>
<td>2.5</td>
<td>SOUND SOURCES – VOICE</td>
<td>9</td>
</tr>
<tr>
<td>2.6</td>
<td>VOICE AND ELECTROACOUSTIC TECHNOLOGIES</td>
<td>14</td>
</tr>
<tr>
<td>2.7</td>
<td>HISTORICAL EXAMPLES OF WORKS FOR VOICE AND ELECTROACOUSTIC TECHNOLOGY</td>
<td>15</td>
</tr>
<tr>
<td>2.8</td>
<td>SUMMARY OF HISTORICAL WORKS OF INFLUENCE</td>
<td>29</td>
</tr>
<tr>
<td>2.9</td>
<td>IDENTITY, GENDER AND FEMINISM</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>PEEP SHOW</td>
<td>33</td>
</tr>
<tr>
<td>3.1</td>
<td>BACKGROUND</td>
<td>33</td>
</tr>
<tr>
<td>3.2</td>
<td>FRITH’S CATEGORIES</td>
<td>34</td>
</tr>
<tr>
<td>3.3</td>
<td>CREATING THE WORK</td>
<td>38</td>
</tr>
<tr>
<td>3.4</td>
<td>AUDIO EXAMPLES</td>
<td>46</td>
</tr>
<tr>
<td>3.5</td>
<td>CONTEXT</td>
<td>52</td>
</tr>
<tr>
<td>3.6</td>
<td>SCREENINGS/ PRESENTATIONS</td>
<td>55</td>
</tr>
<tr>
<td>3.7</td>
<td>SUMMARY - PEEP SHOW</td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>THE MILL ON THE FLOSS THEATRE PRODUCTION</td>
<td>59</td>
</tr>
<tr>
<td>4.1</td>
<td>INTRODUCTION</td>
<td>59</td>
</tr>
<tr>
<td>4.2</td>
<td>THEMATIC CONTEXT</td>
<td>59</td>
</tr>
<tr>
<td>4.3</td>
<td>THE STAGE ADAPTATION</td>
<td>62</td>
</tr>
<tr>
<td>4.4</td>
<td>COMPOSITIONAL APPROACH</td>
<td>63</td>
</tr>
<tr>
<td>4.5</td>
<td>COMPOSITIONAL RATIONALE</td>
<td>64</td>
</tr>
<tr>
<td>4.6</td>
<td>SUMMARY - MILL ON THE FLOSS</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>DAN NÁN RÓN - THE SELKIE PROJECT</td>
<td>76</td>
</tr>
<tr>
<td>5.1</td>
<td>INTRODUCTION</td>
<td>76</td>
</tr>
<tr>
<td>5.2</td>
<td>THE SELKIE MYTH</td>
<td>76</td>
</tr>
<tr>
<td>5.3</td>
<td>THE SELKIE MYTH AND ITS THEMES</td>
<td>77</td>
</tr>
<tr>
<td>5.4</td>
<td>MYTH</td>
<td>80</td>
</tr>
<tr>
<td>5.5</td>
<td>MYTH AND PSYCHOLOGY</td>
<td>80</td>
</tr>
<tr>
<td>5.6</td>
<td>MYTH AND MUSIC</td>
<td>81</td>
</tr>
<tr>
<td>5.7</td>
<td>MYTH AND FOLK SONG</td>
<td>82</td>
</tr>
<tr>
<td>5.8</td>
<td>CREATING THE WORK</td>
<td>84</td>
</tr>
<tr>
<td>5.9</td>
<td>IMPLEMENTING THE SELKIE TRANSFORMATION THEME IN DAN NÁN RÓN</td>
<td>93</td>
</tr>
<tr>
<td>5.10</td>
<td>PERFORMANCES AND TECHNICAL SET-UP</td>
<td>103</td>
</tr>
<tr>
<td>5.11</td>
<td>SUMMARY - SELKIE PROJECT</td>
<td>104</td>
</tr>
<tr>
<td>6</td>
<td>DANCE WORKS</td>
<td>105</td>
</tr>
<tr>
<td>6.1</td>
<td>INTRODUCTION</td>
<td>105</td>
</tr>
<tr>
<td>6.2</td>
<td>BEYOND THE DEPTHS OF SILENCE PRODUCTION:</td>
<td>107</td>
</tr>
<tr>
<td>6.3</td>
<td>CRASHING II</td>
<td>113</td>
</tr>
<tr>
<td>6.4</td>
<td>CRYSTAL CLEAR REMIX</td>
<td>114</td>
</tr>
<tr>
<td>6.5</td>
<td>AUTOPILOT - THE CAR HORN PIECE</td>
<td>114</td>
</tr>
<tr>
<td>6.6</td>
<td>SUMMARY - DANCE WORKS</td>
<td>115</td>
</tr>
<tr>
<td>7</td>
<td>EMIC: THE EXTENDED MICROPHONE STAND INTERFACE CONTROLLER</td>
<td>116</td>
</tr>
<tr>
<td>7.1</td>
<td>INTRODUCTION</td>
<td>116</td>
</tr>
</tbody>
</table>
7.2 BACKGROUND ........................................................................................................116
7.3 DESIGN RESEARCH ...............................................................................................119
7.4 GESTURE ..................................................................................................................119
7.5 FUNCTIONAL AND CONTEXTUAL ASPECTS .........................................................126
7.6 INSTRUMENT DESIGN - eMIC ...............................................................................127
7.7 PROTOTYPE FEATURES ............................................................................................128
7.8 CONTROL SYSTEMS .................................................................................................132
7.9 INTERFACING ............................................................................................................132
7.10 CONTROL FEEDBACK .............................................................................................132
7.11 APPLICATIONS ........................................................................................................133
7.12 MAPPING AND COMPOSITIONAL APPROACHES .................................................133
7.13 SOFTWARE – CHOICE OF SYNTHESIS OR PROCESSING ENVIRONMENT .............133
7.14 EXPERIMENTAL COMPOSITIONAL APPROACH VERSUS FIXED AND REPEATABLE APPROACH ..........................................................134
7.15 DETERMINISTIC MORPHOLOGICAL RELATIONSHIPS VERSUS ARBITRARY MORPHOLOGICAL RELATIONSHIPS ..........................................................135
7.16 PRIMARY GOALS IN MAPPING AND COMPOSING FOR THE eMIC ......................136
7.17 INITIAL MAPPING EXPERIMENTS – EARLY WORKS ..............................................136
7.18 AUDIO CONTROL AND SIGNAL NETWORK ........................................................138
7.19 MAPPING EXAMPLES .............................................................................................139
7.20 INITIAL SOLO PERFORMANCES ............................................................................146
7.21 FEEDBACK AND AUDIENCE RESPONSES ..............................................................147
7.22 COLLABORATIONS WITH THE eMIC .................................................................149
7.23 SUMMARY AND FUTURE WORK - eMIC .............................................................149

8 CONCLUSION ..............................................................................................................151
8.1 SUMMARY ...............................................................................................................151
8.2 FUTURE WORK ........................................................................................................154

9 REFERENCES ...............................................................................................................156
LIST OF FIGURES

FIGURE 1: IMAGE BY TREVOR WISHART FROM HIS BOOK ON SONIC ART (WISHART, 1985) .................15
FIGURE 2 INTERVIEW SUBJECT’S LIPS .................................................................41
FIGURE 3: ENDOSCOPE BEING INSERTED INTO THE NASAL CAVITY .................................43
FIGURE 4: ENDOSCOPIC IMAGE OF THE LARYNX ..............................................43
FIGURE 5: RAW FOOTAGE FROM THE ENDOSCOPE ...........................................51
FIGURE 6 PEEP SHOW INSTALLATION SETUP, LLEWERS GALLERY ..........................56
FIGURE 7 PEEP SHOW EQUIPMENT SETUP, LLEWERS GALLERY .............................56
FIGURE 8 PEEP SHOW FOUR-CHANNEL CONCERT VERSION EQUIPMENT SETUP ...............57
FIGURE 9: OPENING SCENE—WITCH DUCKING ..................................................61
FIGURE 10: THE THREE MAGGIES (FROM LEFT) SUSAN PRIOR, MARTA DUSSELDORP AND KIRSTY HUTTON ..........................................................62
FIGURE 11: MAGGIE (KIRSTY HUTTON) EXPERIENCING A DEAF RAGE’ .....................71
FIGURE 12: PERFORMANCE OF DÁN NÁN RÓN AT WAVEFORM ................................76
FIGURE 13: MELODY OF SEAL SINGING TRANSCRIBED BY MARJORIE KENNEDY-FRASER ........79
FIGURE 14: AUTOMATION PAGE IN AUDIOMULCH .............................................85
FIGURE 15: DÁN NÁN RÓN AUDIOMULCH PATCH ..............................................86
FIGURE 16: LOOPPLAYER OBJECT IN AUDIOMULCH ..........................................86
FIGURE 17: MATRIX OBJECTS IN AUDIOMULCH ..............................................87
FIGURE 18: HÓ i HÓ i GAELIC LYRICS AND TRANSLATION (THOMSON, 1954PG 220) ..........91
FIGURE 19: HÓ i HÓ i MANUSCRIPT (THOMSON, 1954PG 220) ................................91
FIGURE 20: RECORDING TECHNIQUE IN POOL USING AIR MICROPHONE AND HYDROPHONE ....93
FIGURE 21: NORTH POLE VST PLUG-IN PROCESSOR USED FOR VOCAL PROCESSING ..........99
FIGURE 22: REORDER VST PLUG-IN PROCESSOR USED FOR LIVE VOCAL PROCESSING ....100
FIGURE 23: GRANULATOR OBJECT IN AUDIOMULCH USED ON GUITAR CHAIN ............100
FIGURE 24: AUDIOMULCH COMB FILTER USED IN DÁN NÁN RÓN ..........................101
FIGURE 25: DELAY CONTRAPTION IN AUDIOMULCH ........................................101
FIGURE 26: NASTYREVERB CONTRAPTION IN AUDIOMULCH ...............................101
FIGURE 27: CROSFADE ON CONTRAPTION IN AUDIOMULCH ..............................102
FIGURE 28: 8-CHANNEL MIXER CONTRAPTION IN AUDIOMULCH .........................102
FIGURE 29: PULSECOMB CONTRAPTION IN AUDIOMULCH .................................102
FIGURE 30: SPATIALISER CONTRAPTION IN AUDIOMULCH .................................103
FIGURE 31: PHASER CONTRAPTION IN AUDIOMULCH .......................................103
FIGURE 32: AUDIOMULCH PATCHER USED FOR THE MIDNIGHT PIECE ...................109
FIGURE 33: CONTRAPTION WINDOW USED IN THE PERFORMANCE OF MIDNIGHT ............110
FIGURE 34: AUDIOMULCH PATCH USED FOR TWILIGHT & BIOLUMINESCENCE ............113
FIGURE 35: AUDIOMULCH TIMELINE USED FOR TWILIGHT AND BIOLUMINESCENCE (TOP HALF) 113
FIGURE 36: AUDIOMULCH TIMELINE USED FOR TWILIGHT AND BIOLUMINESCENCE (BOTTOM HALF) 113
FIGURE 37: EXAMPLE OF LAPTOP PERFORMANCE USING LIVE VOCAL INPUT - DONNA HEWITT IMPERMANENT AUDIO 2002 .....................................................117
FIGURE 38: DONNA HEWITT PERFORMING AT WAVEFORM 2001 ............................118
FIGURE 39: RED HOT CHILLI PEPPERS, ANTHONY KEIDS ....................................121
FIGURE 40: SEX PISTOLS, JOHNNY ROTTEN .......................................................121
FIGURE 41: JANICE JOHNPL .................................................................................122
FIGURE 42: THE DOORS, JIM MORRISON ..........................................................122
FIGURE 43: MARIAH CAREY ..............................................................................122
FIGURE 44: RED HOT CHILLI PEPPERS .............................................................123
FIGURE 45: JANICE JOHNPL ..............................................................................123
FIGURE 46: MIDNIGHT OIL, PETER GARRET .....................................................123
FIGURE 47: INXS, MICHAEL HUTCHENCE ..........................................................123
FIGURE 48: THE DOORS, JIM MORRISON ..........................................................124
FIGURE 49: JAMES BROWN (JAMES BROWN THROWS THE STAND AND REINS IT BACK IN WITH THE MICROPHONE LEAD) ..............................................124
FIGURE 50: RED HOT CHILLI PEPPERS .............................................................124
FIGURE 51: THE DOORS, JIM MORRISON ..........................................................124
FIGURE 52: RED HOT CHILLI PEPPERS .............................................................125
FIGURE 53: STEVIE NICKS ...............................................................................126
FIGURE 54: MARIAH CAREY ..............................................................................126
FIGURE 55: EMIC PROTOTYPE ............................................................................129
Multimedia item accompanies print copy
Composition Portfolio Contents

Peep Show

Disc 1
*Peep Show* 1999 Duration 6’30
Stereo version DVD

Disc 2
*Peep Show* 1999 Duration 7’00
Quadraphonic version DVD

Disc 3
*Peep Show* 1999 Duration 6’30
Stereo Version CD-Rom
Quicktime 4 or later required MAC/PC.

Mill on the Floss

Disc 4
*The Mill on the Floss* Production Cues1999 Duration 41’15
Stereo Versions CD See (Appendix III and V)

Disc 5
*The Mill on the Floss* Production Cues1999 Duration 41’15
Quadraphonic Versions for DVD A format (see appendix III and VI)
Please note this disc must be played on a DVD-A compatible player

Disc 6
*The Mill on the Floss* Production Music Cues 2004
The cues accompany series of stills of the production taken by Robert McFarlane
DVD Video

Dan nan Rón

Disc 7
*Dan nan Rón* 2001 Duration 10’01
Stereo CD

Disc 8
*Dan nan Rón* 2001 Duration 11’07
Video footage of live *Dan nan Rón* performance
*Waveform* Australasian Computer Music Conference July 2001

Dance Collaborations

Disc 9
Dance Collaboration Compositions
Stereo tracks
**Beyond the Depths of Silence 2002**

1. Descending 1’54
2. Midnight 13’20
3. Reeds I 4’34
4. Moonlight 3’18
5. Crashing 2’54
6. Twilight version I 5’01
7. Twilight version II 1’56

**Autopilot 2002**
8. Autopilot Car Piece Version I 2’05
9. Autopilot Car Piece Version II 2’28

**Crystal Clear Remix 2002**
10. Water sculpture 3’09

**Crashing II 2003 7’05**
11. Stereo version for l-a u d i o

Disc 10
Video footage of Performances
*Beyond the Depths of Silence 15’00*
Arthouse Performances of *Twilight II 1’56 and the Car Piece 2’28”*

Disc 11
**Crashing II** 5.1 surround mix
DVD-A Format

**eMic Project**

Disc 12
*Dysphonia 2003* 10’00
*Nodule 2005* 19’54
*Amphibian 2006* 7’58

Disc 13
Video Footage of selected eMic performances
Abstract

The PhD consists of a portfolio of electro-acoustic compositions and is accompanied by a scholarly dissertation. The portfolio of works explores the development of real time electro-acoustic composition techniques using microphone-captured audio. The portfolio focuses particularly on the voice as a sound source and aims to bring together the authors background as a popular vocalist with her ‘music concrete’ influenced electro-acoustic compositional work. The portfolio culminates in the development of a HCI (Human Computer Interface) called the eMic (eMic extended Mic-stand interface controller), which allows the performer to control sound parameters in real-time via common popular music performance gestures.
1 INTRODUCTION

Art is important for it commemorates the seasons of the soul, or a special or tragic event in the soul’s journey. Art is not just for oneself, not just a marker of one’s own understanding. It is also a map for those who follow after us. (Pinkola Estes, 1992http://www.tmema.org/messa/messa.html)

This thesis consists of a portfolio of electroacoustic compositions which is accompanied by a scholarly dissertation. Although distinctive and deeply personal, the work makes reference to and is contextualised within the existing body of knowledge and ideas surrounding electroacoustic music. It represents a period of artistic development, which contributes to and informs my ongoing artistic practice.

On a macroscopic level, the doctorate is an undertaking to develop and identify my own voice as a composer. This process involves identifying recurring ideas and unifying elements that pervade my practice, from broader philosophical connections through to distinctive technical processes and procedures, and even sound source choices. The process of writing this thesis has been beneficial in providing a great deal of insight into the many subconscious aspects of my creative process.

As the thesis title suggests, ‘voice’ is the central theme explored in the portfolio. The term ‘voice’, however, can be used in such a wide range of contexts that it consequently suggests an extremely broad field of study. The Wordnet dictionary (Miller, 2004), for example, presents some 11 different senses in which the noun alone can be used and provides a further extensive list of different senses for the derivational words.

My interest in voice stems from my background as a vocal performer. This experience primarily encompasses popular styles including pop, rock and folk music. My compositional work, on the other hand, has been primarily in the electroacoustic field, influenced strongly by the French musique concrète school, of which Pierre Schaeffer is considered to be the founder.

Before embarking on this PhD, my compositional work was quite separate to my work as a vocal performer and I was looking to blend the positive aspects of these two creative practices. Working with new technologies in the electro-acoustic
field provided the opportunity for achieving such a goal since it affords fertile
ground for exploring new perspectives and for developing a new aesthetic approach.

Part of developing a unique artistic voice involves consideration of one’s
identity. Given gender forms a significant part of that identity, gender issues attract
significant consideration in the portfolio and form a recurrent theme. The fact that
electroacoustic music is historically acknowledged (Weber-Lucks, 2003, Simoni,
1995) as a male dominated field further heightens awareness of gender issues as one
negotiates one’s place in an environment with relatively few role models.
Electroacoustic technologies allow us to overcome certain biological, physical and
emotional limitations of natural embodied voices. The potential to treat female voice
as an abstract sound object, removed from cultural and gender conditioning and
associations has perpetuated as a sub-theme throughout this research. Feminist
themes thus recur in all of the works and facilitate the development of a more
empowering active engagement with my work.

Microphone captured audio is fundamental to both my composition and vocal
performance practices, enabling the ‘liberation’ of sound from its source. As a
vocalist, the microphone is an integral part of live amplified performance. As an
electroacoustic composer working in the style of musique concrète\textsuperscript{1}, it is also
essential for the capture of environmental and ‘found’ source material. My desire
was to work with microphone captured audio in an immediate, spontaneous fashion.
Reaching this objective has been aided by the significant and relatively rapid
developments in technology during the time this portfolio was undertaken.
Specifically, the development of computer audio processing has made real-time
sound processing possible by reducing latency time to below levels of human
perception.

The associated portfolio examines voice in relation to electroacoustic
composition across a range of musical contexts including theatre, dance, video and
live electronic performance. Each of the works focuses on a different aspect of the
voice. The portfolio comprises the following works:

1) \textit{Peep Show}, an audiovisual work that explores the physical and
emotional constructions of the voice, drawing upon interviews with

\textsuperscript{1} Concrete compositions – in the tradition of Pierre Schaeffer. Works using found sound and recording
technology and the final outcome being a tape work or pre-recorded composition.
female vocalists and using images of the vocal cords captured using an endoscopic camera.

2) *The Mill on the Floss*, which examines voice and electroacoustic techniques in a theatre context. It explores the effect of using recorded and digitally processed voice as sound sources for the development of music cues for playback through a multi-channel speaker system.

3) *The Selkie Project* represents the first work using real-time processing in live performance and explores the voice of non-human sound sources (seal calls).

4) The *Dance Collaborations* investigate human gesture in relation to electroacoustic techniques, and act as a precursor to the eMic (Extended Microphone-stand Interface Controller) project by examining gesture as real-time control/expression.

5) The eMic (Extended Microphone-stand Interface Controller) project is one of the significant outcomes of this PhD. The project encompasses the development of a gestural controller/interface, the eMic, for contemporary vocal performance and electronic processing. It consists of a modified microphone stand, custom fitted with an array of sensors to capture performance gestures as musical control parameters. The eMic fits into a relatively new area of research concerning New Interfaces for Musical Expression (NIME), which contributes to the larger body of research on Human Computer Interfaces (HCI). The controller is an original solution to a range of issues discussed and identified in the preceding works.

One of the common threads in the presented works is the choice of sound sources. Voice, as previously stated, is a common sound source, and so is water. The frequent use of water stems from my interest in Taoist philosophy, in which water is a strong symbol for the existence of wisdom. Taoist philosophy also influences my approach to composition and the overall direction of the portfolio toward a more

---

2 See the New Interfaces for Musical Expression Website http://www.nime.org sighted 09/01/06
fluid and spontaneous expression. The ability to directly use sound sources with an intentionally referential aspect allows exploitation of the symbolic nature of the sounds. The use of musical metaphor is thus a focus of discussion in this thesis.

As will been seen, various interrelationships exist between my interests in voice, water and organic/real-world sound, revealing a consistent set of ideas and approaches to composition. This portfolio thus represents a map of my development as an artist towards the construction of my own artistic space and individual expressive voice.
2 CONTEXT

2.1 INTRODUCTION

This chapter outlines the importance of the listening process to my compositional approach and cites a number of theories on compositional listening. A discussion of the notion of voice and its many identities/usages and how this refers to my creative practice is followed by an examination of important works in the area that directly influence the compositions contained in the associated portfolio. Finally, there is a brief discussion of the influence of gender and feminist issues and how they shape my voice as a composer.

2.2 DEVELOPING AND IDENTIFYING THE COMPOSITIONAL VOICE

Writing about one’s own work is arguably one of the most challenging, yet rewarding and insightful, processes a composer can undertake. In identifying and developing my own voice as a composer, it has been necessary to recognise and unravel the recurrent thought patterns and their variations in my creative work. This has created difficulties in identifying and documenting the degree to which intuitive processes are involved.

2.3 COMPOSITIONAL INFLUENCES

Like many electroacoustic composers, I predominantly work with microphone captured audio or concrete sounds. My compositional work is heavily influenced by the music concrete and acousmatic compositional traditions. The acousmatic compositional method, succinctly described by influential acousmatic composer, Francis Dhomont, is a method that “begins with the concrete (pure sound matter) and proceeds towards the abstract (musical structures), in reverse of what takes place in instrumental writing, where one begins with the abstract and ends up with the concrete” (Dhomont, 1996).

---

The composer Jonty Harrison (2000) extends Dhomont’s definition of acousmatic composition as a method that:

...admits any sound as potential compositional material, frequently refers to acoustic phenomena and situations from everyday life and, most fundamentally of all, relies on perceptual realities, rather than conceptual speculation, to unlock the potential for musical discourse and musical structure from the inherent properties of the sound objects themselves and the arbiter of this process is the ear.

In working with recorded sound materials, my compositional methods rely heavily on the process of aural auditioning, where the sound materials are evaluated through the listening process. This process involves significant spontaneity and is often based on emotional responses to the sound. There is an immediacy with which humans interpret and comprehend acoustic information and it often occurs without conscious reasoning. Researching how composers listen, therefore, provides some insight into the intuitive aspects of my compositional approach.

2.4 LISTENING AND RECEPTION

Humans gain important information through their hearing sense. It is a sophisticated system that has evolved to help sustain human survival. The laws of physics dictate the behaviour of sound in our environment and our perception and interpretation of our environment rely heavily on our familiarity with these natural relationships.

On some level, and as part of the survival mechanism, humans are always listening. It is difficult to shut sound out even when we are preoccupied with other quite complex tasks. Truax (2001) distinguishes various levels of listening according to the level of engagement and attention afforded by the listener:

1) We may listen in readiness for a sound, “where the focus of one’s attention is in readiness to receive significant information, but where the attention is probably directed elsewhere”.

2) We may listen in search of a sound, where “listening is at its most active, involving a conscious search and an ability to focus on one sound to the exclusion of others”. The cocktail party effect, is a term used to describe our ability to filter sounds and listen selectively in a noisy environment.
3) We may engage in background listening, where the sound remains in the background of our attention.

Chion (1990) distinguishes three types of listening:

1) *Causal* – listening to a sound in order to gather information about its cause (or source).

2) *Semantic* – listening to a code or a language to interpret a message, e.g. spoken language and Morse code or other such codes.

3) *Reduced* – a listening mode, first termed by Pierre Schaffer, that focuses on the traits of the sound in itself, independent of its cause and meaning.
   “Reduced listening takes the sound – verbal, played on an instrument, noises, or whatever – as itself, the object to be observed instead of as a vehicle for something else” (Chion, 1990).

In his reduced listening sessions, Chion describes the difficulties experienced by the listeners in speaking about the sounds in and of themselves, independently of any cause, meaning or effect. According to Chion (1990), humans constantly shuttle between a sounds actual content, its source and its meaning. My compositional approach deliberately plays on the ambiguity of sounds that have been removed from their causal context and thus invites the listener to make use of all three modes of listening described by Chion. A fourth listening mode, labelled by Sonnenschein as ‘referential listening’, is also relevant to my compositional approach:

> Referential listening consists of being aware of or affected by the context of the sound, linking not only to the source but principally to the emotional and dramatic meaning. This can be on an instinctual or universal level for all humans (e.g. a lion’s roar), culturally specific to a certain society or period (e.g. a horse and buggy o cobblestones) or within the confines of the sound coding or a specific film (e.g. Jaws’ famous dah-Dah ... dah-Dah). (Sonnenschein, 2001)

It is important to note, therefore, that the way we hear is also contextualised by experience and knowledge, and the composer can draw upon and exploit this knowledge both consciously and subconsciously. For example, when a listener recognises and identifies with a sound emanating from a loudspeaker, it is natural for them to draw upon their existing cultural and/or environmental context for meaning.
Even Smalley (1997:2), whose spectromorphology\(^4\) theory concentrates on intrinsic\(^5\) features in electroacoustic music, acknowledges that ‘a piece of music is never an autonomous closed artefact’ and that music relies on relating to external, cultural experiences for meaning. He says “the extrinsic foundation in culture is necessary so that the intrinsic can have meaning. The intrinsic and extrinsic are interactive” (Smalley, 1986).

Like Chion, Smalley believes that humans have a “natural tendency to relate sound to supposed sources and causes, and to relate sounds to each other because they appear to have a shared or associated origins” (Smalley, 1986). Smalley calls this “source bonding” and he introduced the notion of surrogacy to describe distinct levels of sound abstraction that occur when sound is played back through speakers (Smalley, 1986). They are:

1) **First Order Surrogacy** – includes recordings of sound-making not intended for musical use and where the sources are easily recognised (Smalley, 1986, Smalley, 1997).

2) **Second Order Surrogacy** – traditional instrumental gesture. It includes recordings of identifiable musical instruments (Smalley, 1997).

3) **Third Order Surrogacy** – where gesture is inferred or imagined in the music. There is, however, a degree of ambiguity that makes the listener unsure about the reality of either the source and/or cause or the sound (Smalley, 1997).

4) **Remote Surrogacy** – concerned with gestural vestiges. Source and cause become unknown and unknowable as any human action behind the sound disappears (Smalley, 1997).

When the source or cause of a sound is not discernable, the listener may draw upon physiological and psychological links with the sound. To this effect, Smalley writes that musical gesture is:


... proprioceptive and is concerned with the tension and relaxation of muscles with effort and resistance. In this way sound making is linked to more comprehensive sensorimotor and psychological experience. (Smalley, 1986)

Sound abstraction and surrogacy are important to my compositional approach. Sounds may be processed via myriad electroacoustic manipulation tools leading to source recognition ambiguities. Sounds can be edited, layered and/or digitally manipulated to varying degrees of recognition and in the most extreme cases to the point where the source is no longer recognisable.

Recording and amplification technology allow the composer to remove sounds from their causal context and in re-contextualising sound, the composer can manipulate important semiotic indicators. Van Leeuwen describes the following two important semiotic indicators that can be manipulated:

1) Perspective – relates to simultaneous sounds and is described by Van Leeuwen as:

   ... the hierarchical relationship that influences how a listener will relate to a sound. For example, if a sound is in the foreground with perspective to other sounds then this is the most important sound, the sound which the listener must identify with, and/or react to and/or act upon. (Van Leeuwen, 1999)

2) Social distance – relates to single sounds and refers to the natural relationship between a sound’s volume and quality (Van Leeuwen, 1999).

There are numerous examples in the accompanying portfolio that demonstrate the manipulation of these semiotic principles using the available electroacoustic technologies, in particular, the use of close miked vocal recordings in The Mill on the Floss, Chapter 4.

2.5 SOUND SOURCES – VOICE

Whilst any sound is potential compositional material in my work, I find myself frequently drawn to certain sounds, including voice and water. Given my background as a vocal performer, experimentation with voice as a sound source was a fairly
natural progression. The strong relationships and interconnections between voice and music are a constant source of fascination.

Throughout history strong connections have been made between the human voice and music. According to Connor (2001:3), Western music has been formed around the dissension between music and voice. He writes:

On the one hand, the human voice has provided the image of music itself, distilled, clarified, and personified ... and yet, there is also within the history of Western music, a struggle between the voice and musical sound as such (Connor, 2001).

McCartney (1995) points out that we constantly make descriptive and metaphoric references to voice, indicating a clear link between the human voice and music. McCartney writes that “these metaphorical references, embody powerful cognitive and performative functions” (McCartney, 1995). This is supported by Kittay, who explains that ‘metaphor has the cognitive function of enabling us to understand a new domain of experience by relating it to a domain that we already know’ (Kittay, 1987).

The study of voice is an extensive field with the term voice being applied to many diverse usages. The following categories are presented to provide some background to the term, as it is relevant to this thesis.

2.5.1 Voice – Anatomy

The term voice can be used to refer to the actual part(s) of the body responsible for producing vocal sounds, providing humans with the ability to speak, sing and vocalise. An example of this usage might be to say that someone has lost their voice or are taking good care of their voice. The term voice is often used to refer to the voice box, which is thought of as the primary sound producing part of the anatomy.

2.5.2 Voice – Expression, Articulation and Communication

For humans and other species, voice is a primary means of communication and expression. Humans use voice to articulate and convey information to one another and to themselves, while all animals use voice to express a wide range of emotions
and inner feelings. The expressive nature of both voice and music can be seen to link the two. Vocal sounds can be used to convey both conscious and unconscious feelings. Frith (1996) comments that “the voice is the sound of the body in a direct sense”. He says:

Certain physical experiences, particularly extreme feelings are given vocal sounds beyond our conscious control – the sounds of pain, lust, ecstasy, fear, what one might call inarticulate articulacy: the sounds for example of tears and laughter; the sounds made by soul singers around and in between their notes, vocal noises that seem expressive of their deepest feelings because we hear them as if they’ve escaped from a body that the mind can no longer control. (Frith, 1996)

Humans rely on both linguistic and paralinguistic utterance as forms of communication and expression. Paralanguage refers to the non-phonemic properties of speech, such as speaking tempo, tone, volume, rhythm and vocal pitch (Truax, 2001). Paralanguage provides additional information and shades of meaning to speech, such as attitude or mood, and given the involuntary nature of paralanguage, can sometimes reveal unintended information where, for example, the tone of the voice might reveal when someone is not telling the truth. Paralanguage is often thought of as the musical aspect of speech “because it involves inflection (pitch contours), rhythm, phrasing, emphasis (or accent), punctuation, timbre (or sound quality), silence (rests), and even cadences – exactly those variables that are used to describe a single voice melody” (Truax, 2001).

Cone also considers the tone, rhythm and pitch of spoken work. He writes:

When we speak, we are normally completely conscious of the words we use, but much less so of our inflection of tone, pitch, loudness, rhythm and speed. Often when we are excited or deeply moved we are entirely unaware of them. Singing in its nonverbal aspects emphasises just these components of speech and subjects them to artistic control. Its power derives from its articulation and intensification of these usually amorphous elements. (Cone, 1974)

Cone extrapolates from this idea that:

When, as in song, a musical line is combined with a text, it is natural for us to accept the music as referring to a subconscious level underlying – and lying under whatever thoughts and emotions are expressed by the words. (Cone, 1974)
As will be demonstrated throughout this thesis, electroacoustic techniques provide an opportunity to explore paralanguage, or the so-called “musical aspects of speech” and this is a recurring interest in the work in this portfolio.

2.5.3 Abstracting Voice

The human voice offers a special case in terms of abstracting sound in electroacoustic music, in that it remains recognisable even after undergoing extensive processing. According to Truax, “the voice and human soundmaking are the sounds to which we are most sensitive as listeners” (Truax, 2001).

Music involving voice naturally appeals to humans because the voice as a means of expression represents both familiarity and intimacy.

Certain sounds retain their intrinsic\(^6\) recognisability under the most extreme forms of distortion. The most important sound of this type is the human voice, and particularly human language, although the particular formant structure of the human voice itself has a high intrinsic recognisability for human beings. This is partly due to the obvious immediate significance of the human voice to the human listener, but also the unique complexity of articulation of the source. (Wishart, 1985)

Smalley points out that it is not just the sound that is significant in the experience of vocal expression, but the associated physical bodily experiences of producing the sound, such as breathing and the various muscular tensions and releases (Smalley, 1996). Smalley says:

... vocal sound production, even the semblance of it, invites us to identify with and infer meaning from it because of our reliance on linguistic and paralinguistic utterance as a form of communication, as well as our conditioned knowledge of involuntary utterance and the timbre and gesture spaces defined by physically-defined factors such as vowel formants and breathing patterns. (Smalley, 1996)

\(^6\) Wishart makes a distinction between intrinsic and contextual recognition of sound. In certain cases we are reliant on the visual medium for sound recognition In virtual acoustic space of an electroacoustic work projected on loudspeakers, sounds may at times be completely devoid of aural context and hence more difficult to recognise.
2.5.4 Voice – Utterance

The word voice is often used metaphorically and sometimes anthropomorphically to refer to the suggestion of a vocal utterance. We apply the term to non-human entities, for example, ‘the voice of the wind through the trees’ where the term is used to indicate the means or agency by which something is expressed. We see from this example that even when a sound is not necessarily vocal in source, we often relate to it as such and are inclined to cling to the broader imagery or symbolic associations of voice as utterance because we understand it.

There have been many notable attempts by artists to reject or challenge the supremacy of the voice as an instrument of musical expression. John Cage is a particularly good example here, but even earlier, Luigi Russolo attempted to draw attention to other sounds and noises that were at the time not considered musical or musically expressive. He created the Intonarumori (noise intoners), instruments designed to play various noises such as humming, scraping, booming, whirring and roaring. According to Connor (2001:3), however, Russolo’s Intonarumori, follows the conventional modelling of instruments upon the operations of the human voice. He says:

_His noise machines as it were add a larynx to the accidental noises of the world. In being given utterance, these noises are spoken through, becoming another form of musical persona for the human (Connor, 2001)._
example, that advocates for a cause, or speaks on behalf of a group of people, could be said to be the voice of that group.

Humans also have a tendency to classify groups according to particular identifying biological or cultural vocal characteristics; for example, voice may used to deduce information about someone’s gender, age or nationality.

The use of voice to refer to identity is exemplified in the writing of Edward Cone. Cone writes of the composer’s voice in relation to nineteenth century music. He argues that a composer creates a unique persona for each composition:

“Not the persona of a composer” but “a persona of the composer” and says that the persona of each composition is uniquely created by and for that composition. (Cone, 1974)

2.6 VOICE AND ELECTROACOUSTIC TECHNOLOGIES

Many artists have sought to combine the voice with electroacoustic technologies. The relatively rapid developments in technology over recent years have facilitated the emergence of a creative playground for those interested in exploring and expanding the nexus between voice and music. While my interest in voice stems from my background as a popular vocal performer, electroacoustic music has helped to expand my thinking about voice.

Wishart’s diagram in (Figure 1) shows the extensive number of branches of study relating to human utterance and the interrelationships between those areas of study. Composers have drawn upon these various categories to inspire their creative works, including speech, language, paralanguage, conscious and unconscious vocal production, human and non-human voice, singing, vocal noises, and human and non-human voices.
To illustrate this point, in the following section I have provided a selection of key artists and summarised significant historical works that demonstrate the breadth and variety of work involving voice and electroacoustic technology. This list provides a context for the work in this portfolio, but is by no means exhaustive; given the size of the field, this is beyond the scope of this thesis, although it does include key influences on the compositional work that comprises this portfolio.

2.7 HISTORICAL EXAMPLES OF WORKS FOR VOICE AND ELECTROACOUSTIC TECHNOLOGY

2.7.1 Early Recorded Works

The following composers and their works comprise major historical examples that have influenced this research and portfolio.
2.7.1.1 Pierre Schaeffer (1910 – 1995)

The earliest experiments using recordings of real (concrète) or found sounds in a musical context have been attributed to Pierre Schaeffer. Schaeffer developed an approach to musical composition based on the use and manipulation of found and instrumental sounds, recorded and played back in a musical context. He called this kind of composition *musique concrète* and his work in this area occurred at the Paris broadcasting network known as Radiodiffusion Télévision Française (RTF).

*Symphonie pour un homme seul* (Symphony for a solo man), is one of the earliest examples of *musique concrète*, notable for its use of voice as a sound source. The work, composed jointly by Pierre Schaeffer and Pierre Henri, comprises eleven movements using recordings of vocal and other bodily sounds produced by a man.

Prior to the availability of analogue tape, sounds were recorded by cutting directly into a disc with a lathe and were edited by playing back several discs simultaneously and then cutting between them. Schaeffer’s work rejected traditional models of composition in which a performer would interpret a composer’s score; instead the composer would realise the work for a fixed medium such as analogue tape.

The technology provided the composer with the ability to break speech down into smaller components in order to explore the natural rhythms of spoken phrases (Chadabe, 1997).

2.7.1.2 Karlheinz Stockhausen (1928 –)

A few years later in the Cologne *Electronische musik* studio, Stockhausen, who had previously worked only with electronically generated sound, began to work with recorded material. His well-known work *Gesang der Junglinge* (1955-56) combines voices with electronic sounds. The composer proceeded to slice recordings of a boy’s voice into fragments and then treat the fragments as musical materials devoid of their original linguistic and semantic meaning. Stockhausen created what he called a synthesised equivalent for each of the vocal sounds, endeavouring to blend the voice and electronic sounds in a seamless way.
For each sound component of spoken language there exists a synthesized equivalent ...
Thus a continuum between electronic sound and vocal sound is established at every point
between the extremes of tone and voice. (Stockhausen, 1991)

The original version of Gesang der Junglinge is significant also for its exploration of spatial dimensions. Five loudspeakers were located around the concert space through which Stockhausen circulated sounds from the five existing tracks. He calculated various paths and trajectories for the sounds in an effort to make the sounds more “differentiated, more clearly heard and more comprehensible” (Chadabe, 1997).

The handling of vocal and electronic resources in a composition and the exploration of relationships between vocal and electronic sound are central concerns in the portfolio of composition work that accompanies this thesis. Several of the works in the accompanying portfolio have been mixed for multi-channel playback and are thus influenced by Stockhausen’s work with spatialisation of sound.

2.7.1.3 Luciano Berio (1925 – 2003)

Luciano Berio, from the Milan studio RAI (Radio Audizioni Italiane/Italian Radio Broadcasting), is also notable for his work with voice and electronics. In his work Thema-Ommaggio a Joyce (1958), he cuts a text, performed by Cathy Berberian, into phonetic elements and re-orders them. He said, “What I emphasized and developed in Thema is the transition between a perceivable verbal message and music …” (Chadabe, 2002).

In Berio’s later work, Visage (1961), Cathy Berberian improvised with the word parole (Italian for word) over a background of electronically generated sounds. The work, says Berio, is “based on the sound symbolism of vocal gestures and inflections with their accompanying shadow of meanings and their associative tendencies …” (Chadabe, 2002).

As with Berio’s work, improvisation is one of the means for generating source vocal materials in some of the works in this portfolio. My compositional work also explores editing and fragmentation of text and vocal utterance, but deviates from
Berio’s approach in that I use my own voice as a sound source and am in control of
the processing that is applied to my voice.

2.7.1.4 Pauline Oliveros (1932 –)

Pauline Oliveros is a significant early pioneer in the electroacoustic music scene and
is notable for being one of the first women to work in the field. She is now arguably
most well known for her Deep Listening aesthetic, which has culminated in the
establishment of the Deep Listening Institute, an organisation dedicated to the
philosophy and practice of active listening. Oliveros has combined voice and
technology in her works, notably her 1966 work Beautiful Soop. In Beautiful Soop,
Oliveros used Don Buchla’s 100 series analog synthesizer and a self-developed tape
delay system to create a mix of synthesized sounds using quotes from classic
literature, including the poetry of Lewis Caroll. The voices are processed using the
tape delays resulting in echoes and accumulative modulations. The work is
demonstrates the composer’s effective placement of musical information within the
stereo space (Hinkle-Turner, 1998).

Another notable work by Pauline Oliveros that utilises voice and technology is
Humayun’s tomb (1986). In Humayun’s Tomb Oliveros uses granular synthesis to
process and transform her poem, the idea being to blur the human voice with the
natural sounds of the Delaware River (Duguid, 1998).

2.7.2 Poetry and Text

In the 1950s and early 1960s, the poetry world also began to engage with the idea of
cutting up text using the montage techniques of musique concrète. The compositional
focus of much of this work was on language and text, and as such was consistent
with the concerns of the sound poetry discipline. This area is seen to have a close
relationship with contemporary vocal composition, particularly where it intersects
with editing and audio manipulation technologies.
2.7.2.1 Brion Gysin (1916 – 1986)

Brion Gysin is recognised for his early experimentation with text montage and the tape recorder. The first experiments he undertook with the tape recorder were simple extension of cut-ups on paper. William Burroughs describes one of the many ways this can be done:

... record say ten minutes on the recorder, then you spin the real backwards or forwards, just like that, without recording, stop at random and cut in a phrase, now of course where you’ve cut in that phrase you have wiped out whatever was there and you have a new juxtaposition. (Burroughs, 1976track 2).

2.7.2.2 Henri Chopin (1922 – )

In 1956, Chopin composed Rouge, a piece for two-track tape that used filter and echo devices. He was one of the first to abandon spoken word, and became an eminent figure in the world of sound poetry. Chopin continued his exploration of voice and electroacoustic technologies and created a work in 1974 called Extreme Tension. The work is basically a breakdown of the word air. As he vocalised, he recorded two simultaneous tracks, one capturing the sounds from inside his mouth and the other from outside his mouth. He later manipulated the two tracks using filter techniques, pitch modulation and delay (Lentz, 2000). He is notable for his use of multiple microphones in his 1979 work, Trio d’Été. He recorded his vocal improvisations with four microphones, each undergoing processing before being sent to two rooms, where other musicians responded to the sounds he was producing with his mouth (Lentz, 2000).

2.7.2.3 Amanda Stewart (1959 – )

Australian performance poet Amanda Stewart composes with language and non-verbal vocal material and her work crosses over between musical and literary worlds. She writes:

My strength and my weakness seem to be that my work is half-way between poetry and music. It’s a bit of a lonely place to be sometimes. I’ve certainly had a lot more in
common with composers in the last 7-8 years than with my own poetry mates. (Stewart, 1995)

Stewart works with stereo microphones and multiple layers of vocal sound. Her work IT.'I', uses a pre-prepared multi-tracked vocal backing to which she performs live. Stewart describes the way the work is constructed:

The work is composed of relationships and distinctions between language, music, logic and speech, incorporating ideas from linguistics, psychoanalysis, science and philosophy. These are juxtaposed with compositional and extended vocal techniques. Stewart sees the voice as a unique instrument with the ability to synthesise musical, linguistic and causal structures into an integrated continuum. (Stewart, 2003)

2.7.2.4 Annea Lockwood (1939 - )

Annea Lockwood demonstrates the use of low-tech electronics in her works. Her improvisation work The Secret Life (1989), was written for bass player/vocalist Joelle Leandre. The piece begins with the performer telling stories about her experiences with the double bass. The double bass is modified in such a way that it acts as a transducer and gradually as the piece progresses, the bass starts to act as a loudspeaker eventually by the end of the working taking over the vocalist completely thereby making her redundant (Lockwood, 1991).

2.7.3 Extending the Voice

2.7.3.1 Joan La Barbara (1947 – )

For Joan La Barbara, the use of technology to expand and extend the voice was a logical direction given her previous exploration of this idea via acoustic means. In her first work, Vocal Extensions (1975), she used a phase shifter, pitch modulator and delay unit to extend her natural voice. She is quoted in reference to this work as saying:

Without electronics, I had only my voice, and the sound I could make depended upon what I could physically do – but with electronics, I could extend this. (Chadabe, 2002)

7 Please note that this is not a typing error, it is the title of Amanda Stewart’s piece.
She later used Buchla® equipment in her work *Autumn Signal* (1978), to process her voice and move it through space.

La Barbara composed extensively with tape recorders to create multi-track works. Her 12-minute work *Twelvesong* consists of 12 layers of vocal material, each layer created as she circular breathed. She later expanded upon the idea of the fixed multi-track work and created a version of *Twelvesong* for a live performer and tape backing. Thus we see technology enabling a vocal performer to use many layers of their own voice for accompaniment in a live performance. This method is used extensively in the work in this portfolio.

Her later collaborative works with Jaap Blonk, Golan Levin and Zach Lieberman are notable for their use of voice and interactive media. The 2003 work *Messa di Voce* (Ital., "placing the voice") is described as:

> an audiovisual performance in which the speech, shouts and songs produced by two abstract vocalists are radically augmented in real-time by custom interactive visualization software. The performance touches on themes of abstract communication, synaesthetic relationships, cartoon language, and writing and scoring systems, within the context of a sophisticated, playful, and virtuosic audiovisual narrative. [Levin, 2003 #328http://www.tmema.org/messa/messa.html#overview]

The performance/installation work uses a video camera to track the head movements of the performers as they vocalise. The vocal sounds captured by the microphones are analysed by the computer and in response, the computer displays visualizations on a projection screen behind the performers. The visualizations serve to graphically represent the vocalizations and the timing is such that the projections appear to emerge directly from the performer’s mouths. The visuals may also serve as a playable interactive interface by which the sounds they depict can be re-triggered and manipulated by the performers (Levin, 2003).

---

8 http://www.buchla.com/
2.7.4 Repetition and Looping

2.7.4.1 Steve Reich (1936 – )

Another tape technique adopted by numerous composers is tape looping. Steve Reich is well known for his use of looping, in particular those works that use vocal loops. In 1965 he used loops of the voice of a black preacher, Brother Walter, in his work *It’s Gonna Rain*. Reich described how the “incessant repetition of the words comprising the loop ‘it’s gonna rain’ intensified their meaning and their melody at one and the same time” (Reich, 2002). In contrast to the trend in *musique concrète*, where it was usual to use sounds that were not easily recognised, Reich “preferred using sounds as they naturally occur in unprocessed form” (Reich, 2002). He said in relation to his use of voice:

*If one could present speech without altering its pitch or timbre, one would keep the original emotional power that speech has while intensifying its melody and meaning through repetition and rhythm.* (Reich, 2002)

One of Steve Reich’s best-known works is *Come Out* (1966). In this work, as with his earlier works, he explores the idea of phase shifting. He does this by allowing two tape loops playing the same sound to drift slowly out of time phase with each other, subsequently creating a whole series of new harmonies and rhythms derived from the coming apart and regathering of the voice (Reich, 2002).

2.7.4.2 Alvin Lucier (1931 – )

Alvin Lucier’s work *I am Sitting in a Room* also uses a vocal text in a repetitious manner. In this work he records himself speaking in a room, then takes that recording and plays it back into the room and records it, then takes that recording and plays it back into the room and records it. He does this over and over until the voice eventually becomes incomprehensible, and what the listener hears are the remnants of the voice as excitations of the space (Lucier, 1995).

As with Reich’s work the voice slowly degrades into unintelligible sound. But Lucier’s aesthetic differs somewhat to Reich’s in that he basically uses the voice to
excite a resonant acoustic space as a way of drawing attention to the importance of the environment in music. The use of speech in the work, with stutters and slurs included, provided Lucier with the natural irregularity contained in speech rhythms. The work can be said to emphasise the musicality in speech as well as exposing some of the hidden content inside speech.

Lucier’s 1967 work *North American Time Capsule* employs the use of a vocoder and is notable for its use of human voices as both sound sources and control signals. Although originally conceived for live performance with numerous portable vocoders and live performers, Lucier made a version for two tracks since he only had access to one vocoder. The sound sources consisted of sounds made by live performers using speech, singing, playing musical instruments, along with other sound-producing devices such as electric shavers and toothbrushes. The live performers’ sounds were fed to the various vocoder inputs, which included a spectrum analyser, pitch detector and voice/unvoiced detector. The composer continually changed the configurations of performers at the vocoder inputs and continually altered the various controls of the vocoder throughout the performance. He created eight tracks in sequential order and later reduced those to two tracks (Lucier, 1995).

2.7.5 Live Performance and Opera

2.7.5.1 Laurie Anderson (1947 –)

Whilst Lucier used the vocoder before Laurie Anderson, Anderson is famous for the use of the vocoder in her work *O Superman*. She generates an androgynous, robot-like vocal quality by channelling her voice through a vocoder. She is well known for her play on androgyny and has often used electronic devices to alternate between male and female speaking and singing voices. *O Superman* is part-sung and part-spoken, and thus crosses over between poetry and song.

Her earlier works also employ voice and technology in interesting ways. In *Stereo Songs for Steven Weed*, she creates a dialogue by turning her head between two microphones. As the speakers are on opposite sides of the room, she can control the placement of the voice in the stereo pair via her choice of microphone.
2.7.5.2 Alcides Lanza (1929 –)

Lanza is notable for combining fixed media with live performers and real-time vocal processing. His 1968 work *Ekphonesis* uses a fixed tape part accompanying real-time modifications on the live voice using a Putney synthesiser. He describes how the electronics were “simultaneously influencing the unusual sounds that the singers were making” (Chadabe, 2002).

Lanza’s interest in live processing can also be seen in his composite voice/theatre work *Trilogy*, which was composed during his time at McGill University. The trilogy is made up made up of *Ekphonesis V* (1979), *Penetrations VII* (1972) and *Ekphonesis VI* (1988). The work was conceived as a solo opera for singer/actress Meg Sheppard. Sheppard’s live vocal text was accompanied by a tape part as well as the live digital signal processing. Lanza used the digital signal processing as electronic extensions, to grade the comprehensibility of the text between clear semantic meaning and abstract sound (Chadabe, 2002).

2.7.5.3 Robert Ashley (1930 –)

Ashley made use of technology to develop his unique multi-media opera style, designed for live television presentation. His first opera was *Music with Roots in Ether* (1976), followed by *Perfect Lives* (1980) (Cage, 1986). His works were an attempt to create operas that would be suitable for the English language rather than trying to “adapt English to the old-fashioned opera style” (Ashley, 1997).

His technique involved the use of a principle voice, which was accompanied by other backing voices or what might be thought of as a chorus. Each voice would establish a character through its unique compositional treatment. The main character might establish their unique character identity through the sound of the voice singing or inflecting on and around an assigned pitch and within a small range of around half an octave. The backing voices would indicate their unique identifying character through their use of a harmoniser set to specific chordal patterns.

The rhythms imitate the speed of spoken English and the performers are required to deliver the text according to this prescribed tempo and prescribed timeframes (Ashley, 2002). Ashley’s use of close microphone techniques emphasises
the subtle pitch inflections of the voice creating a unique sound quality that is only made possible through the use of a microphone (Ashley, 1997). The close microphone creates an intimate and deep sounding voice.

2.7.5.4  Pamela Z (1956 –)

Pamela Z is a San Francisco-based composer/performer and audio artist who works primarily with voice, live electronic processing and sampling technology. She makes extensive use of delay effects, and in live performance controls these using foot controls; more recently she has used a laptop computer to run Max MSP. She combines a range of extended vocal techniques with operatic bel canto, text, found percussion objects and sampled concrete sounds. She triggers the sampled sounds using the Body Synth⁹ MIDI controller. Pamela Z’s work exemplifies a general trend towards live manipulation of sound and is important for its inclusion of gesture and body as part of the performance. Her work closely aligns with the eMic project discussed in Chapter 7.

2.7.6  Paralanguage

2.7.6.1  Paul Lansky (1944 –)

Paul Lansky’s work Small Talk comes to mind when contemplating compositions that explore the “musical components of speech”. In making Smalltalk, Lansky recorded a conversation with himself and his wife, and then wrote some software to hide the words they spoke while capturing the rhythms, pitches and contours of their conversation. Smalltalk essentially takes away the comprehensible text leaving only the inflexions of the speech. As Lansky (1990) states in his liner notes for the CD, “Smalltalk tries to capture the spirit, emotions and music behind and within our conversation”.

This work has had a significant influence on my compositional work using voice in that it drew my focus to the concept of paralanguage and the exploration of the expressive components of voice. As will be seen in this portfolio, there are a

⁹ The BodySynth was created by Chris Van Raalte and Ed Severinghaus http://www.synthzone.com/bsynth.html cited May 2005
number of examples where processing is deliberately used to reveal or extract the emotive qualities of voice, see the Chapter 3 *Peep Show*, Chapter 4 *The Mill on the Floss* and Chapter 5 *The Selkie Project*.

2.7.7 Hybrid voice, Transformation, Metaphor

2.7.7.1 *Trevor Wishart (1946–)*

Wishart’s work with voice explores the noise components in voice and focuses on the nexus between utterance and non-utterance. His 1977 work *Red Bird* (Wishart, 1992) was made using the elementary studio facilities available to him at the time; these included tape editing, mixing and mixer equalisation. Wishart creates hybrid sounds by meticulously transforming one sound into another. He uses an array of real sounds including the sounds of birds, animals, words and mechanisms, body sounds, door slams and metallic scrapes, and combines these with his repertoire of extended vocal techniques. The transformations are all made from voice to other sounds (Wishart, 2000). Wishart employs various strategies for finding points of connection between the different sounds. The sound transformations have a strong metaphorical basis and the work itself symbolises ideas of imprisonment and freedom (Wishart, 1978).

Sound transformation and hybridisation is explored extensively in this portfolio, and the Selkie Project, in particular, is based on a myth that explores the notion of transformation.

2.7.7.2 *Hildegard Westerkamp (1946–)*

Numerous artists have used the term **voice** in relation to non-human sources. Hildegard Westerkamp’s 1987 work, *Cricket Voice*, is an example of this.

Westerkamp, who is described as an acoustic ecologist, makes extensive use of environmental recordings in her work. *Cricket Voice* comprises an environmental recording of a cricket and the sounds of the composer “playing” along with the cricket using percussive sounds from the desert environment, including desert plants, spikes on cacti, dried up roots and palm leaves. Westerkamp slowed down the recording of the cricket throughout the composition and describes the resulting sound
as “the heartbeat of the desert” (Westerkamp, 2007). This work is an example of the use of technology to explore the concept of non-human voice. This idea is echoed in the works in this portfolio, in particular the Selkie Project (Chapter 5).

2.7.7.3 Simon Emmerson (1950 – )

Simon Emmerson was also interested in “extending the timbral world of the live performer’s voices and their acoustic instruments” (Chadabe, 1997). Notable works include Ophelia's Dream (1979) in which he attempts to aurally construct a dream-like experience and a sense of the experience of being inside Ophelia’s head (Emmerson, 1996). In his 1984 work Time Past IV, he used transformed vocal sounds on tape as echoes of the live soprano’s voice. Then late in 1990 he created a work called Sentences for soprano and live electronics – the voice was processed live and distributed to the loudspeakers around the performance space (Chadabe, 1997).

2.7.8 Language

2.7.8.1 John Young (1962 – )

A recent example of an electroacoustic work exploring language is Young’s 1999 work SJU. The piece is based on variable pronunciation of the Swedish word sju. The composer recorded varying pronunciations produced by a range of different voice types, genders and ages. He subjected these recording to a range of digital processing and produced multiple extensions of the word sju. He stated that his aim was:

... to encourage listeners to gain some sense of my confrontation with the pronunciation of ‘sju’ by virtue of the many variants used and their electroacoustic extensions, as well as tying this to the complicating factor of the conflicting nature of the pronunciations as they occur in reality. (Young, 2002)
2.7.9 Popular Music

2.7.9.1 Bjork (1965 – )

Popular female vocalist Bjork is included in this selection of significant historical works for her unique 2004 album Medulla. Where instruments, in popular music, usually accompany voice, all of the sound sources on this album are generated from vocal sound sources. Bjork experiments with a broad range vocal sounds including singing, grunting, yawning, snoring, breathing, groaning, whispering, whining and hyperventilating, and in addition to her own voice, she has also included Icelandic choirs, human beat boxes (Schlomo Rahzel (of the Roots)), Japanese acapella (Dokaka), Mike Patton (Faith No More), Robert Wyatt, classical singer/human trombonist Gregory Purnhagen, Inuit throat singer Tanya Tagaq, along with processed vocals created by Mark Bell (Hooper, 2006).

The album was recorded in 18 different locations and Bjork describes the process as follows:

I used different methods with each person, but I encouraged everyone to express themselves and imagine they were a human drum loop or bassline. I also got the Icelandic choir to pretend to be insects and birds and other ancient creatures. The difficult job was sitting at the computer afterwards deciding what to edit. I had so much material I’d say 80% of the time spent on this album was pure editing. Sometimes I just needed to swap chunks around, other times I had to add vocals from one track to another or strip everything down to a couple of notes. As much as everyone delivered live performances, there was a lot of weaving and layering needed to bring the whole album together. (Sarah-Jane, 2006).

The use of voice as a sound source to generate all the materials for a piece of music was a concept used in the first work in my portfolio (Peep Show, 1999). The voice offers an enormous range of sound possibilities of which Bjork’s album explores in a popular music context. This is of interest given my background as a popular vocalist and even though this album was released after the majority of the compositions in this portfolio were created, (and therefore was not an influence), it is worthy of inclusion here as an example of the extension of the voice in a popular
music context. The latest works in the portfolio in particular, will be seen to demonstrate the merging of my experience with popular and acousmatic styles.

2.7.9.2 Laura Scarborough (1974 – )

Laura Scarborough is a significant artist worthy of mention given her crossover between electronic and popular styles. Laura makes use of an array of acoustic instruments including piano, vibraphone, drums, melodica, air organ and voice, along with extensive use of technology such as synthesisers, live sampling and laptop processing. Her eklectronik project (as she calls it) LlA’s MEDiCiNE combines the use of a wide range of vocal sounds with electronic effects such as vocal delays, slicers and other effects (Scarborough, 2007). Her work is a significant example of the use of voice with electro acoustic technologies where the female vocalist is in control of her own processing in a live context. This approach resembles the later work in this portfolio in its use of technology in a popular music context.

2.8 SUMMARY OF HISTORICAL WORKS OF INFLUENCE

From this overview it can be seen that artists working with the human voice use technology in a broad range of ways. The ability to capture and reproduce the human voice allows the voice to be removed from the body and its associated biological limitations, such as breath, pitch range, timbral quality, volume/amplitude and so forth. In this way the technology can be seen to be extending or expanding the existing vocal instrument.

Using multi-track recording technology, the voice can be layered upon itself, allowing vocalists to accompany themselves with their own voice. That accompaniment may be processed or unprocessed, in real or non-real time. Very dense textures can be created from one voice or the voice may be broken down into its component or elemental parts. The use of multiple microphones and speakers facilitates the exploration of voice in space.

The general direction of technology has been to increase the range of sound possibilities derived from the human voice and to increase the level of efficient and
flexible control over the voice. The general trend seems to be toward the real time treatment.

2.9 IDENTITY, GENDER AND FEMINISM

Part of developing a unique artistic voice involves consideration of one’s identity. Gender forms a significant part of that identity and has both consciously and subconsciously been a pre-occupation of mine, subsequently forming an underlying thread in this portfolio. As a woman looking to establish a path as an electroacoustic composer I feel I have had very few female role models. Technology, and more specifically electroacoustic music, are areas historically acknowledged as male-dominated and thus tend to draw attention to gender-related issues. McCartney writes that “to be a woman composer of electroacoustic music is to straddle two worlds, both gendered male” (McCartney, 1995).

Studies by Simoni (Simoni, 1995) and Bosma (Bosma, 2003) demonstrate the relatively small number of women composers in the electroacoustic domain, and on a much larger scale, much feminist musicology study has inferred that both technology and Western art music composition can be seen as male gendered domains (Citron, 1993, McClary, 1991). Not only is the number of women working in the field relatively small, women have also been shown to face difficulties in receiving due credit for their creative roles in electroacoustic works. Bosma’s studies relating to composer Luciano Berio’s work immediately come to mind. Bosma, in her examination of the collaboration between Berio and Cathy Berberian on the work Visage, demonstrates the hierarchical relationship between Berio, as composer and Berberian, as performer. Despite Berberian’s unprocessed vocal improvisation being a major part of the work, Berberian is not consider co-author or composer of the work and her credits are far less prominent than Berio’s (Bosma, 1996).

Comparably at the top end of the popular music recording industry, women are significant by their absence as authorial figures, in particular as producers. Producers happen to occupy one of the most powerful areas of the music business and receive a great deal of artistic and authorial credit for the music created (Mayhew, 2004). According to Mayhew (2004), “very few women, unless economically independent, have the chance to position themselves as producer”.

30
The gender issue is much less of a concern to me now than when I first started to work with technology and indeed at the outset of work on this PhD. I recall, early in my career, participating as a panel member in a forum for women composers and technology. The review by Zoë Sofoulis noted:

*that the sense of “disadvantage” associated with being in a female minority seemed to vary according to age and stage of professional development. Younger women, and those still in training institutions, were more sensitive to issues around the behaviour and attitudes of their male peers. (Sofoulis, 1998).*

This has certainly been my experience as I feel much less concerned about gender related issues now than I did earlier in my career, and I believe that the active steps I have taken throughout this PhD to develop my own creative space have contributed to my feeling more comfortable.

There are both positive and negative aspects for women working in electroacoustic music. While on one hand it can be alienating, sometimes being in a minority group enables one to stand out. McCartney’s (1995) study of 14 Canadian women demonstrates the different ways women respond to masculine structures. McCartney (1995) shows how the women “echo (reflect, mimic, contest or change the tone of) the stereotypical male construction of the technological world”. She says:

*A few find that their gender is not a problem, and that they are not discriminated against. Most find that they feel alienated to some extent by the emphasis on masculinity in the electroacoustic world, and have developed strategies to live with this alienation. These strategies range from denying their gender (becoming one of the boys), to playing the exceptional woman, to separating work from the rest of their lives by exploring what it means to be a woman away from the electroacoustic world. Many of my consultants mention how exhausting this constant performance can be.*

I read McCartney’s study after completing my portfolio and immediately identified with many of the ideas she expressed. I became very interested in the comment in this previous quote where women speak of their constant performance.
The idea that women feel as if they need to perform infers that they feel as if they are not able to be themselves. This suggests a distinction between the real self and the more artificial role they feel they play. As Carlson points out:

*In the discipline of performance, a distinction is often made between the performer as a person, the authentic self, and the role they play as a performer. While defining selfhood is problematic, the distinction between “self” and “role” inevitably suggests that the latter is less authentic, more artificial. (Carlson, 2002)*

I realised after reading McCartney’s research that the idea of performed identity, was an idea that I had subconsciously been working through and is a key theme in the first three works in this portfolio: *Peep Show, The Mill on the Floss* and *The Selkie Project*. McCartney’s research revealed a similar thematic focus on gender and identity issues in the electroacoustic compositions of some of the women she investigated (McCartney, 1995).

*Peep Show* explores women working in the popular music domain where they often perform according to well established constructed identities as pop singers. *The Mill on the Floss* explores the performative nature of the identity of a woman who struggles to conform to Victorian social structures and expectations, and *The Selkie Project* centres around a mythological creature that uses its skin to transform its identity in different environments.

Whilst technology may historically be constructed as a masculine domain and may pose challenges for women, new technology also provides the opportunity to re-assess pre-existing constructs and stereotypes:

*... electronic sound technologies offer possibilities for empirical experimentation and open up a creative play-ground for a new aesthetic approach. (Weber-Lucks, 2003)*

The exploration and consideration of gender and identity has influenced the work in this portfolio enormously and has ultimately led to the development of the major outcome of the work in this PhD, the eMic, which is discussed in Chapter 7.
3 PEEP SHOW

3.1 BACKGROUND

Peep Show is the first work in this portfolio and began as an investigation into contemporary female vocal performance practice. At the time Peep Show was made, I had been performing for around ten years as a lead vocalist on the Sydney pub and club scene. While there are many advantages in being a female vocalist in the popular music genre, the practice is tainted by a range of negative issues. My personal experiences have included feeling objectified, being subjected to occasional verbal abuse both on and off stage, and feeling frustrated that I had very little control over the sound of my voice through the sound system, ordinarily the domain of the live sound technician.

These negative experiences led me to question my vocal performance practice and Peep Show is the result of this inquiry. The work is a response to an enormous list of questions about vocal performance and stage presence, both on a personal level and in a broader sense. The following list of questions was part of the soup of thoughts fuelling the work, and formed the basis for the initial research.

- What attracts women to singing on stage?
- To what extent do we present our ‘true selves’ onstage – or do we merely play a role?
- What are the primary shared experiences and emotions of female vocal performers and what do they tell us?
- What are the relationships between performers and audiences?
- What does the audience look at and what is the performance displaying?
- How does vocal performance differ to instrumental performance?
- What are the negative experiences of vocalists and what do these mean?
- What roles, if any, do the women play in inviting negative responses and what roles do societal norms play in inviting negative responses?

Peep Show combines my personal thoughts and experiences about voice with those of other vocalists. Through working and conversing with other female popular music vocalists, I became aware that many shared my experiences. The first step in
making the work, therefore, was to conduct a series of interviews with female
vocalists who worked in the popular music scene and record these interviews on
video. Not only did these interviews inform the work, they became a substantial part
of the source material for the work itself.

In an attempt to gain a clearer outlook on my practice, I explored various
perspectives of the voice: vocal training, physical and biological characteristics of
the voice, the personal, emotional aspects of using the voice and the way the voice
can depict or portray our personal characteristics to others. Frith (1996) offers an
insightful and comprehensive discussion of the voice in his book *Performing Rights*,
which is useful to draw upon for the discussion of this work.

### 3.2 FRITH'S CATEGORIES

Frith (1996) discusses the voice under the following categories:

1. Voice As Instrument
2. Voice As Person
3. Voice As Body
4. Voice As Character

#### 3.2.1 Voice as Instrument in Peep Show

As Frith states, “voice can be used like any other instrument, to make noise of the
right sort at the right time” (Frith, 1996). When I think about a musical instrument,
the idea of instrumental training comes to mind. Training is important for the
development of technical skill and proficiency. Vocalists, like other instrumentalists,
generally undergo considerable training and repetitive practice in order to develop
vocal co-ordination, control and dexterity. Voice is an unusual instrument, in that the
instrument is the body itself. With other instruments there is normally a relationship
between the body and something external. With voice, much of the instrument is
hidden within the body and this poses some challenges for the student and teacher.
We learn to use the voice from birth and much of our experience is not based on a
visual process but rather through embodied physical and emotional means. The voice
is intimately tied to our emotional state and well-being.
Vocal training involves many exercises, and often requires the student to produce a range of sounds that feels ridiculous. One exercise that comes to mind calls for the student to sing a scale while poking the tongue in and out. My singing teachers always placed heavy emphasis on diaphragmatic breathing. There was, at times, an almost machine-like, clinical treatment of the student’s body, where the emotive aspects of the voice were of far less importance in the production of the sound.

Much of the pedagogy at the time of my training stemmed from the classical music tradition in which diaphragmatic breathing is essential. My interests and experience were more in the popular music domain and hence finding appropriate training was difficult. As Wishart (1985) suggests,

... in the classical tradition, the singer strives toward the perfection of a particular kind of voice, which is a social convention felt to be transferable from one work or one expressive context to another (liturgical, concert etc.), whereas the popular music tradition embraces the idiosyncratic features of the individual singer’s voice.

For me, therefore, the experience of vocal training was often at odds with my interest in popular music performance. As will be seen, there is an emphasis on breathing in Peep Show, which stems from this emphasis on breathing in vocal training.

3.2.1.1 The Microphone and Sound System – Extending the Instrument

One aspect of popular music not generally covered in training is the use of microphones and amplification systems. For the popular music vocalist, the microphone and amplification system (PA) can be thought of as an extension of the voice and hence, as part of the instrument. The microphone and PA not only provide the vocalist with the ability to amplify their voice, they can also be used to shape and influence the sound in various ways. The sound system can, for example, alter the spectral balance of the voice, or an effects processor might be used to add reverb, delay, distortion or other signal processing.

Van Leeuwen describes how the technology of amplification, recording and artificial reverberation impacts on the semiotic systems of perspective and social
distance by uncoupling the usual relationships between the quality and amplitude of a voice. “The close miking of voices and instruments … can further enhance closeness, while adding reverb can enhance a sense of space and distance” (Van Leeuwen, 1999). Amplification can be used “to make the audience perceive each song as an intimate, individual communication” (Frith, 1996). Microphone technique is therefore an important aspect of popular music vocal performance and it requires practice and experience to use a microphone and sound system effectively. Microphone and amplification systems can be used creatively and have a major impact on the music itself.

3.2.2 Voice as Body in Peep Show

If we contemplate the voice as an acoustic instrument for the moment, without any extension via amplification or recording technology, we may appreciate its uniqueness as an instrument, in that the sounding apparatus is wholly contained within the body. As Frith (1996) writes, “the voice is the body’, and unlike conventional musical instruments where there is a relationship between the body and something else, the voice does not depend on, or need anything outside the body, in order for sound to be produced and manipulated.

The voice “draws our attention to something happening to the body itself” (Frith, 1996). In the context of popular music, the body is often sexual and seen more as an object of desire than a musical instrument. I was looking for ways to subvert this dynamic and wondered what would happen if the audience were able to view the vocal cords in action during a performance.

After attending Jo Estill’s (Estill, 2005) workshops on vocal belting, I became aware of the potential to capture such images of the vocal cords in action via an endoscopic probe, because Estill used these images in her classes (see Figure 3 and Figure 4). After carrying out some initial research into vocal endoscopy procedures, I made contact with the National Voice Centre who, through their affiliation with medical practitioners, made it possible for me to undergo an endoscopy session to capture images of my own vocal cords. (A detailed discussion of this occurs in section 3.1.1.3.) Such access to medical technology provided me with the
opportunity to explore endoscopic images in a creative context, raising questions about how one might work with images of vocal cords in a compositional context.

3.2.3 Voice as Person/Voice as Character in Peep Show

In the discipline of performance, a distinction is often made between the performer as a person, the authentic self, and the role they play as a performer. While defining selfhood is problematic, “the distinction between ‘self’ and ‘role’ inevitably suggests that the latter is less authentic, more artificial” (Carlson, 2002). Further, while voice is an important means by which we recognise a person, it is also a means by which we can change our identity. As noted by Frith (1996), “the voice is usually taken to be the person (to imitate their voice is a way of becoming that person – hence the art of the impressionist)”, while on the other hand ‘voices are also changeable and voice is one of the ways we can change our identity, we can “pretend to be something we are not, deceive people, lie” (Frith, 1996).

So who are we really when we are performing on stage? According to Wishart, it is usually assumed that, at some level, the singer is not acting – that the conventionalisation stops – and that the singer is presenting his or her personal utterance (Wishart, 1985). Frith deems that the pop singer negotiates three different forms of self:

1. Communicator of the song’s narrative;
2. Pop star with associated culturally-defined behaviours;
3. Intimate self in the public forum.

The degree to which each of these three forms of self is adopted varies from performer to performer and, in my experience, from performance to performance, depending on the audience and the performing context. Some performers are more likely to reveal themselves on stage, while others are more comfortable playing the role of a pop star or otherwise. Furthermore, a performer may shift between these three forms of self during any given performance (Frith, 1996).

Whiteley suggests that the 1990s saw an emergence of popular women artists who spoke for, or represented themselves (Whiteley, 2000), as opposed to playing a role. She cites Tori Amos and Alannis Morissette, amongst others, as examples, with
the former being well known for singing about her personal experiences of rape in *Little Earthquakes*.

*My analysis of the 1990s suggests that musically the period is discursively constructed by two distinguishing practices (each with its own assumptions, values and premises) and that these are contextualised by the cultural space or context from and through which (women) artists “speak” or represent themselves. (Whiteley, 2000)*

In *Peep Show*, I felt that interviewing a number of female vocal performers was one way of revealing something of the vocalists as real people, what drives them to perform and what they are like in real life when they are not on stage playing the role of a performer or pop star. I wanted to discover something of the individual – the thinking, feeling person that exists in the shadow of the pop singer conventions and stereotypes.

### 3.3 CREATING THE WORK

The process of creating *Peep Show* can be described as a series of stages. The first stage consisted of capturing the primary source materials; the next stage involved the processing and treatment of primary source materials; and the final stage involved the editing, layering and composition of materials to structure the final work. The video in *Peep Show* was constructed in Media 100\(^\text{10}\) and the sound component was constructed using Pro Tools\(^\text{11}\) software. The video editing and audio composition was undertaken sequentially. Once the video was finalised, a Quicktime movie was created and loaded into Pro Tools to act as a reference for the composition of the soundtrack.

#### 3.3.1 Primary Source Material – Audio and Video Recordings

The compositional materials for *Peep Show* were derived from two main sources:

1. Recorded interviews with female vocalists (video and sound).

---

\(^{10}\) Audiovisual software created by Media 100, http://www.media100.com

\(^{11}\) Audio software created by Digidesign, http://www.digidesign.com
2. Sound recordings of my voice and video of my vocal cords.

3.3.1.1 The Interviews

Six female pop music vocalists were interviewed (recorded on video) in an informal setting and were asked a set of questions (see Appendix 1), designed to uncover shared and common experiences. The edited interview audio became the foundation upon which the rest of the work was built. From a couple of hours of footage only sixteen segments of text were extracted and used in the final work. These segments can be found in order of appearance on the first 16 tracks of Peep Show Disc 14 (see Appendix II for the CD track listing). Apart from some de-noising, gain adjustments and subtle equalisation, the chosen segments were left unprocessed, allowing the individuality and natural tones of the women’s voices to emerge. The variety and nuances of the different voices helps the piece to maintain momentum and acoustic interest.

While there were some preconceived notions about the kinds of materials I wanted to use in the final piece, I felt it important to allow the interview responses to play a role in shaping the final outcome. It would have been possible to give the subjects scripted lines to read out (turning the interview into a scripted performance), but this would have prevented the subjects from influencing the work, adding a layer of artificiality to their recorded presence. Spontaneous responses, by nature, are generally more convincing and believable. This decision ultimately imbued the work with a powerful sense of integrity and realism.

In seeking genuine responses from real subjects, the piece draws on documentary form, in that the narrative is constructed through careful editing of the source material. This gives the composer the power to emphasise particular ideas. For example, the women were asked to describe the kinds of unpleasant comments that are made by audience members. The negative responses were subsequently narrated and used as a repetitive compositional device in order to emphasise how common these experiences are.

“every, single night” – Sharon Bowman

“we get so used to it as women” – Mary Wyer
“you know what they are going to say nine times out of ten” – Sharon Bowman

and

“show us your tits” – Sharon Bowman

“show us your tits” – Jenny Martin

“show us your whatever” – Sharon Bowman

The idea of violation is emphasised by the placement of text in relation to particular images, for example, images of the endoscope entering the nasal passage precede the following text fragments:

“that wasn’t a real good feeling” - Nicole Atkins

and

“something that makes you feel uncomfortable’ - Katrina Parnell

The main challenge in these interviews was ensuring the subjects felt comfortable and relaxed enough to speak honestly about their experiences and to reveal their true feelings. The fact that they were interviewed by another (somewhat sympathetic) female vocalist helped to make them feel comfortable. Another strategy to make the women feel relaxed was to avoid revealing their identity by only videoing their mouths.

In the end, one can never know how sincere the interview subjects really are, but what is most important in the creation of Peep Show is the perception of, and our belief in, that sincerity. In the words of Frith (1996) “believability and its complex relations with both realism and fantasy, is one of the aesthetic/functional axes around which all cultural judgments work.”

3.3.1.2 Objectification, Identity, Lips and Orifices

The feeling of objectification was one of the most common negative experiences described by the vocalists in their interviews. Objectification occurs when a human being is represented as a physical object, devoid of feelings, emotions, personal qualities or individuality. The media is saturated with images of women’s bodies and
body parts, promoting this view of woman as object (Archer, 1983, Kilbourne, 1994). Moreover, sexual images of female body parts are extremely prevalent in popular music.

Objectification can be achieved through selective camera framing and camera angles. By not showing the full face and only framing part of the body in Peep Show, I was able to draw (ironically) upon the technique of objectification. For example, in only videoing the mouths of the subjects, I was exploiting the image of the lips as a sexualised body part.

A juxtaposition was created whereby the women were at once anonymous, objectified, sexualized body parts and very much real people discussing their personal feelings in unique, individual voices. This poses a question concerning how we think about the vocal performer. Is she an individual or merely a desirable object?

Figure 2 Interview subject's lips

3.3.1.3 Seductive Smiles, Inviting Kisses and Bright Red Lipstick

I was interested in exploring the role women play in their own objectification. Complaints of objectification from women pop singers are sometimes treated with skepticism by those who believe women are, in some cases, complicit in the process. I wanted to explore this powerful ambiguity so I asked the interview subjects to wear bright red lipstick (thereby emphasising and sexualising the lips) and asked them to blow kisses at the camera. I slowed down one of the woman’s smiles to give it a more confident, seductive quality. The tension between these clichéd images and the gritty realism of their interview responses conveys this irony in a powerful way.
The women were asked to describe how they dressed on stage, and in some cases, to describe the sexiest thing they had ever worn. The majority of vocalists seemed to feel pressure to look a certain way and to conform to the stereotype of the sexy woman pop singer. The clothing they described as having worn was generally in this vein and some of them said that they definitely felt a pressure to wear less clothing on stage.

There is considerable debate in the literature over women’s role in their own objectification. As a well-known pop diva, Madonna is often debated in this regard, some labelling her a feminist icon and others an opportunist (Whiteley, 2000). On the one hand Madonna may be criticised for confirming masculine definitions of femininity by sexualising her bodily attributes, on display simply for male gratification. On the other hand, as Whiteley (2000) argues, Madonna is ingeniously confrontational in her later videos suggesting that she is fully aware of gender politics and is thus consciously manipulative.

Women are seen to be playing a dangerous game by using their sexuality to lure in their audiences. Luc Irigaray argues that “in mimicking patriarchal definitions of femininity, women may be drawn back in, that they may, in fact, be regarded as inviting a sexual response” (Whiteley, 2000).

The interviews conducted for Peep Show revealed that the majority of women were very aware of their ability to use their sexuality as an asset in their performance practice. The interview subjects conveyed the notion that women want to feel sexy, be adored and loved, and the popular music mode of performance is attractive for its ability to act as a vehicle for this. This approach to performance does, from time to time, invite negative responses of a sexual nature and the interview subjects varied in their reaction to this. Some felt quite disturbed by it and others saw it as part of the job. It may be that performers who feel they are playing a part or role rather than being themselves, may be less affected by negative responses because they feel more distanced from the situation.

3.3.1.4 The Endoscopy Sessions

The human voice is the product of the action and co-ordination of numerous muscles and parts of the body, including the vocal cords, the lungs, the various resonating
cavities of the body, along with important feedback loops between the brain and auditory mechanism. The vocal cords are the primary acoustic exciter of the vocal instrument and are housed within the throat cavity of the body. It is possible to view the vocal cords in action by inserting a small probe containing a miniature fibre-optic camera into the nasal cavity and down through the back of the throat. The images can then be viewed in real-time, and can be recorded on video, enabling the vocalist to see what happens to the vocal cords as they make different sounds.

Figure 3: Endoscope being inserted into the nasal cavity

Figure 4: Endoscopic image of the larynx

I underwent two sessions with an Otorhinolaryngologist (ear, nose and throat surgeon), Dr Jonathan Livesey, to obtain images of my own vocal cords. During those sessions, images of my vocal cords (making a range of different sounds including sobbing, crying, laughing, singing and speaking) were recorded to SVHS videotape while the sound was simultaneously recorded on a DAT recorder. The
recorded audio was later synced to the video, using the lower quality sound track on
the SVHS video as a guide. I was assisted during the first session by vocal coach,
Helen Tiller, who advised me on the kinds of sounds to make in order to obtain the
widest variety of images.

In addition to the internal recording, the endoscopy process itself was
documented on video via external mid and wide-shots. I used this footage to extract
images of the endoscope entering the nasal passage from outside the body. In doing
so, I wanted to exploit the invasive nature of the endoscopy process and made use of
these shots during a section of the piece featuring audio grabs about violation.

3.3.1.5 The Studio Recordings

The sound recordings captured during the endoscopy sessions were made under less
than ideal acoustic circumstances, in that the endoscopy machines were quite noisy
and the room was not isolated from outside noise. I decided, therefore, to undertake
another recording session in a recording studio in order to generate a library of high
fidelity recordings of my own voice and hence to expand the choice of (non-sync)
source materials I could draw upon to create Peep Show. The acoustically isolated
studio environment enabled me to obtain very soft, intimate, close-miked sounds that
were difficult to capture in isolation elsewhere.

During the studio recording session, I recorded various scales and soft sounds
such as vocal constriction and sounds that required minimal vibrations of the vocals
cords. I also recorded a range of vocal training exercises, including breathing, warm-
up and relaxation exercises, as I wanted some of my experiences of vocal training to
filter into the work. Of the materials recorded, the breathing exercises became a
significant part of the final work. The extensive use of breathing was a deliberate
commentary on the preoccupation that my singing teachers had with breathing
technique in vocal training pedagogy. The studio recordings are decontextualised,
edited and synced to the movements of the vocal cords with the intention of
presenting them in an ambiguous, erotic way.
3.3.1.6 Secondary Source Material – Audio Processing Techniques

Some of the primary source materials obtained for *Peep Show* were used unprocessed, or with very minor processing applied, and other materials were subjected to a range of electronic processing techniques, resulting in more severe augmentation. The techniques employed included:

*Pitch shifting* – Pitch shifting was used to both increase and decrease the pitch of the materials. I had access to pitch shifting algorithms in Pro Tools, SoundHack\(^{12}\) and Sound Effects\(^{13}\) and the choice of algorithm depended on the desired outcome. The pitch shifting in Pro Tools, for example, provided quite a crude, unnatural and electronic sounding result, whereas SoundHack provided a much smoother, more natural sounding pitch shift.

*Time compression and expansion* – Both compression and expansion were used to generate and develop sound materials. I had access to algorithms in Pro Tools, SoundHack and SoundEffects. As with the pitch shift processing, the time compression algorithms in Pro Tools also yielded relatively crude results and were used when audible electronic artifacts were desired, whereas SoundHack was used to achieve a smoother, more natural sounding effect.

*Granulation* – Granulation was used extensively in *Peep Show*. Granulation is a synthesis technique involving breaking a sound wave into particles and recombining those particles in various ways. The size of the grains and the overlap between the grains are parameters that affect the resulting sound. I had access to a granulator algorithm that was included in a set of freeware plug-ins for SoundEffects, called Mike’s Modules\(^{14}\).

\(^{12}\) Written by Tom Erbe http://www.soundhack.com

\(^{13}\) Written by Alberto Ricci, http://www.riccisoft.com/soundeffects

\(^{14}\) Written by New Zealander Michael Norris, http://www.riccisoft.com/soundeffects/, called *Granular Synthesis* and *Sample Hose*. 
Cross-synthesis (mutation and convolution) – Cross-synthesis algorithms from Tom Erbe’s SoundHack were used. Convolution takes two sounds, analyses their spectral content and multiplies the two spectra to create a new sound. This emphasises frequencies that are held in common, and reduces frequencies that are not. Mutation measures the spectral change over time in two sound files (called the source and target) and resynthesises a new sound file through various strategies of combination (Erbe, 2005).

Filter sweeps – The bandpass filters on the Kurzweil K2000 synthesiser were used to sweep through the frequency content of some of the sound sources. One can essentially play the filter sweeps on the K2000, thus providing a more intuitive musical result. This was more desirable than the alternative available in software at the time, which required a fixed setting and processing in non-realtime.

Spatialisation – The binaural processing algorithm in SoundHack was used to move sounds around and to help provide an immersive mix under headphone listening conditions. This spatialiser works with monoaural soundfiles. The filter applies a head-related transfer function (HRTF) to a monaural sound file in order to create the localisation cues necessary for the listener to localise a sound at a particular point in space. The HRTF processor essentially emulates the filtering action of the human head and outer ear for any position around the listener’s head. Since the original version of Peep Show was created for headphone listening in order to accentuate the sense of intimacy and immersion, this binaural processing algorithm was ideal in this context.

3.4 AUDIO EXAMPLES

3.4.1 Time Stretch Examples – Slowed Text

The following tracks are examples of text that were time stretched:
“Feeling” – track 24
“Show us Your Tits” – track 26
“Uncomfortable” – track 27
“Violated” – track 28
The audible digital artifacts in the processed text excerpts above are a clear indication to the listener that the recordings have been treated in a more complex fashion than simply slowing down the recording. The text remains intelligible, the intent being to draw upon the cultural associations of slowed speech.

In cultural terms, when we speak slowly it is generally to emphasise something or improve intelligibility in some way. We may use slowed speech in the following ways:

- If we are explaining something;
- if we are learning a language and are trying to practice the pronunciation; or
- if we are speaking to a child or someone with hearing difficulties.

Slow speech can also be a sign of a physical ailment or an indicator that the body is breaking down in some way. We speak slowly when we are being sarcastic, disrespectful or are mocking someone or something. A study by F-nagy and Magdics on intonational properties of emotional states (F-nagy, 1972), found that sarcasm is signified by portamento and by lengthening of the stressed syllables. Time-stretching text tends to produce this effect and hence can be interpreted as sarcasm given an appropriate context.

Time-stretching was applied to many other sounds throughout the work, of which Disc 14, track 25, is a notable example. The source sound was a recording of a person sobbing. In this example, the effect of time-stretching creates a more reverberant, unnatural acoustic. By creating distance and emptiness, the sense of sadness is intensified, implying a sense of loneliness. This can be heard at around 2’16” in the work.

3.4.2 Granulation Examples

The word violated, on track 29 on Disc number 14, is subjected to granulation processing and, as with the previous time stretching examples, the text remains comprehensible. Granulated or broken text is similar to slowed speech in its cultural associations, in that it can also indicate a sign of something physically wrong with the body. There is a deliberate play on the idea of violation in the treatment of this
sound source, in that the speech is literally violated by the granulation processing technique. The sound process mimics the idea of violation and hence draws on the metaphorical association of the word.

3.4.3 Filtering with the Kurzweil 2000

Filtering processes on the Kurzweil K2000\textsuperscript{15} (K2000) were applied to the text about violation, again drawing upon the metaphorical associations. These processed examples can be heard on tracks 80, 81 and 82:

- Track 80 – a filter sweep using the K2000 is applied to the track 14 text – “she felt quite violated” – and is then subjected to the SoundHack binaural spatialiser.
- Track 81 – a filter sweep using the K2000 is applied to the track 14 text – “she felt quite violated” – this time with a different sounding result. As in the previous example, it was subsequently processed using the SoundHack binaural spatialiser
- Track 82 – this is another treatment of the original sound file from the track 14 interview text. This time the word \textit{vile} emerges through the processing. The processing results in pitch shifting of the voice beyond what would normally be acoustically possible for a woman. The grains gradually speed up, creating a sense of urgency, while the movement between the left and right speakers creates spatial interest as it moves in and out of phase. The word \textit{violate} is essentially degraded through the processing and this is symbolic of the actual experience of violation and degradation. It also creates a sonic gesture that implies a dynamic interaction.

3.4.4 Convolving the Text

The violated text sample (track 14) was also subjected to convolution processing in SoundHack. The sound file on Disc 14, track number 76 resulted from convolving track 65 (stretched ‘violated’ sound) with track 63 (reversed slowed sigh), the latter

\textsuperscript{15}Kurzweil K2000, http://www.kurzweilmusicsystems.com/home.html
sound file being used as the moving impulse response. Track number 74 uses the same two sounds, but instead the slowed violated sample (track 65) is used as the moving impulse response.

3.4.5 Reversing Sound Sources

One of the simplest but most effective treatments of the source material in *Peep Show* is the use of the reverse processor. Examples can be heard on tracks 63 and 64. The original recording was a vocal sigh. In track 63, the recording was simply slowed down and then reversed. Track 64 is the same as 63 except it has been processed using SoundHack’s binaural spatialisation. The effect of reversing the file and its associated amplitude envelope meant that the sound built to a climax instead of dying away as in the original. This was very useful for moments in *Peep Show* where a climax or impact was required, such as at 2’56” where there is a build before cutting away to an interview comment by Mary Wyer that says “it doesn’t give anybody the right to violate her in that, in that way”.

3.4.6 Spatialising: Positioning and Movement of Sounds

The SoundHack binaural processing algorithm was used extensively throughout the work. Track 64 is one example where the use of spatialisation helps to create a sense of movement. At around 28 seconds into the work, video footage of the endoscope moving through the nasal passage is used, while the processed sound helps to create the impression of fast movement.

The use of spatialisation is apparent throughout the work and is frequently used to provide a contrast to still, centered sounds; for example, the footage described above with the moving image travelling through the nasal passage is followed by interview text. This sound occurs several times during the work and provides a contrast to the speech that is generally still and often centered in the mix.

Track 31, used at 26 seconds into the piece, is another example of the use of binaural spatialisation. Again the movement provides a contrast to the still, interjecting interview text. It draws attention to the text by providing contrast and
helps to dramatise and maximise the impact of what the interviewed women have to say.

Above all, spatialisation was intended to increase the sense of immersion in the work, especially under headphone listening conditions.

3.4.7 Frequency Content and Pitch Shifting

Since most of the sound material used to create Peep Show originated from female vocal recordings, the material tended to be concentrated in the frequency range of that source\textsuperscript{16}. It was desirable, therefore, to generate some variety in the pitch of the material available and so I proceeded to pitch shift numerous files. Examples can be heard on tracks 47, 45, 46, 47, 51, 62 and 75. Tracks 78 and 79 are examples of materials generated with the K2000 in order to obtain some material with lower frequency content.

3.4.8 Video Preparation and Processing

As with the audio, some of the images were used in an unprocessed form and others were subjected to varying levels of processing. The unprocessed images are used to convey a sense of reality while the processed images generally present a more dreamlike, unreal state. Processing is a way of abstracting the images from reality and thus increasing the sense of objectification of the already isolated body parts. The degradation of the quality of both the sound and images towards the end of the piece is intended to symbolise the less glamorous aspects of being a popular vocalist.

The source video for Peep Show was shot in SVHS, VHS and Hi-8 format and was edited on a Macintosh computer using the following software:

- Media 100\textsuperscript{17}
- Adobe Premiere\textsuperscript{18}
- Adobe Photoshop\textsuperscript{19}

\textsuperscript{16} The female voice fundamentals range from around 175-1175 Hz with harmonics around 2-12 kHz.
\textsuperscript{17} http://www.media100.com
\textsuperscript{18} http://www.adobe.com/products/premiere/main.html
\textsuperscript{19} http://www.adobe.com/products/photoshop/main.html
One of the technical challenges in creating the video was that the endoscopy images were circular and surrounded by a large area of black (see Figure 5). The black area contained text that the medical practitioner used to help identify and archive the footage. This text was unnecessary for my purposes, so it was removed and the endoscopy image enlarged to fill the whole screen. The problem with enlarging the endoscopy image was that it produced a significant loss of image quality. It was therefore decided to make the whole video work at half screen resolution in order to maintain the image quality of the source material.

![Figure 5: Raw footage from the endoscope](image)

### 3.4.8.1 Secondary Source Material: Video Processing Techniques

Some of the images were treated in similar ways to the audio, for example, cross-fading, reversing, time compression and expansion. Other processing techniques included wall-paper effects, chroma and luma keying\(^{20}\) as well as various colour saturating and de-saturating effects. Both cross-fading and abrupt cuts were used to move between images.

---

\(^{20}\) Keying involves combining two images. A portion of the front image is removed according to the keying signal which can be either a luma key (black and white values) or a chroma key (colour values), thus allowing the background image to be revealed.
3.4.8.2 Video-Processing Examples

- Example 1: Occurs at 28” – 34”
  This section was a reversal and time expansion of the footage of the endoscope exiting the nasal passage.

- Example 2: Occurs at 3’05” – 3’25”
  The footage from the endoscope travelling through the nasal passage was time expanded in order to make the section more dramatic.

- Example 3: Occurs at 1’16” – 1’50”
  The endoscopic images were coloured red. Red is a strong colour that symbolises many things including anger, lust, seduction and blood. It was also used to provide contrast to the colourless images.

- Example 4: Occurs at 2’14
  Only the lips are coloured; the rest of the image is black and white and therefore draws attention to the red lips.

- Example 5: Occurs at 4’11” – 4’18”
  The video of Katrina Parnell blowing a kiss then smiling was slowed down turning the original quick kiss and embarrassed smile into a more seductive, confident smile.

3.5 CONTEXT

*Peep Show* demonstrates how the contextual aspects of a work can influence audience interpretation and perception. In creating *Peep Show*, sounds and images that were not innately sexual were placed into a context where they could be interpreted as such. For female singers, the established constructions of many popular music environments also mean that the performers are often placed in a context where they are viewed sexually. The breathing sounds, for example, were merely recordings of vocal relaxation training exercises, and the images were simply vocal cords; but when the two coincide, they become ambiguous.
Peep Show highlights the importance of context in the interpretation of creative work. This includes:

- the framework in which the actual piece is performed or presented;
- the placement of a sound in relation to other sounds within a composition (sound combinations – what accompanies, precedes and/or follows a sound can alter the listener’s perception); and
- the placement of a sound in an acoustic sound field, i.e., does it sound close and therefore intimate, or reverberant and distant.

3.5.1 Framework: Title and Presentation

The suggestive title and the way in which Peep Show is presented are important factors in the construction of the work because they set up a context imbued with audience expectations. The title is intended to arouse curiosity and draw the attention of the viewer to his or her own gaze. To peep at something is to steal a look, or to view something that perhaps shouldn’t be seen. It is often compelling to look at something that is deemed forbidden, whether through sheer curiosity or voyeuristic pleasure. Sexualised images are very prominent in our culture. In advertising, for example, they are frequently and unashamedly used to grab attention in order to promote or deliver a message. This intensity of exposure means that stylised images of bodies and body parts become the norm; the repetitive use of the lips in Peep Show was intended to reflect this idea, as was the ambiguous play on the endoscopic images of the vocal cords.

The ambiguous images of the lips and vocal tract are interrupted periodically throughout the work by abrupt cuts to the interview segments, intended to continually remind the audience of their own gaze, raising questions over our complicity in objectification as viewers.

3.5.2 Sound Choices and Placement

The contextual relationships between the sounds are important. What accompanies, precedes and or follows a sound can alter the listener’s perception. In an audiovisual work, the simultaneous perceptions of image and sound influence one another.
According to Chion (1990), sound can influence the perception of movement and speed of film images. A notable example can be seen in Peep Show at around 28” (Discs 1,2 and 3) into the work where we see the image of the endoscope travelling through the nasal cavity towards the throat. The accompanying sound provides an enhanced sense of movement and urgency. Chion believes that it is not necessarily the speed of the sound that is responsible for this. He says “a rapid piece of music will not necessarily accelerate the perception of image’ but rather ‘temporalisation depends more on the regularity of the aural flow than on tempo in the musical sense of the word” (Chion, 1990).

In applying Chion’s theory to the above example, it may be the irregularity of the sound accompanying the endoscope image moving through the nasal cavity that is contributing to the enhanced sense of movement. In contrast, the sound accompanying the later image through the nasal cavity, at around 3’10”, is more regular and stable in quality and thus the movement is perceived to be much slower.

The context in which the text is presented in Peep Show helps to shape how we listen and helps determine the meaning we draw from what is being said. At times, the text is presented unaccompanied and at other times combined with or immersed in other electronic sound. Given human evolutionary wiring, it is natural where the human voice is concerned to listen for meaning. This is what Chion calls semantic listening, and thus the presence of spoken text dominates the work. According to Cone (1974),

... when, as in a song, a musical line is combined with a text, it is natural for us to accept the music as referring to a subconscious level underlying – and lying under whatever thoughts and emotions are expressed by the words.

The sounds accompanying the text in Peep Show, therefore, play an important role in the interpretation of what is being said – they can reinforce the meaning, perhaps through mimetic behaviour, and equally, they can suggest irony or sarcasm, or they can undermine the meaning of the text in some way.

Examples: Section from 2’33” to 2’46” contains the following text grabs from the women vocalists:

“That wasn’t a real good feeling” – 2 minutes 34 seconds
“And she felt quite violated” – 2 minutes 36 seconds
“Something that makes you feel uncomfortable” – 2 minutes 42 seconds

These comments are accompanied by fragmented and pitch shifted text, for example, “vile, vile, vile”, and are mixed with reverberant filter sweeps. The sounds are intended to reflect the meaning of the text. A sense of coldness is achieved through the reverberant quality of the filter sweeps. The sounds sweep from a low groaning quality into higher more piercing frequencies and the lack of mid-range frequencies contributes to the lack of warmth in the soundscape.

3.6 SCREENINGS/ PRESENTATIONS

Peep Show has been presented in a number of different contexts. It was originally composed for an Exhibition at the Llewers Gallery in Penrith, NSW, Australia. The exhibition was called Fuse (The Red Exhibition) and was curated by Nadia DeCeglie. Following Fuse, the piece was adapted and mixed using four-channel sound format for concert presentation and then later for CD-Rom (see Discs 2 and 3).

At the time of writing Peep Show had been screened at the following events:

- Fuse (The Red Exhibition), Llewers Gallery, Penrith, NSW, Australia. Binaural installation version
  http://www.penrithregionalgallery.org/archives/fuse.htm
- Sonic Circus, 1999, University of Western Sydney, NSW, Australia – Quadraphonic- version.
- Waveform ACMC 2001 Conference, University of Western Sydney, NSW, Australia – Installation version.
- Most Significant Bytes Concert Series, Ohio, USA. Screening of work and presentation on website.
- The 1999 National Student Film and Video Festival, Chauvel Cinema, Paddington, Sydney, NSW, Australia, 20 October 1999.
- Sonic Residues 02 – November 2000, Australian Centre for Contemporary Art, Melbourne, VIC, Australia – 5.1 DVD version.
• SECS (Sydney Eclectic Composers Society) Concert, 2004, Sydney Conservatorium of Music, NSW, Australia.

3.6.1 Installation Version

*Peep Show* was initially designed for private, one-on-one viewing and was set up in a secluded corridor in the *Llewers* Gallery. The audience could view the looping video by peering through a slot in a red door, thus setting the viewer up as a voyeur (see Figure 6). To increase the sense of intimacy and to avoid intrusions from other sounds in the gallery, the piece was designed for headphone listening and a binaural mix was specifically created to increase the sense of immersion in the work. Figure 7 shows a diagram of the equipment set up for the first installation version of the work.

Figure 6 *Peep Show* Installation setup, Llewers Gallery

![Figure 6](image)

Figure 7 *Peep Show* equipment set-up, Llewers Gallery

![Figure 7](image)
3.6.2 Four-Channel Concert Version and DVD

*Peep Show* was remixed for concert presentation using a four-channel speaker format. The four-channel version was mixed on the Yamaha O2R console.

![Diagram of four-channel concert version equipment set-up](image)

*Figure 8 Peep Show four-channel concert version equipment set-up*

3.7 **SUMMARY - PEEP SHOW**

*Peep Show* is a foundational work in this portfolio. By examining and questioning my experiences as a popular music vocal performer, as well as the experiences of other women, I have gained a more informed perspective on an aspect of my artistic practice at the time of making *Peep Show*. I have identified the influence of well-established social constructions in the popular music arena and have seen how women in performance contexts often behave according to these deeply embedded social expectations. I have explored the human voice, physically, emotionally, visually, aurally and as a sound source for generating all the compositional materials for the work.
Compositionally, the relationships between image and sound, and music and text have been examined. A range of techniques has been explored, including the application of documentary processes to an audio/visual work. The work has been produced and adapted for a range of different presentation contexts. In addition, *Peep Show* facilitated the exploration of semantic listening (Chion, 1990) and the development of a sophisticated application of metaphor, intentionally amplifying ambiguities to make the viewer conscious of their role as complicit in the objectification of women vocalists in the popular music arena.

*Peep Show* thus paves the way for the development of more empowering and satisfying modes of expression using electroacoustic composition techniques and voice and, importantly, is a work in which I am active as a composer, performer and technician.
4 THE MILL ON THE FLOSS THEATRE PRODUCTION

4.1 INTRODUCTION

Following the production of Peep Show, I accepted a commission to compose music for The Mill on the Floss, a theatrical adaptation of George Eliot’s (Eliot, 1903) novel of the same name, by Helen Edmundson (Edmundson, 1994). The Australian production, directed by John O’Hare, premiered on 4 August, 1999, at the Wharf Theatre 2 in Sydney, Australia, and was produced by Babylon Productions by arrangement with the Sydney Theatre Company. Composing for The Mill on the Floss differed from making Peep Show in that, as the composer, I was not responsible for every aspect of the final outcome of the work. In theatre work the composer plays a supportive role to the action and plot of the play, where the musical cues form part of a larger piece rather than being complete entities within themselves. Being part of a team was a stimulating experience. I immersed myself in the project by attending many of the rehearsals, was involved in numerous discussions with the director and cast and even took part in the physical training and movement exercises during the first week. The timeframe of three weeks for composing the music for this production was short compared to the time that would normally be spent on a studio-based composition.

4.2 THEMATIC CONTEXT

The Mill on the Floss explores the internal emotional struggle of a woman who does not conform to expectations of Victorian society. It highlights these societal pressures to conform and to reject any sense of individuality and difference.

The author of the novel, Mary–Ann Evans (1819–1880), is notable for publishing under the psuedonym George Eliot. Her decision to use a male alias arose from the difficulty faced by women in being accepted as serious authors in Victorian England (Edmundson, 1994). Her liaison with Henry Lewes, a married man, was unconventional for the time and is also believed to be a factor in her decision to disguise her identity. The novel is reportedly semi-autobiographical with some striking similarities between the life of the author and the novel’s main character, Maggie Tulliver (Edmundson, 1994).
The exploration of self, identity and prevailing social attitudes are major themes in this story and were primary factors in my decision to work on this project. Given my own quest to identify and articulate my creative voice, the stories of other women are attractive for their ability to provide insight and perspective for my own experiences.

In order to provide a context for the compositional strategy, it is first necessary to provide a summary of the storyline and key themes of the play.

4.2.1 Plot Summary

*The Mill on the Floss* is the story of a nineteenth-century heroine, Maggie Tulliver. Maggie is a literary girl with an intelligence and emotional capacity beyond that of her family and the narrow-minded, patriarchal society in which she lives. As she struggles to conform, Maggie finds refuge in her friendship with the kind, artistic and deformed son of her fathers’ enemy, Philip Wakem. Maggie is forced to end this unsuitable relationship, however, as a result of the long-running dispute between their families. She leaves the family’s flour mill and goes to stay with her cousin Lucy in St Oggs. Unfortunately, Lucy’s betrothed, Stephen, falls for Maggie and although she is attracted to Stephen, Maggie’s conscience and loyalty to Lucy prevent her from accepting Stephen’s advances. In a moment of weakness, however, she takes a boating trip with him and subsequently compromises her reputation. She rejects Stephen’s ensuing offer of marriage and what may have been a chance for real happiness and fulfillment. Her refusal to conform to societal expectations leaves her with few supporters and she ultimately drowns in a terrible flood while attempting to save her brother Tom.

The following themes underpin the compositional approach to the music.

4.2.2 The Witch Ducking Theme

One of the strongest images in the play is the witch ducking in the opening scene (Figure 9). Witch ducking was a medieval practice used to determine if a woman was a witch. Women would be dunked in a river or body of water, where mortals would sink or drown but a witch would survive. Being cleared of witchcraft far outweighed the issue of losing one’s life.
This imagery recurs and underpins the play and is used to symbolise Maggie’s experiences and ultimate death by drowning. The playwright draws parallels between the hopelessness of Maggie’s situation and the fate of the women who were subjected to witch ducking.

4.2.3 The Gypsy Theme

The author uses the idea of the gypsy, a contemporary witch, in order to link the medieval witch ducking theme with the Victorian setting of the play. Maggie is likened to a gypsy on numerous occasions throughout the play by several of the other characters. Gypsies have a dubious reputation and their practice of fortune telling links them with mysticism and witchcraft. There are constant taunts about Maggie’s resemblance to a gypsy, including references to her brown skin, her dark eyes and her undesirable behaviour.

Mr Glegg: “It must be a little gypsy from the common.”
Mrs Pullet: “She’s certainly like a gypsy now. I doubt it’ll stand in her way i’ life to be so brown.”
Phillip Wakem: “You have dark eyes.” (Edmundson, 1994)

---

21 Photograph by Robert McFarlane.
The author uses the constant gypsy references to indicate the possibility of a mystic element influencing Maggie’s ill fate.

4.3 THE STAGE ADAPTATION

The central concept of Edmundson’s stage adaptation has Maggie depicted by three different actors. Each actor portrays Maggie at a different age and period in her life. The transitions between the three Maggies occur after significant life-changing events that prompt her to adapt her behaviour in some way in order to gain social acceptance.

The youngest Maggie is the most spirited and carefree. She is brash and a little wild, inviting shock and scorn from her immediate family and older relatives. The second Maggie is sadly reined in to a more obedient and moral way of life. She turns to religion and attempts in vain to resist her unruly thoughts and desires, but the temptation for her young, spirited self to return still overcomes her at times. By the end of the play we see the third Maggie, a more mature, refined woman attempting to follow her heart.

At times throughout the play, multiple Maggies appear on stage simultaneously. The playwright uses the interactions of the different Maggies to reveal Maggie’s internal dialogue and thoughts. We effectively observe the voice(s) in Maggie’s head, we witness her talking to herself and we see how her environment influences the voice(s) in her head.

Figure 10: The three Maggies (from left) Susan Prior, Marta Dusseldorp and Kirsty Hutton22

Often, there is conflict between the characters as the older Maggie fights the younger Maggie (or the two other Maggies in some instances), revealing her burdened

22 Photograph by Robert McFarlane.
conscience to the audience. Maggie constantly struggles to conform to societal expectations despite her true desire to behave otherwise.

In summary, the use of multiple Maggies enables Edmundson to highlight the following:

- The influence of environment on behaviour and identity.
- The fluid, changing, performative nature of identity.
- The existence and impact of the ‘inner voice’ and conscience.

The goal in composing for this production was to support and extend these main ideas through the aural soundscape.

4.4 COMPOSITIONAL APPROACH

In keeping with my existing compositional approach, I was keen, where possible and appropriate, to use microphone-captured audio to generate the compositional sound sources. Voice was once again a sound source of interest and given voice is traditionally the central instrument in the theatre, it provided a fertile playground for this project. The director was supportive of my use of the actors’ voices in generating compositional materials, and one of the initial goals was to create musical materials that drew upon the emotive qualities of the voice, thereby exploring the connections between voice and music. It was thought that using the actors’ voices would help to unify the work and create connections between the live voices on stage and the amplified compositions.

4.4.1 Collecting Sound Sources

A studio session was conducted to obtain recordings of Kirstie Hutton’s\(^{23}\) and Nathan Spencer’s\(^{24}\) voices. Both actors performed a range of different vocal sounds, songs and texts. The text was taken from the script, the songs were predominantly gypsy folk songs and the vocal sounds included screaming, crying, sobbing and gasping.

The director was eager to incorporate live music elements on stage and to use the musical abilities of the actors where possible. Nathan Spencer could play guitar, and since

---

\(^{23}\) Kirstie Hutton played the role of the youngest Maggie.

\(^{24}\) Nathan Spencer played the role of Philip Wakem and the auctioneer.
his character Philip Wakem purportedly possessed artistic talent, it seemed appropriate that he perform a number of folk songs live on stage. Several of these songs were recorded in the studio and elements of these recordings were woven into the music cues in the form of fragmented elements and digitally processed motifs, thus helping to unify the play.

Other recorded sounds included water, bells, power tools, and piano accordion. Water was a particularly important sound source given the setting for the play was on the river Floss and the witch ducking and drowning imagery recurred throughout the story.

The recorded material formed a substantial library of sound sources, which were drawn upon to create the music cues. Some of the materials were used unprocessed and others were subjected to various digital signal processing.

The cues were constructed using Protools and were then mixed on the Yamaha O2R in four-channel surround. Multi-channel presentation of the audio was used as a way of engaging and wrapping the audience in the acoustic environment of the play. The 5.1 format could not be used because the centre speaker interfered with lighting and set design and a four-channel Protools system was the only multi-channel playback resource available.

4.5 COMPOSITIONAL RATIONALE

As Maggie’s personal, internal struggle was a central theme of the play, the use of multiple Maggies was a clever device for revealing the main character’s internal thoughts or ‘inner voice’.

The extensive use of Maggie’s inner voice and the emphasis on the role of Maggie’s conscience in her own demise became important considerations in the development of the musical cues. The intention was to represent the inner voice and convey its omnipresence and persistence throughout the play.
4.5.1 Inner Voice and Identity

The inner voice is the voice we use to talk to ourselves. Monitoring self-talk is an integral strategy of cognitive behavioural therapy. Motivational coaches and psychologists often use it to help their clients achieve success in their chosen endeavour. But these inner voices can also be destructive as is seen in Maggie’s case.

The first consideration was how Maggie’s inner voice might sound. As Jonathan Ree suggests, “it may be difficult to know one’s own voice amidst the babble of the different voices in which we talk to ourselves” (Frith, 1996), and in the case of Edmundson’s multiple Maggies, one questions which of the conflicting inner voices should be used to represent the real Maggie, or if there should be multiple representative voices.

A person’s voice is strongly linked to their identity due to the uniqueness and individuality of the sound of their voice. As Frith explains, “voice is an important way we recognise people we know and assess people we don’t know” (Frith, 1996pg 197). We use it to help determine a person’s gender, their place of birth, state of health, or even their level of education. Frith also identifies voice as a means by which we can change identities through “taking on someone else’s voice” (Frith, 1996pg 197).

4.5.2 Identity Theory

In conceiving of the sound of the inner voice, therefore, it was useful to draw upon the numerous theories that exist in relation to identity. While an extensive investigation of identity theory is not possible here, the following summary explains the main identity theories used by the composer to contextualise the way internal voice is conceived in the music cues. Hall identifies three conceptions of the self which are summarised as follows:

1) The enlightenment subject, comprising the highly individualist Cartesian subject, with some kind of essential, stable centre or core.

___________________________________________________________
2) The sociological subject, a concept known as symbolic interaction, examining how the self was shaped and developed by significant others or reference groups and so on.

3) The post-modern subject or the de-centered subject, in which there is no stable core identity; some would not consider the post-modern subject as having a self but, rather, a multiplicity of selves (Hall, 1992b cited by Underwood, Underwood, 2003)

It could be argued that *The Mill on the Floss* demonstrates the existence of some sort of essential stable centre or core with regard to Maggie’s identity. While the character is seen to change externally (her behaviour), her internal thoughts, desires and ideas remain quite consistent and I like to think of this as being more authentic and representative of Maggie’s true self. As Maggie matures, we see her attempting to reject her inner voice and to a greater extent playing the role that society expects of her. So once again this distinction between self and role arises as a theme in this thesis.

The role Maggie plays and is expected to play by her society, is defined by her gender as a woman. It is here that the views of Butler are interesting and relevant to the themes in *The Mill on the Floss*. Butler believes that there is no distinction between authentic self and performance, but rather, authentic selfhood is made up of repeated performances. Butler says gender is “performative”, defining performativity not as a singular act, “but a repetition and a ritual, which achieves its effect through its naturalisation in the context of the body, understood, in part, as a culturally sustained temporal duration” (Butler, 1999).

I decided to use identity theory as a framework for the compositional structure. Having not read Butler's writing at the time of making the work, I was drawn to the notion of a stable core or centre comprising one’s identity and thought that I could use voice as a metaphor for this idea. I, therefore, used one of the actor’s voices as a sound source to generate many of the cues, in order to represent the idea of a consistent core or underlying thread. The voice was subjected to external digital processing which disguised the sound source to varying degrees and was representative of the way Maggie’s true identity was altered by the external pressures placed on her by her society.
Of the three Maggies, I considered the youngest to be the most truthful owing to her rebellion against her societal expectations and for this reason, I felt the voice of the actor (Kirsty Hutton) playing the youngest Maggie would be suitable to use as a representative voice. Hutton’s voice was used to generate many of the cues throughout the play, and therefore acts as an underlying, unifying thread.

4.5.3 Removing Sound from its Causal Context: The Voice from the Actor

Electro-acoustic techniques, in particular the ability to remove a sound from its causal context, facilitated the creation of the inner voice, a voice distinguishable in the production from the live performed voice.

Removing a voice from its source or causal context, in this case, the voice from the stage actor, allows the composer to create a unique acoustic space in which to represent that voice. The composer can manipulate the perspective of the voice and the relationship the voice has to other sounds and to the listener.

“There are natural relationships that exist between a sound’s quality and its dynamic level” (Van Leeuwen, 1999). Van Leeuwen refers to this as social distance and explains that the relationship between a sound’s quality and dynamic level can be uncoupled through the use of recording technology.

*When a person is close (literally and figuratively speaking), we speak more softly than when we have a more formal relationship with them in the context of a more formal occasion. As distance grows, the voice not only becomes louder, but also higher and sharper (Van Leeuwen, 1999).*

Audio recording breaks the causal context, allowing the manipulation of semiotic principles, and thus can be used to provide additional information for an audience. Close miking can achieve a greater sense of intimacy or closeness than the actor on stage might achieve, given the need for performers to project their voices in order to be heard. Distance, on the other hand, might be created through distance miking, equalisation, or the addition of reverberation.

An example of Van Leeuwen’s principles (also discussed in the *Peep Show* chapter) can be observed in the opening witch-ducking cue.
4.5.3.1 Witch Ducking Cue

During this scene, nine-year-old Maggie is reading about witch ducking. As she reads:

... bringing those things called witches or conjurors to justice; this is first to know if a woman be a witch, throw her into a pond; and if she be a witch she will swim and it is not in her own power to prevent it’ (Edmundson, 1994).

we see the third/eldest Maggie being ducked on stage (see Figure 1).

The musical cue for this scene had to depict Maggie’s vivid imagination and the internal, private nature of the experience. The decision was made to record her reading the passage in a soft, almost whispered voice, rather than reading out loud at stage volume. This enabled a close (intimate) perspective of the voice to be obtained, a vocal quality that would not be possible in a stage context. The stereo version of this cue can be heard on Disc 4 track no 2.

The voice quality used in the recording adheres to Van Leeuwen’s principles, in that it is a voice quality we would normally hear only if we were close to a person. This close-miked recording technique and subsequent amplification helps to create a sense of intimacy, which is about individual attention. Playing to an audience of many excludes intimacy because of the size of the performance space and the need for vocal projection. The recording and delivery over loudspeakers allows the composer to re-introduce the notion of intimacy to many people simultaneously. It draws the audience in, as if the information is meant for each of them individually, and it also helps create empathy for Maggie’s position.

The voice dominates the mix as the most important sound and, in order to create a sense of distance and subsequent dreaminess, a significant amount of reverberation is added to the voice. As the story of witch ducking unfolds, the other sounds circulate in the four-channel mix and eventually swell and take over, creating an overwhelming sense of immersion.

4.5.4 Multiple, Simultaneous Inner Voices

Electro-acoustic techniques were useful in this production for conveying the complex nature of the inner voice. At times Maggie is bombarded by her multiple, conflicting
thoughts. The use of multi-tracking, layering and spatialisation techniques allows for the simultaneous presentation of those voices to convey this complexity. Complex layers of rapidly moving, swirling sound are thus used to reflect the chaotic and tormented nature of Maggie’s inner world. This can be heard in cues 8 and 9 of Disc 4.

4.5.5 Inner Voice and Processing

In addition to the multi-layering possibilities, the treatment of the voice via digital signal processing was useful for expressing and enhancing the emotive dimension of the inner voice.

Granular synthesis and time-stretching algorithms were used in a number of the cues where Maggie’s inner voice is used to recount the various, disturbing taunts of her relatives. Her brother’s comment “nobody loves you anymore” has a particularly strong effect on her. This is conveyed through the musical cue by repeating the text over and over, layering and overlapping it as well as granulating and time stretching the phrase. The result is effectively a confused bombardment of Maggie’s own thoughts. The stretching of the temporal structure of the phrase in the sonic world hints at the persistence of this wound in her life. Examples of this technique can be heard in Cue 3 (Disc 4, track 3) and Cue 10 (Disc 4 track 10).

4.5.6 Extracting the Emotional Content of the Voice

Voice is a unique sound source in that it remains recognisable even after undergoing the most extreme forms of distortion. In the words of Wishart (1985):

... the human voice can be recognised even when its specific spectral characteristics have been utterly changed and it is projected through a noisy or independently articulated channel; it is also notoriously difficult to imitate electronically.

Alvin Lucier (1995, p. 424) wrote the following notes about voice in relation to his work North American Time Capsule (1967):

I was struck by the rhythmic strength of human language which, along with the expressive content of speech, can cut through almost any amount of electronic modification.
Through the use of Digital Signal Processing (DSP), technology gives the composer an opportunity to explore the emotive components of the voice, as well as the expressive connections between voice and music by allowing the source material to reflect the event in question rather than abstract and formalise it through an acoustic instrument.

According to Young (2002):

*Vocal sound production, even the semblance of it, invites us to identify with and infer meaning from it because of our reliance on linguistic and paralinguistic utterance as a form of communication, as well as our conditioned knowledge of involuntary utterance and the timbre and gesture spaces defined by physically-defined factors such as vowel formants and basic patterns.*

Numerous sound/music cues in *The Mill on the Floss* used heavily processed voice to draw out the emotional content. One such example can be seen in the cue for Maggie’s recurring rages.

Maggie experiences what the author describes as “deaf rages”, where she hears “terrible booming sounds in her head” (Edmundson, 1994). These rages represent an extreme, anxiety-related, internal experience. The basic cue devised to accompany Maggie’s rages consists of:

- a booming sound created by close-miking a large bass drum skin;
- a sawing sound derived from a recording of a band-saw tool that was then subjected to DSP processing; and
- the sound of a heartbeat, which was used to indicate the internal nature of the experience.

The sound of Maggie desperately screaming and crying “no” was time-stretched, granulated and then layered into the musical mix. Once processed, the words she spoke were no longer intelligible; however, the desperate emotional vocal quality is still arguably perceptible.
4.5.7 The Scream

The scream is also used in the drowning sequence at the end of the work where it has also been subjected to time-stretching and granulation. The processing emphasises the emotive quality of the sound and abstracts the original sound to a point where it is still obviously vocal in quality. This can be heard in Cue 32 Disc 4, track 27.

The scream, according to Wishart (1985), is a universal indicator. Universal indicators are sounds that always retain some of their primeval communicative power and transcend the barriers between species. The scream is characterised by Wishart (1985) “as a continuous, high-frequency, loud, broad-spectrum emission”. He goes on to say:

*In fact this indicator is so universal that we may assume that any sustained high-frequency, loud (and usually broad spectrum) signal will carry the connotations of terror. Even in the highly-formalised musical context of Schoenberg’s Erwartung the sustained, high frequency, loud but pure-toned pitches which are sung at certain points retain the ‘resonance’ of screaming. (Wishart, 1985)*

4.5.8 Maggie’s Curse Motif and Reversed Text

The author alludes to the possibility of mystical elements influencing Maggie’s fate, namely her encounter with a mysterious gypsy male (played by Michael Labram), the possible source of her curse. This occurs in Scene Five (Edmundson, 1994, p. 21), when Maggie runs away and meets a mysterious man who is said to resemble a gypsy. The

---

26 Photograph by Robert McFarlane
Cues for this scene can be heard on track 9 and track 10. The man tempts her to go with him and as she does she sees him turn in to the devil. Her father subsequently rescues her, and while the nature of her experience is not revealed, there is an inference that something untoward happened to her during this encounter.

Parallels with the evil, gypsy lurer are made throughout the play to both Maggie’s loves, Stephen Guest and Phillip Wakem. In this production, the director, John O Hare, deliberately connects the two by using the same actor, Stephen Guest, to play both parts. Stephen Guest is ultimately the man who tempts Maggie later in the play, leading to her demise.

The persistent destructive force behind Maggie’s ill fate required a recurring ominous motif, which for the purposes of this document will be referred to as Maggie’s curse motif. There are a number of elements comprising the curse motif, the main elements being processed guitar and Maggie’s voice.

The processed guitar is first heard in the opening witch ducking cue (Disc 4, track 2), as well as in the subsequent shorter witch ducking cues (Disc 4, tracks 13 and 27). This processed guitar motif is derived from Nathan’s Spencer’s guitar playing and is a deliberate aural means of linking this character – the evil tempter – with the gypsy curse and witch-ducking cue. The guitar cue is created using convolution processing in SoundHack. Granulated guitar is also used when Maggie first encounters the mysterious gypsy man (the blacksmith) in Scene Five (Edmundson, 1994, p. 21). This can be heard on Disc 4 track 10.

Maggie’s own voice was used in the curse motif cue by subjecting various phrases such as, “your majesty”27, to reversed processing in Protools. The resulting sound has an ominous, demonic quality. (This can be heard on Disc 4 tracks 2, 13, 27) By using reversed recordings of voice, this cue draws upon cultural coding associated with reversed text. Reversed text is a sound that has now become associated with evil or the devil. There are examples in popular culture where reversed speech recordings have been thought to be the words of the devil:

_Controversy raged extensively in the late 70s and early 80s when religious fundamentalists claimed that Satan possessed the minds of singers, causing them to insert messages backwards into albums. (Oates, 2006)_

---

27 “Your majesty” was the phrase used by the mysterious gypsy man who is suspected of cursing Maggie.
The use of reversed recordings of Maggie’s voice, therefore, was appropriate for the suggestion that Maggie was cursed. The fact that the evil sounding voice in this recurring cue is actually Maggie’s worked particularly well with the idea that Maggie’s own conscience or inner voice are strongly implicated in her demise.

The reversing process changes the envelope of the speech so that there is a soft attack and an abrupt decay. In a study on the melodic patterns of ten different emotions or emotional attitudes, F-nagy and Magdics (1972) indicated that “scorn is signified by an even and slightly descending melodic line, a slow tempo and long stressed syllables”. This description aligns to some degree with the quality of the reversed voice. Further investigation, which is beyond the scope of this exegesis, may provide further insight into the nature of the interpretation of reversed voice.

The sounds of distant thunderstorms were used to accompany the reversed voice, again drawing upon cultural coding and thereby supporting the ominous nature of the cue.

4.5.9 Gypsy Sounds and Folk Songs

In order to support the textual references to gypsies, numerous musical references to gypsies were used. This was achieved by:

1) choosing instrumentation associated with gypsy music (the piano accordion); and
2) using gypsy folk melodies and folk songs about gypsies.

The use of the piano accordion can be heard in Cue 9 (Disk 14, track 9). This cue was used for the opening of Scene Five (Edmundson, 1994, p. 20), when the youngest Maggie runs away from home after being taunted by her family. One of those taunts refers to her resemblance to a gypsy, and part of her intention in running away is to be with the gypsies. In this brief scene, the musical cue sought to capture the combination of Maggie’s defiant will, her youthful naivety, her sense of relief at escaping the taunts and the voices in her head, and a hint of the erotic. The cue consists of following:

1) A recording of a folk melody played on the piano accordion (played by John Pohl).
2) Soft, repeated, high-pitched, plucked, guitar recording – taken from the blacksmith theme that follows.
3) Recordings of Maggie (Kirstie Hutton) whispering text such as “She’s certainly like a gypsy now”.
4) Breathing sounds – close miked, intimate recordings of breathing.
5) Bird sounds – outdoor environment.

Maggie’s repetitive internal voices remind her of the constant taunts she is subjected to, and help her to feel justified in her decision to run away. The taunts were deliberately recorded in Maggie’s voice rather than in the voices of the actual offenders, expressing her inner voice. The breathing sounds convey a feeling of relief and contain erotic overtones. The same breathing is used in later intimate scenes when Maggie is enticed on a boating trip with her lover Stephen Guest.

4.5.10 Gypsy Melodies

Given Maggie’s links with gypsies, it was decided that she should sing gypsy melodies. A Hungarian gypsy folk song was chosen for the opening scene in which all three Maggies are present on stage and sing the song live in three-part harmony. The melody was found on a CD by Blindman’s Holiday (Blindman's_Holiday, 1991). This same melody is used in the opening of Scene Six (Edmundson, 1994, p. 22), when Maggie is leaving the Mill. Here it is sung solo, it is much slower and more melancholic than in the first scene, and is intended to convey Maggie’s sadness in having to leave her home.

Another gypsy folk melody is used in Scenes Seventeen, Eighteen and Nineteen (Edmundson, 1994, pp. 42, 43, 45), and can be heard on Disc 14 Track No. 20. The melody is taken from a CD called Road of the Gypsies, track 3 - Lindráji Szi, recorded by Andro Dom (Ando-Dom, 1996). The setting for these scenes is the Red Deeps, the site of an old overgrown stone quarry where Maggie liked to walk and be alone. It was here that she met up with Philip Wakem, who shared her passion for the natural beauty of the Red Deeps. Maggie began to meet Philip secretly in the Red Deeps until her brother Tom put an end to their meetings. The cue is made up of the following:

1) Maggie singing the melody of a gypsy song. The original recording was subjected first to delay and was then layered.
2) Recordings of Maggie calling for “Philip” and whispering “to the Red Deeps”.
3) Philip whispering the lyrics from a traditional gypsy folk song.
The layering of the gypsy melody, along with the whispered voice of Philip Wakem, gives this cue a romantic dreaminess indicative of the Red Deeps and Maggie’s encounters with Philip.

All of the cues can be heard on the Disc 4 in stereo, or Disc 5 in 4-channel surround. Descriptions are provided for each cue in the Appendix III. Disc 6 contains a number of the music cues accompanying still photographs of the Production taken by Robert McFarlane.

4.6 SUMMARY - MILL ON THE FLOSS

This chapter outlined the use of composition for voice and electronics in the theatre work, The Mill on the Floss. It described how the relationship of voice and identity was used as a conceptual framework for the development of the musical cues in this production. Electroacoustic technology facilitated the creation of the inner voice by enabling a unique acoustic environment to be constructed for the voice as distinct from the live actors’ voice.

The use of the actors’ voices as a sound source not only helped to unify the production, it was also useful in conveying the central concept of the inner voice.

The use of voice and electroacoustic technology thus provided a powerful means of expression for the composer and enhanced the themes and ideas of the playwright in The Mill on the Floss.
5 DAN NAN RÓN - THE SELKIE PROJECT

5.1 INTRODUCTION

The Selkie Project, or Dan nan Rón (Gaelic for Song of the Seals\textsuperscript{28}) is an electro-acoustic performance work based on the traditional Scottish mythology of the Selkie\textsuperscript{29}. The work was first performed in May 2001 at the Southern Hemisphere Marine Mammal Conference at Phillip Island and then in July 2001 at the Australasian Computer Music Association’s Annual Conference Waveform at the University of Western Sydney.

![Figure 12: Performance of Dan nan Rón at Waveform](image)

As with earlier works in this portfolio, this project uses microphone-captured audio as source material. However, it expands on the research approach of the previous works in that it is the first attempt to incorporate real-time electronic manipulation of both pre-recorded and live acoustic input. It also extends the sonic palette via the exploration of non-human vocalisation.

5.2 THE SELKIE MYTH

Selkie folklore tells of mythological creatures that have the ability to change between human and seal form. The folklore reportedly owes much to the animal’s resemblance to a human being, “with their round head and large staring eyes and vocal cries resembling

\textsuperscript{28} The Gaelic word for seal is roane or Rón (Butler, 1996). Slíochta nan Rón or Slíochd nan Rón means children or offsprings of the seals.

\textsuperscript{29} There are various spellings including Silkie, Selchie and Sulkie, and these different forms of dialect indicate a common root from early Firbolg or perhaps Pictish mythology or tradition (Pickett & Pickett, 1999). There are other similar mythological creatures called Kelpies, as well as many stories about the related stereotypical seal maidens and mermaids (Thomson, 1954; MacAulay, 1998).
those of humans” (Andersson, 1967). The Reverend Archibald MacDonald, who carried out significant research on Selkie mythology, was of the opinion that the “unique deference shown to seals was due to their large soft eyes, and the appeal of their semi-human expression” (MacGregor, 1937). There is little doubt that Selkie mythology is attributable in some capacity to the fascination and intrigue inspired by the similarities between seal and human vocal expression. The abundance of Selkie mythology and related folk songs is testament to the emotive effect of seal vocalisation on human beings.

This work draws upon the Selkie themes for its construction and is particularly concerned with the similarities between human and non-human utterance. Recordings of human and seal vocalisations thus form the primary source material for creating the work.

5.3 THE SELKIE MYTH AND ITS THEMES

There are many variations of the Selkie myth but the legend is fairly consistently characterised by a number of recurring themes that are outlined below. The most common version of the story tells of a Selkie woman (Selkies can be male but are more often female) who has her skin stolen by a man, preventing her from returning to the sea. She subsequently marries the man and they have children together, but all the while she yearns for the sea. After several years, one of her children uncovers the hidden skin and the Selkie is then able to return to the sea. A full transcript of this version of the Selkie myth can be found in Clarissa Pinkola Estes’s book Women who Run with the Wolves (Pinkola Estes, 1992).

5.3.1 Themes

5.3.1.1 Transformation and Skin

The Selkie myth is one of the “shape-changing or form-shifting myths”, a category of myth featuring transformations between human and animal or bird forms (Cavendish, 1995). The most consistent theme in Selkie-related mythology is that Selkies possess the ability to change from seal form into human form and vice versa. Central to this transformation is the Selkie’s skin. Each Selkie has its own unique skin which is typically
admired for its softness and beauty. If the skin is stolen or kept from the Selkie, the Selkie is prevented from returning to the sea, its natural environment (Andersson, 1967).

5.3.1.2 Union with Mortals

In many of the stories, Selkies marry mortals and have offspring that supposedly carry Selkie blood. When humans and Selkies mix, their offspring are likely to be chimerical – with webbed feet and hands or leathery patches on their hands and feet (Pickett). Some families in the Hebrides, such as the MacCodrums, still claim descent from Selkie folk (MacGregor, 1937).

Another allegedly true story, documented by the Keltoi folklorist, Walter Traill Dennison, centres around one North Uist family whose children where all born with webbed feet and fingers. The mid-wife present at the birth clipped these webs desperately with shears: “and many a clipping Ursilla clipped, to keep the fins from growing again; and the fins, not being able to grow in their natural way, grew into a horny crust on the hands and soles of the feet. And this horny substance can be seen in many of Ursilla’s descendants to this day. (Pickett)

5.3.1.3 Harming the Selkie

The many and varied stories tell of the good luck brought to those who are kind to Selkies and bad luck to those who are not (Andersson, 1967, MacAulay, 1998). One story found in MacGregor’s book tells of a woman named MacCodrum, who would be seized with violent pains during the annual seal hunts. It is thought that she was descended from the seals and so suffered in sympathy with her relatives (MacGregor, 1937). This aspect of the myth serves to remind us of the connection between humans and the natural environment.

5.3.1.4 Selkies are Musical

The Selkies have been described as the “Great Grey Musical Doctors of the Sea”(Anderson, 1988) and are believed to possess musical abilities:

Often in the Hebrides local people have heard strange, sorrowful music out at sea that would move them deeply. This is the ‘Dan nan Ron’, the song of the seals. (Butler, 1996)
There are various documented accounts of seals ‘singing’ and/or responding to music, along with a number of actual transcriptions of seals supposedly singing. One such story describes how a “a hunter aiming at a seal with his gun or bow heard the creature begin to sing, in a voice of supernatural beauty, a song lamenting the loss of her dear ones” (MacGregor, 1937).

Another well-documented case is that of Marjory Kennedy-Fraser who describes her experience in the introduction to her book *From the Hebrides* (Kennedy-Fraser, 1925):

*We were some little distance from the water’s edge, parallel with which out in the sea, ran a long line of skerries, reefs that are covered at high tide. On the skerries were stretched, also basking in the sunlight, innumerable great grey seals, seals that visit these isles only at long intervals. My friends, great enthusiasts for Hebridean songs, who use their own string instrument arrangements of them for their students, said to me: Try singing “The Seal-woman’s Sea-Joy” to the seals themselves. I raised myself on my elbow I was too lazily happy at the moment to stand erect, and with the most carrying tone I could summon, sang the first phrase of the song. Instantly the response began at the Southern end of the reef, and a perfect fusillade of single answering tones came from seal after seal, travelling rapidly northward, until at the further end of the reef it ceased. Then, after a moment of intense silence, a beautiful solo voice sang this phrase (see Figure 13).*

![Figure 13: Melody of seal singing transcribed by Marjorie Kennedy-Fraser](image)

*The voice was quite human in character but much greater in volume than any mezzo-soprano I have ever heard. In their answering phrase the solo seal sang the interval of an ascending sixth, a favourite melodic step with the Islesfolk in their tunes. Did the Islesfolk borrow this of the seals or the seals of the Islesfolk? (Kennedy-Fraser, 1925)*

A discography Selkie-related songs can be found in Appendix IV
5.4 MYTH

Myth offers fascinating insights into the ways our ancestors understood and identified with their environment. Levi-Strauss argues that there is an intellectual approach at play in myth and though inferior in one way, myth is different to scientific thinking in that “the aim is to reach by shortest means possible a total understanding of the universe” (Levi-Strauss, 1978). He says that, although unsuccessful in giving humans more power over the environment, “myth gives man the illusion that he can understand the universe” (Levi-Strauss, 1978).

Our modern world has a tendency to limit wisdom to scientific facts, and despite our scepticism as to the actual truth in myths, the symbolism and wisdom they embody ensures they endure. Jung argues that an appreciation of mythology is crucial to an understanding of the human mind. He says that “ancient myths were built up from primordial images carried within our unconscious, reflecting ancestral experiences common to us all” (Schafer, 1993). He believes myth represents the unconscious archetypal instinctual structures of the mind (Walker, 2001).

5.5 MYTH AND PSYCHOLOGY

Jungian psychologist, Clarissa Pinkola Estes, uses myth as a form of therapy for her clients. In her book, Women who Run with the Wolves, she writes that

... most times we are able to find the guiding myth or fairy tale that contains all the instructions a woman needs for her current psychic development ... It is like a play with stage instructions, characterisation and props (Pinkola Estes, 1992).30

Pinkola Estes believes that the seal is one of the most beautiful of all symbols for the wild soul. The wild soul represents a healthy woman’s psyche, and she refers to the healthy psyche of a woman as “her innate instinctual self”(Pinkola Estes, 1992). Estes explains that the theft of the seal’s skin, which occurs in well-known versions of the Selkie story, is akin to the robbing of one’s spirit, or a weakening of one’s sense of self (Pinkola Estes, 1992).

30 Pinkola Estes uses mythology and stories, in particular, to describe the feminine instinctual psyche referring to the “innate instinctual self”. An archetypal wild woman, according to Pinkola Estes, is one who shares certain psychic characteristics with wolves. (Pinkola Estes, 1992)
The theft of the skin prevents the Selkie from returning to the sea, which as Estes (1992) explains, is the Selkie’s “soul home”, a place where she can truly be herself, where her psychic reserves are replenished so she can thrive with family, relationships and creative life. So even though the Selkie possesses adaptable qualities and can survive as a terrestrial being, its “innate instinctual self” (ibid) is as a sea dweller.

The myth thus makes a distinction between the two identities of the Selkie, one which is a truer, more authentic self (the sea dweller) and the other, which represents the loss of a sense of self (terrestrial dweller). This notion of identity is a recurring thread in the works in this portfolio and was encapsulated in the performances of the women electroacoustic composers (discussed in 2.9 Identity, Gender and Feminism), interviewed by McCartney, who described the necessity of having to behave as “one of the boys”, as an exhausting experience.

5.6 MYTH AND MUSIC

Artists and musicians often draw upon mythology as inspiration for their work. Nattiez (1990) defines both myth and music as symbolic forms and as “a sign or collection of signs, to which an infinite complex of interpretants is linked”. Myth and music, according to Levi-Strauss, share a similar structure and similar features. Strauss believes that in using people and wild animals with a particular significance for the group, the myth illuminates more abstract relationships and categories of thought. He says that myth gains its power from its unfolding in time and that the way the myth is told is of great importance (Levi-Strauss, 1978). Strauss explains that music and mythology both stem from languages but grow apart in different directions:

... music emphasises the sound aspect already embedded in language, while mythology emphasises the sense aspect, the meaning aspect, which is also embedded in language. (Levi-Strauss, 1978)

He also says that myth and music:

... in their different ways transcend articulate expression, while at the same time – like articulate speech, but unlike painting – require a temporal dimension in which to unfold. (Levi-Strauss, 1978).
Norris (1996) believes that musical metaphor is particularly strong in the electroacoustic domain because the ability to use sound with an intentionally referential aspect allows a more direct level of metaphorical assignation. He says:

... an affective assignation in instrumental music tends to be made at the level of the musical code, or through a psychological/psychoacoustical opposition. In electroacoustic music, however, the use of sounds with an intentionally referential aspect allows another more direct level of metaphorical assignation. (Norris, 1996)

5.7 MYTH AND FOLK SONG

This composition project provides an interesting case study for examining the interrelationships between myth, symbolism and music. The Selkie-myth-inspired folk song is interpreted in a modern, technological context where technology, via recordings, enables direct use of the seal sounds; in traditional folks songs, seal sounds could only be represented through another instrument or voice.

The traditional approach is exemplified in the earlier passage by Marjory Kennedy-Fraser; she heard the seal singing, was obviously intrigued and inspired by the sound and proceeded to transcribe it as a melody, which was intended to be sung or played on an instrument.

Similarly Messiaen, who was influenced by bird song, took his manuscripts into the woods where he proceeded to transcribe the bird sounds. His books of piano pieces, Catalogue d'oiseaux, and his orchestral work, Oiseaux exotiques, are both based on bird song, and all of his works composed after 1955 include fragments of birdsong (Messiaen, 2004).

According to Norris (1996), this use of aural resemblance in Messiaen’s music is the most basic level of signification, which he labels the sound-index. Norris hypothesises two other types of sound-signification that can be found in acousmatic music environments: the sound-symbol and the sound-metaphor. The sound-symbol “relates the object to some convention or coded expression e.g. ‘pathetic’ minor second and the sound metaphor relates the signal to the object through an individual’s own experience with the sounding world” (Norris, 1996). Norris’s sound metaphor is exemplified in Wishart’s work Redbird, which is described in the opening chapter.
Electroacoustic techniques provide a more direct way of implementing the Selkie myth’s main theme of transformation by allowing transformations of the sounds themselves. The myth’s thematic notion of interconnectedness between humans and their environment is symbolised throughout the composition by deliberate blurring and abstraction of the sounds in order to draw parallels between human and non-human utterance (described in detail in 5.9).

One of the main reasons listeners connect with seal vocalisation is its emotive quality. This is exemplified in the earlier quote about the people of the Hebrides feeling moved by the “strange, sorrowful music of the seals” (Butler, 1996).

What makes the sound sorrowful given the seals are not using language to convey this idea. One explanation is that the listeners are drawing on experiential information for this interpretation. As Young (2004) explains:

... vocal sound production, even the semblance of it, invites us to identify with and infer meaning from it because of our reliance on linguistic and paralinguistic utterance as a form of communication.

Smalley (1996) says that:

... the fact that the sounds of utterance are generated from within the body, and that they are the essential vehicle of personal expression and communication, makes utterance intimate and emotionally charged.

“Different emotional states evoke different involuntary physical responses from the body and the vocal tract in particular” (Bachorowski, 1999). We are familiar with these physical experiences and correlate these with particular sounds. “Smalley proposes that we follow and interpret a sound energy and spectral shaping through time with the potential to correlate this with muscular actions, tensions and releases” (Smalley, 1997, Young, 2002). Smalley (1996) therefore believes that “the listener’s relationship with utterance is often reflexive rather than indicative”.

One of main aims in the Selkie composition was to extract and highlight the emotive qualities in the seal vocalisations through the use of electroacoustic processing techniques. Specific examples of this will be discussed in the later sections of this chapter see 5.9.
5.8 CREATING THE WORK

This project is the first in the portfolio to incorporate real-time electronic manipulation of both recorded and live acoustic input. The live acoustic input is human voice and the recorded materials consist of both unprocessed and processed recordings; both the live vocal and sound files can also be manipulated in real-time.

The software used to perform the work is Ross Bencina’s AudioMulch (Bencina, 1997). Bencina describes AudioMulch as “software for real-time sound synthesis, music composition and performance-oriented audio processing” (Bencina, 1997). The AudioMulch patch essentially becomes the score, allowing the performer to construct the work for their audience in real-time. Up until this point, the compositions in this portfolio have been designed for a fixed digital medium such as CD or DVD. The process would normally begin with record materials, which would then be subjected to digital manipulation before being edited and constructed in a multi-track timeline environment such as Protools.

While this approach to composition allows the composer to realise the work him/herself rather than have a performer interpret the composer’s score (as is the case in traditional compositional models), software like AudioMulch brings together the composer and performer, allowing for a more fluid and flexible realisation of the work. AudioMulch allows the composer to make decisions in the moment and respond to the audience or performance environment.

With AudioMulch, the composer/performer can vary the framework of the composition to allow for either a relatively fixed composition or a more substantial improvised framework where the compositional decisions are more spontaneous and intuitive. My goal is to ultimately move towards a more fluid and spontaneous framework where I can incorporate my vocal performance experience.

Dan nan Rón represents a step in that direction, including both fixed and fluid elements, and I envisage that future works will include a greater proportion of fluid elements as I become more competent and familiar with the software interface.
5.8.1 Fixed Elements

By using an abundance of pre-prepared audio materials and the automation timeline I was able to create a fairly stable framework for the piece around which I could improvise.

The automation features in AudioMulch were utilised to allow automated playback of the sound files as well as automation of processing parameters. The ability to automate playback of the sound files enabled me to create a layer or bed of materials to which I could add other sound files and/or live materials. The ability to automate some of the processing meant that I would have fewer decisions to make during the performance and therefore not feel overwhelmed by the technology. This was desirable since it enabled me to focus on the live vocal performance. The automation page can be seen in Figure 14.

Figure 14: Automation page in AudioMulch

Figure 15 shows the patch used in the first two performances of Dan nan Rón; A description of the individual contrapptions in this patch follows.
The loop players (see Figure 16) are basically designed to play audio loops and were used to play back the pre-prepared sound materials.

Figure 15: Dan nan Rón Audiomulch patch

Figure 16: LoopPlayer object in Audiomulch
The matrix objects allowed me to configure the routing of the various inputs to the various outputs in an efficient way. Rather than having to individually go and turn a whole series of files on and off, I could simply change the configuration using the Matrix objects (see Figure 17). An additional feature of the Matrix objects is that they allow cross fades of varying lengths between the configuration settings.

![Matrix objects in AudioMulch](image)

Figure 17: Matrix objects in AudioMulch

5.8.2 Sound Sources and Rationale for Processing Methods

The source recordings fall into two main areas:

1. Recordings of seal vocalisations
2. Recordings of human vocalisations

5.8.3 Seal Vocalisation Recordings

Both hydrophone and air recordings of the vocalisations of a range of different seal species were obtained. Where possible, I recorded them myself; otherwise I used field recordings donated by marine mammal (seal) researchers. Examples of the various seal calls can be heard on Disc 15.

I listened to as many different seal sound recordings as possible and found that there was a great variety in the sounds made by the different species. However, the resemblance between seal sounds and the human voice was, in my opinion, quite remote in some cases.
I carried out further research to pinpoint which seals were most likely to have inspired the Selkie myth and discovered that the folklore is particularly abundant in Ireland, the Outer Hebrides, Argyll and nearby Islands, the Orkneys, Shetland Isles, Caithness and Sutherland, the northeast coast of Scotland, and even Norway and Greenland (MacGregor, 1937). I presumed that the seals inhabiting these areas would most likely be responsible for the sounds that inspired the Selkie myths and songs. Marine mammal researchers from the CSIRO31 advised me that the Grey Seal and Harbour Seal32 were the most common species in the areas where the mythology was most prevalent. Indeed, after listening to them, I considered these sounds to be more aurally similar to human sound than the majority of the seal sounds I had heard up to that point.

By listening to many different seal sounds I also discovered the amazing underwater sounds made by the Arctic and Antarctic seals. These sounds were recorded with a hydrophone and were unlike anything I had ever heard in nature. In fact, when I first heard the sounds, I thought that a man-made synthesiser of some kind had produced them, as they certainly did not fit any preconception I had had about what seals sounded like. I decided therefore, that I would not exclude the use of any of the seal vocalisations on the basis that they did not inspire the myth. I decided to expand the idea in the myth to include all seal sounds, including the sounds that only recording technology has made available to us, that is, the hydrophone recordings.

The easiest way to obtain my own recordings of seal vocalisations was to record seals in captivity. Many seals in captivity are trained to vocalise on command; as a result I was able to get closer to the sound source and control the acoustic environment a little more. I recorded captive seals at the following centres:

- Oceanworld, Manly, Sydney, Australia
- Darling Harbour Aquarium, Darling Harbour, Sydney, Australia
- Taronga Zoo, Mosman, Sydney, Australia

In addition to the seal sounds I recorded myself, a number of researchers, including Tracy Rogers, a Taronga Zoo researcher of Antarctic leopard seals, Antarctic Weddel 31 CSIRO is the Commonwealth Scientific and Industrial Research Organisation.
32 Although these are the seals that commonly inspired the myths, they are not necessarily the only ones, and in my research I came across an Australian Aboriginal myth most likely inspired by fur seals or perhaps elephant seals. The Arctic seals for example would have more than likely inspired Inuit mythology while the Dugongs found on the Western Australian coastline likely to have inspire Aboriginal mythology.
seals and elephant seals, and Sofie Van Parijs, researcher of Arctic bearded seals and grey seals, allowed me to use copies of their field recordings. Recording examples can be heard on Disc 15 (see Appendix VII).

The recordings varied in quality. In many cases, fidelity was not a major concern for the researchers who made the recordings and as a result there was a lot of noise in the recordings. Sometimes this noise was the result of inferior recording technology, at other times microphone handling created noise, and generally there was a lot of background and environmental sounds such as wind or water. Where possible, I proceeded to treat some of the recordings to remove the background noise. In experimenting with noise reduction tools, I created some very interesting sounds using extreme settings on the plug-ins; the process therefore generated some additional source materials for the composition.

Owing to the location of natural seal habitats, water was one of the main background sounds in the original field recording. Water is integral to the Selkie myth given that Selkies (and seals) move between aquatic and terrestrial environments. I therefore decided to keep this sound in some of the recordings and make it part of the composition. Water is also a sound source that I use frequently in my compositions for its many rich, symbolic associations.

5.8.4 Human Sounds

Recordings of human voice can be divided into two main areas:

1. Recordings of folk songs
2. Recordings of voice in aquatic environments

5.8.5 Selkie Folk Songs

I first became aware of the existence of Selkie mythology through learning a Selkie song with my acapella group, Cairdean. I subsequently undertook research to find as many folk songs about the Selkie myth as I could. This included locating manuscripts and listening to recordings (see Appendix IV). I decided to use some of my findings as source materials for the work. I chose a number of songs that I found interesting, either for their melodies or texts, and recorded them with the intention of using them in both processed and unprocessed form throughout the piece. These songs included:
• *The Song of the Seals* performed by Jean Redpath (Redpath, 1994). Poem by Harold Boulton, music by Granville Bantock. Sample heard on track 39.
• *Silkie* track 40 ‘The Great Silkie Traditional Arrangement’ by Moira Craig.
• *The Fairy Dance* (Craig, 1996) track 3.
• *Seal-Woman’s Sea-joy* (Kennedy-Fraser, 1925pg 21), track 41.
• *Hó i Hó i*, track 42 Scottish Gaelic song (Thomson, 1954pg 220).

Of the above, *Hó i Hó i* (Figure 8) became a prominent part of the final work and the other songs were used in a more minor way. I was not able to find any recordings of *Hó i Hó i* therefore my interpretation of the song is not influenced by any existing recordings.

**Hó i Hó i**

Refrain

Hó i hó i hi o hó i Hó i hi o hó i i.
Hó i Hó i. Hi o hó i cha robh mi’ m ónar an raoir.

Verse 1

‘S mairg ’san tir so ‘Smairg ’san tir ‘G ithe dhaoine ‘n r iochd a’ bhidh
Nach fhaic sibh ceannard an t-sluaigh Goil air teine gu cruaidh cruinn.

Verse 2

‘S mise nighean Aoidh Mhic Eoghainn Gum b’eòlach mi mu na sgeirean Gur maairg a dhèanadh
mo bhualadh: Bean uasal mi o thir eile.

**Hó i Hó i English Translation**

Hó i hó i hi o hó i
Hó i hi o hó i
Hó i Hó. Hi o hó i

Last night I was not alone.

It is a pity that in this land
They eat human beings in the form of food.
Do you not see the leader of the Seal Host
Boiling fiercely on a fire?

Hó i hó etc.,
Last night I was not alone

I am the daughter of Hugh the son of Owen.
I know the skerries well.
Woe betide the person who would strike me
For I am a gentlewoman from another land.

Figure 18: Hó i Hó i Gaelic lyrics and translation (Thomson, 1954pg 220)

Figure 19: Hó i Hó i manuscript (Thomson, 1954pg 220)
According to John Matheson (Thomson, 1954), *Hò i Hò i* is believed to be “a lament sung by a seal somewhere near the Island of North Uist, in the days when the flesh of seals was commonly eaten” (Matheson, 1938). Superstition around the hunting of seals is often indicated in the myths and this song is a pertinent example of that.

I learnt the correct pronunciation for the song from Robyn MacKenzie[^33], a native Gaelic speaker, who kindly donated several hours of his time to teach me. He allowed me to record the correct pronunciations to assist in the learning process. Once I felt confident with the pronunciation, I proceeded to make a multi-track recording of the song. The arrangement consisted of several layers of voice and acoustic guitar as accompaniment. The full version can be heard on Disc 16 track 11. The guitar part is played by Julian Knowles. The guitar and vocal tracks from the Selkie song were played back as loops using the loop player contraptions in AudioMulch. The loops were then automated using the automation functions in AudioMulch. The whole song was then looped and mixed in and out as desired during the live performance. The AudioMulch patch allowed the recorded vocal to be replaced or accompanied by the live vocal thus allowing the voice to be used as its own accompaniment.

5.8.6 Human Voice in Aquatic Environments

In order to explore the similarities between seal and human vocalisation, it made sense to record them both in similar acoustic environments. Recordings of human voice were undertaken in a backyard concrete pool using both an air microphone and a hydrophone. The male vocalist (Julian Knowles) made a range of sounds including singing, blowing bubbles and imitating seal sounds.

One of the techniques I used involved simultaneously recording the hydrophone to one of the DAT tracks and the air microphone (positioned above the water), to the second track (see Figure 20). The vocalist moved above and below the water as he vocalised thus drawing attention to the effect of the acoustic environment

[^33]: Robyn MacKenzie was the conductor of the Sydney Gaelic Choir at the time.
on the sound source. Examples can be heard on tracks 1 to 8; tracks 7 and 8 have been treated with noise reduction techniques.

![Diagram](image1.png)

Figure 20: Recording technique in pool using air microphone and hydrophone

5.9 IMPLEMENTING THE SELKIE TRANSFORMATION THEME IN *DAN NAN RÓN*

The Selkie myth raised two main ideas that I wanted to explore in the composition. The first was the idea of transformation between sounds possessing similarities and the second was the transformation of sound into song and hence the interrelationships between sound, song and voice.

I started out by examining the inherent similarities between the sounds, then considered techniques to both draw out and generate similarities in order to create connections that I thought could be useful in a musical context.

5.9.1 Similarities between Source Materials

Similarities between sounds can be explored in terms of:

- the innate properties of the actual sounds (e.g. melodic, timbral, rhythmic elements);
- the acoustic space around the sound (the acoustic perspective, how near or far away the sounds seems, what sort of acoustic space the sounds appear to be in, e.g. a large hall, underwater, in air);
• the context in which the sounds are heard (what sounds are simultaneously present and what is the relationship between those simultaneous sounds as well as what precedes or follows a sound).

5.9.1.1 Similarities and Imitation in Raw Recordings

I listened to many seal recordings of seal vocalisations and felt that the sound emanating from grey seals most resembled human vocal expression. The grey seal pups in particular sounded a lot like human babies. (Grey seals can be heard on Disc 15, tracks 31-46). In addition, I made a concerted effort to create some recordings that would have similarities. For example, I recorded human voice\textsuperscript{34} deliberately imitating seal sounds in an environment that resembled the environment in which the seal recordings were made. Therefore, underwater recordings and in-air recordings were made in aquatic environments.

My research also unearthed a documented case of a Harbour Seal called Hoover in the New England Aquarium in Boston that was taught to convincingly mimic human voice (Ralls, 1985):

\textit{Among the phrases he turned while living at the Aquarium: “hello there”, “how are ya”, “get outta here”, “get down”, “Hoover”, and a number of variations of each accompanied by a signature guttural laugh.}\textsuperscript{35}

Unfortunately I was not able to get a copy of the recording of Hoover to use in the composition but a recording is now available on the New England Aquarium website.\textsuperscript{5}

5.9.1.2 Imitation and Selkie Songs

Many of the Selkie folk songs I recorded were supposedly transcriptions of seal song. One such example is Hó i Hó i in Figure 19, which is reportedly a transcription of a seal singing a lament near the Island of North Uist. For the purpose of my

\textsuperscript{34} It is worth noting here that Wishart similarly used his voice to generate sounds to be used for transformation in his work \textit{Redbird}.

\textsuperscript{35} http://www.neaq.org/scilearn/kids/hooveronly.html cited July 2006
composition, I considered the Selkie song recordings to be a form of imitation of the seal songs.

5.9.1.3 Investigating Similarities through Digital Processing Techniques

Digital processing techniques provide a means for investigating transformation between seal and human sounds. Digital processing effectively abstracts the sound to varying degrees, and can either highlight the similarities between the sounds or create similarities and points of connection. Some of the digital processing was applied in real-time and some of the sound materials were pre-prepared. The pre-prepared materials were played back using the AudioMulch interface and in some cases were further processed during the performance.

5.9.2 Cross-synthesis or Hybrid Sounds

Cross-synthesis is a particularly useful technique that allows the transference of certain characteristics, such as the changing formant structure, of one sound source onto another. The main cross synthesis techniques used in this piece were convolution and mutation from Tom Erbe’s SoundHack. I also used cross fade algorithms in Mike’s modules, which is a freeware plug-in that I used with SoundEffects software. (Mutation and convolution are described earlier in 3.3.1.6).

The following section provides examples of cross-synthesis techniques.

5.9.2.1 Convolution and Mutation Examples

- Convolution Example 1: Track 12 is a convolution between track 10 (bearded seal recording) and track 11 (recording of Ḥo i Ḥo i), with track 11 as the moving impulse.

- Convolution Example 2: Track 15 is a convolution between track 13 (bearded seal recording) and track 14 (guitar part from ‘Ḥo i Ḥo i’ multi-track recording) with track 14 as the moving impulse. After hearing the
effectiveness of the guitar part in the previous examples I tried using the audio files with solo guitar as the impulse. This produced a very similar result to Example 1, except there is no vocal.

- Convolution Example 3: Track 17 is a convolution between 16 (grey seal recording) and 14 (guitar part from ‘Hó i Hó i’ multi-track recording), with track 14 as the impulse.

- Convolution Example 4: Track 19 is a convolution between track 18 (grey seal recording) and track 14 (guitar part from ‘Hó i Hó i’ multi-track recording), with track 14 as the impulse.

- Convolution Example 5: Track 22 is a convolution between track 20 (Antarctic leopard seal hydrophone recording) and track 21 (guitar part from ‘Hó i Hó i’ multi-track recording), with track 21 as the impulse

- Mutation Example 1: Track 24 is a mutation between track 11 (recording of ‘Hó i Hó i’) and track 23 (grey seal recording), with 23 as the target.

- Mutation Example 2: Track 25 is a mutation between a bearded seal recording and the recording of the ‘Hó i Hó i’ (track 12).

- Mutation Example 3: Track 26 is a mutation between the ‘Hó i Hó i’ and a bearded seal recording.

- Mutation Example 4: Track 27 is a mutation between the ‘Hó i Hó i’ and a grey seal recording.

The processing helps to disguise the sound source and creates a complex set of correlates to what the sources may be. The major outcome of these processing procedures was the creation of hybrid sounds. These sounds would not be found in nature and are subsequently somewhat mythical and surreal.
5.9.2.2 Cross-Fades in Mike’s Modules Examples

- Iterative Cross-fade Example 1: Track 28 is an iterative cross-fade (performed in SoundEffects using the iterative cross-fade from Mike’s modules) between a section of the singing of the Selkie song (track 39) and a leopard seal recording.

- Iterative Cross-fade Example 2: Track 29 is an iterative cross-fade between layered vocal song (track 39) and a leopard seal recording.

- Iterative Cross-fade Example 3: Track 30 is iterative cross-fade similar to the previous two examples.

The distinguishing feature of the leopard seal vocalisation is its pulsing, rhythmic quality. In these examples, the two source files are still recognisable, but the smooth nature of the human vocal once processed adopts a more rhythmic pulsing quality that more closely resembles the sound of the leopard seal calls.

5.9.3 Time Expansion and Granulation

The time expansion and granulation processes were effective in abstracting or blurring the original sounds. The following are examples of time expansion and granulation processing:

- Time Expansion Example 1: Disc 16, Track 31 is an example of time expansion processing applied to a grey seal recording.

- Time Expansion Example 2: Disc 16, Track 32 is a time expanded grey seal pup recording.

- Time Expansion and Granulation Example 1: Disc 16, Track 34 is a time stretched and granulated water splash.
Disc 16, Track 38 is one of the pivotal sounds in the work. The original recordings can be heard on tracks 35 and 36 of Disc 16 and a de-noised version on track 37 of Disc 16. As noted above, the sound was created by subjecting the recording of the sub-Antarctic fur seal pup to time expansion and granulation processing. The highly emotive product resembles a human scream. The processed sound is much more exaggerated and dramatic in quality than the original sound and is used in the context of the work to create a sense of drama and climax. The granular processing, when applied to the seal sounds, abstracts the original sound to a point where there is ambiguity as to the source of the sound. It is still recognisably vocal in quality but whether it is human or non-human is not discernable. The processing draws out the emotive qualities of the original sound and highlights the emotive links between seal and human utterance.

Similar processing techniques were applied to human voice in the previous compositional work, *The Mill on the Floss*, generating a scream-like vocal sound (see section 4.5.7). The scream is used in similar ways in both compositions to create a climax or a point of extreme tension. As stated earlier, the scream, according to Wishart (Wishart, 1985), is a universal indicator.

The reason for the similarities between the screams of different species is likely, according to Darwin, to be due to the similarities in the physiological properties between species. Certain experiences, such as fear for example, “cause(s) all the muscles of the body to tremble, the voice naturally becomes tremulous, and at the same time husky from the salivary glands failing to act”; tremulous breathing, therefore, is indicative of fear (Wishart, 1985).

5.9.4 Overall Compositional Structure

In order to explore how an environmental sound becomes a song, one of the structural approaches I took was to start with the real recorded sounds of the seals
and to gradually transform those into the traditional Selkie folk song *Hò i Hò i*. This was done by progressively introducing fragments of the song along with the range of morphed and hybrid sounds. In the performances of *Dan nan Rón*, the presence of the song tended to dominate the piece and made the section prior to the entrance of the song seem more like an introduction. In terms of merging the acousmatic techniques with the traditional folk song structure, therefore, the piece was not as successful as I had hoped. For that reason, I remixed the piece in the studio and avoided introducing the whole song for any length of time.

5.9.5 Live Processing Patch

Several digital processes were used in the AudioMulch patch to carry out live processing of either the live vocal input or the audio files.

The Prosonic NorthPole VST plug-in (Figure 21) was used to process both the human voices and the seal vocalisations according to various presets. Examples can be heard on Disc 16, tracks 50 and 51.

![North Pole VST plug-in processor used for vocal processing](image)

The Velocet Reorder VST plug-in (Figure 22) was used to process and abstract the human voice. Examples can be heard on Disc 16, tracks 52, 53 and 54. This plug-in allowed the vocal sample to be chopped into 16 equal parts and then re-ordered. The speed of playback of the fragments was adjusted to lock in with the other rhythmic elements within the AudioMulch patch.
The DLGranulator in AudioMulch (Figure 23) was used to granulate the guitar part of ‘Hó i Hó i’ and is used to break down the song at the end of the piece. Audio examples can be heard on Disc 16, tracks 55 and 56.

The seal sounds were fed into the comb filter processor, which was tuned to the chords of the seal song. Each chordal changed was stored as a preset. The presets were then automated in the timeline to correspond with the chordal changes of the folk song.
Both the delay (Figure 25) and reverb (Figure 26) are used to vary the perceived physical distance of the sound from the listener.

The cross-fader contraptions (Figure 27) are a convenient way to move between raw and processed materials. In particular, the cross-fader was used to move between the raw and granulated guitar.
The mixer contraption (Figure 28) allows live mixing of levels between the various contraption outputs.

The pulse-comb contraption (Figure 29) was used to process the live seal sounds.
The spatialiser (Figure 30) was used to manipulate the spatial properties of a sound and to create the impression that a sound was moving nearer or further in the depth of field.

![Spatialiser contraption in AudioMulch](image)

Figure 30: Spatialiser contraption in AudioMulch

The Phaser contraption (Figure 31) was another contraption used to process both the seal sounds and the guitar sounds in real-time.

![Phaser contraption in AudioMulch](image)

Figure 31: Phaser contraption in AudioMulch

## 5.10 Performances and Technical Set-Up

*Dan nan Ròn* was performed at the following events:

- ACMC<sup>36</sup> Australasian Computer Music Conference *Waveform* University of Western Sydney, 13 July 2001.

• *Impermanent Audio*37 (Imperial Slacks Gallery) Surry Hills NSW Australia, 15th July 2001

The technical set-up for these performances consisted of: a Pentium III desktop computer (800MHz, 256RAM, running Windows 98 SE); an Emagic EMI2/6 audio interface; a Mackie 1202 mixing console; a SM58 microphone; and AudioMulch version 0.9b7.

5.11 SUMMARY - SELKIE PROJECT

The Selkie Project continued my exploration of electroacoustic composition for voice and technology. The Selkie myth itself provided a rich thematic framework for the composition, and stimulated a number of threads of enquiry, including the exploration of non-human voice and the notion of musical metaphor. The project demonstrates how the myth has been translated by electroacoustic techniques in contrast to traditional western compositional methods, thereby exemplifying Dhomont’s notion that an acousmatic approach begins with the concrete and ends with the abstract and vice versa (Dhomont, 1996).

The project extends the previous work in the portfolio through the exploration and implementation of real-time processing in live performance, thereby providing an opportunity for me to incorporate my live vocal performance skills with my composition. A major accomplishment of this project was that it enabled me to control my own vocal processing in a live performance context and allowed me to use my own voice as accompaniment. One of the drawbacks was the need to sit in front of a computer, which I found physically inhibited my vocal production

37 http://www.impermanent.info/ cited July 2006
6 DANCE WORKS

6.1 INTRODUCTION

Following the Selkie project, I undertook a collaborative project with choreographer/dancer Nell Andrew to create a series of compositions for her dance company Fluid Form. The first and major production was called Beyond the Depths of Silence and was performed at The Edge Theatre, Newtown on February 2002.

Following the success of Beyond the Depths of Silence, the group was then invited to present a series of short performances at the ArtHouse Hotel, Pitt Street Sydney. Some of the works from Beyond the Depths of Silence were revised and re-used in this series along with a selection of new works.

This dance project marks a slight diversion from the main topic of this exegesis in that it does not investigate voice as the primary sound source. The project, however, provided a platform for further exploration of real-time processing for live performance. It provided an opportunity for me to develop skills with Audiomulch software and to explore the relationship between sound and human gesture. This project paved the way for the development of the eMic, which is the final project in the portfolio and what I consider to be the major outcome of this PhD research.

Beyond the depths of Silence was inspired by the ocean as is explained in the following program note:

6.1.1 Beyond the Depths of Silence Program Note

An affinity with the ocean has drawn us to base the theme of the work on just that ... the water. By delving “Beyond the Depths of Silence” we have discovered there to be three layers or ‘zones’ which categorise the ocean’s varying depths, the Midnight zone, the Sunlight Zone and the Twilight Zone. The life inhabiting each of these zones is very diverse. We endeavoured to capture certain aspects of each distinct habitat expressing our interpretation through movement, floor patterns, dynamics, music and colour. We aim to recreate for the viewer the emotional effect of being submerged. The sense of weightlessness, the timelessness, stillness, peace and serenity. The juxtapositions of power and strength, with calmness and surrender.
This is the beauty of the ocean ... come and see it ... embodied
Nell Andrew (2002)

Each of the pieces in the production represents some aspect of the ocean and attempts to capture a unique essence or contrasting mood. The original idea was to create pieces that represented the various layers of the ocean, from the deepest bottom layer (Midnight Zone) where no sunlight penetrates and few creatures survive through to the top layer (sunlight zone), that is abundant with life (Brooks, 2006). The compositions in this dance production characterise the different states of water and explore flow, movement, tension and release.

6.1.2 Water as a Sound Source

Water is a sound source that is used frequently in my work. I am interested not only in the liquid form of water but also its solid and gaseous forms, which also offer rich possibilities in terms of the sound they generate. My interest in water stems from my science studies where I recall learning about the unique chemical and physical properties of the substance. I recall the emphasis my lecturer placed on the fact that water, unlike most other substances, becomes less dense in solid form than in liquid form and hence we have icebergs. While this may seem like a fairly unremarkable principle, it has major ramifications for the existence of life on this planet.

Water is not only fascinating to scientists but also plays a major role in religion, philosophy and psychology. According to Jung, water is the commonest symbol for the unconscious (Jung, 1964). Water is a strong symbol in many philosophical teachings. Taoist leader Lao Tzu uses water as a symbol for wisdom as illustrated in the following translation by Heider.

Water cleanses and refreshes all creatures without distinction and without judgement; water freely and fearlessly goes deep beneath the surface of things; water is fluid and responsive; water follows the law freely. Water is fluid, soft and yielding. But water will wear away rock, which is rigid and cannot yield. As a rule, whatever is fluid soft and yielding will overcome whatever is rigid and hard. What is soft is strong. (Heider, 1992)
Schafer discusses the symbolic significance of water in his book *The soundscape: Our sonic environment and the tuning of the world*. He says,

*The sea has always been one of man’s primary symbols in literature myth and art. It is symbolic of eternity: its ceaseless presence. It is symbolic of change: the tides; the ebb and flow of the waves… It illustrates the laws of conservation of energy: from the sea, water evaporates, becomes rain, then brooks an drivers, and finally is returned to the sea… It is symbolic of reincarnation: water never dies. (Schafer, 1993)*

6.1.3 Water and Music

Many of the adjectives used to describe water can also be applied to music. Water is fluid and subjected to transformation in time, as is music. Water flows at various speeds, it varies in density, frequency content and character.

Given the prevalence of water in the previous Selkie work and in the Mill on the Floss, I already had a substantial library of unused sounds from those work that I could draw upon. The Dance project also provided me an opportunity to re-work and develop some of the materials I did use in the Selkie project.

While the final pieces for the performance were fixed and played back from CD, the compositional process involved me improvising at rehearsals as I watched the dancers develop their choreography. Due to time constraints, not all the materials could be developed this way so we resorted to videoing the rehearsals, which I then took away and watched while generating the music cues.

6.2 BEYOND THE DEPTHS OF SILENCE PRODUCTION:

The performance opened with a video piece of the dancers moving underwater. This served as an illustration of real human movement under water thereby providing a context for the choreography that followed. The accompanying sound for the video was a simple, literal soundscape created from unprocessed water recordings and various water sound effects.

The stretched seal scream (Disc 16, tracks 37 and 38) created for the Selkie work was reused in this work as a transition from the video into the first dance piece
(Disc 9, track 1). The sound was useful for its dramatic impact, which was effective in drawing the audience’s attention to the start of the live dance pieces.

6.2.1 Midnight (trio) and Spindalinae (solo)

The first two dance pieces were titled Midnight (dance trio) and Spindalinae (dance solo). (Disc 9, track 2) Midnight starts at 2 seconds and Spindalinae starts at 8 minutes 50 seconds.

Midnight and Spindalinae represented the deepest layer of the ocean, known as the Midnight zone. It is evocative of the strangeness of this environment and the peculiar movement of the creatures that exist there. The Midnight Zone is completely foreign and hostile to human existence and the inhabitants survive in total darkness and under extreme pressure (Brooks, 2006).

In creating an aural representation of this environment, I felt it necessary to explore the idea of extremities. To this effect, the work combines a mix of extremely high and low frequencies. I thought about the aural sensations I had experienced when diving too deeply under water and recalled there being quite intense high frequency tones, which I decided to emulate in the work.

At extreme depths in the Midnight zone I imagined there to be slow moving currents, slow moving life forms and generally slow rates of change in the environment and therefore used gradual transformations of the sound were used to depict this.

I created a patch in Audiomulch that I could improvise with and play live as I watched the performers (see Figure 32).
Figure 32: Audiomulch Patcher used for the *Midnight* piece

The patcher comprised of:

- Signal Generators - sound file players, loop players and a harmonic sound generator.
- Filters – Nebuliser and Risset Filters.
- Mixers – 6 stereo channel mixer, 2 stereo channel mixer and a 8 x 8 Matrix.

Presets were assigned to each of the contraptions, allowing the performer to alter the processing parameters in real time during a performance.
I recorded a number of these improvisations using the above patch (Figure 32, Figure 33), edited between these takes and then compiled the final piece onto CD to play back in the performance.

6.2.2 Reeds 1 (trio)

As the title alludes, the movement of reeds in an aquatic environment inspires this work. The dance is choreographed for three performers moving in synchronicity. The piece symbolises the ebb and flow of the water currents and the languid, yielding behaviour of the reeds responding to the current (Disc 9, track 3). The sounds for this piece were created by processing and hybridising a range of different water recordings. I then took these sound files into Audiomulch where I was able to play them back using the loop players and further process them using Audiomulch contraptions. As with the previous piece *Midnight and Spindalinae*, I improvised with the material using Audiomulch and once satisfied with the structure recorded this and compiled it onto CD.
6.2.3 Selkie (song)

The dance pieces in this production were intermingled with a number of interludes comprising vocal performances by singer Morika Zelek. This provided the opportunity to re-use the Selkie song Ḥo I Ḥo I from the previous Selkie Project. I used Audiomulch to adjust the arrangement to suit the context of the production, which required a more traditional folk song structure and less digital processing.

6.2.4 Moonlight (trio) and Minnow (solo)

This work represented the top layer of the ocean where the sun penetrates. (Disc 9 Track 3). This layer of the ocean contains most of the oceans plant and animal life. Minnow is the name used to describe small silvery fish\(^\text{38}\) and was used for inspiration for the dance solo Minnow, performed by Rachel Ward.

The composition re-uses the convolved materials created for the Selkie project. Fragments of Ḥo I Ḥo I can be heard throughout the composition and this helps to create a sense of unity between the compositions in this production.

6.2.5 Crashing

_Crashing_ was originally titled _Cracking_ and was inspired by the idea of frozen water; water in its most solid, rigid state. The choreographer later changed the title to _Crashing_ which in the context of the whole production tended to conjure up the idea of shipwrecks from many audience members. The piece primarily explores the notion of tension and release.

The main sound source is very close-miked recordings of foam being broken. The foam sounds are accompanied by an array of creaking objects such as doors, beds and chairs. The choreography is extremely challenging physically and the sound helps to build anticipation and tension. The physical strain is evident both visually and aurally. The use of cracking sounds in this work illustrates Smalley’s suggestion that we “follow and interpret a sound’s energy and spectral shaping through time

\(^{38}\) [http://fish.dnr.cornell.edu/nyfish/Cyprinidae/cyprinidae.html#Moreaboutminnows](http://fish.dnr.cornell.edu/nyfish/Cyprinidae/cyprinidae.html#Moreaboutminnows) cited May 2006
with the potential to correlate this with muscular actions, tensions and releases (Smalley, 1997, Young, 2002). It is an excellent example of the use of musical metaphor as was discussed in 5.4 Myth.

6.2.6 Twilight and Bioluminescence

*Twilight and Bioluminescence* were the final pieces in the Production. These pieces represent the middle layer of the ocean zone where plant life does not exist due to the lack of sunlight. Many of the creatures that inhabit this zone are able to produce their own light sources hence the use of *Bioluminescence* in the title for the piece.

As with the earlier works, this one was also partially improvised and recorded while watching the performers rehearse, then the final take was compiled from the improvisation sessions. The patch for this piece can be seen in Figure 34. I set up a timeline in Audiomulch (see Figure 35 and Figure 36), which included automation of the drums and rhythm section along with some of the other processing parameters. I then improvised with the remainder of the contraptions and settings in the contraptions window.
6.3 CRASHING II

I reworked the materials from the *Crashing* piece for a concert presentation as part of the Australasian Computer Music conference in Melbourne 2003. The dancer, Nell
Andrew, could not make the trip to Melbourne due to illness and the piece was therefore reworked as a Dolby 5.1. surround piece using Logic Version 4 as the mixing interface. This piece can be heard on Disc 10 (the format is DVD-Audio, so can only be played on a machine that will read this format).

6.3.1 Crashing II in the i a u d i o Festival

A stereo version of Crashing II was included in the i a u d i o Festival at the Performance Space, Sydney, Australia, September 2003. This can be heard on Disc 9, track10).

6.4 CRYSTAL CLEAR REMIX

Following the production of Beyond the Depths of Silence, I was approached by the dance school at the University of Western Sydney, who were also doing a project with a water theme. The project was called Crystal Clear and was a partnership between Sydney Catchment authority and the University of Western Sydney. The aim of this project was to educate high school students about water conservation through the use of performance.

I reworked the material from Beyond the Depths of Silence to create a piece for a portable water sculpture that was purpose built for the project. The dancers used the Water sculpture as a stage prop, interacting with it and moved around it during their performance. This piece can be heard on Disc 9, track 10.

6.5 AUTOPilot - THE CAR HORN PIECE

I continued to work with choreographer Nell Andrews on a number of productions that took place at the Arthouse Hotel in Pitt Street Sydney. One of the performances titled Autopilot, gave rise to a composition I call the Car Horn Piece.

Autopilot was based on the idea of repetitive human movement, the movement of everyday life that we become unaware of and carry out, without the need for conscious thought. The choreography for the Car piece was based on the repetitive movements we undertake when driving a car.

I was interested in exploring this idea in relation to sound and listening. As was discussed in 2.4, when we hear a sound frequently, we are able to give the sound less focus even though we still hear the sound and are aware of it’s presence. The composition for this piece uses the sound of car horns. I was interested in my experience of this sound and the immediate associations it conjures up. The car horn is a sound designed to alert the listener, it is associated with the car and hence there is a direct connection made with choreography. The car horn is such a prevalent sound in a city sound scape that it often becomes part of our background listening. I tried to explore this idea in this composition. I obtain numerous recordings of sound horns of various pitches and durations and subjected these to time expansion and granulation algorithms. I created two versions of the composition; the first uses only processes car horn sounds (Disc 9, track 8) and was freer in terms of rhythmic structure, while the second version used drum beats and a more rigid structure (Disc 9, track 9). The processing abstracts the sound and gives it a trance like, dreamy quality reminiscent of my experience of background listening in a city sound scape.

6.6 SUMMARY - DANCE WORKS

The dance collaborations provided an excellent opportunity to hone my skills with the real-time performance software Audiomulch.and most importantly to explore the relationship between sound and the human body which is paramount to the eMic project.
7 EMIC: THE EXTENDED MICROPHONE STAND INTERFACE CONTROLLER

7.1 INTRODUCTION

This chapter describes work undertaken to develop a gestural-controller interface for contemporary vocal performance and electronic processing. The device known as the eMic (extended microphone-stand interface controller), is a modified microphone stand, custom fitted with an array of sensors and devices aimed at capturing new and commonly used gestures and movements of vocal performers who use microphones and microphone stands in electroacoustic performance.

This project is the major outcome of this PhD research. It is a culmination of the recurring web of ideas generated from each of the works in the portfolio and successfully brings together my practice as a vocal performer and compositional approach using recorded sound. The eMic unites composer and performer, it moves the vocalist into a more active creative engagement in the music-making process, as opposed to existing musical models where the vocalist is viewed as a relatively passive participant. This view is common in the popular music domain.

The chapter includes a discussion of the gestures and movements of vocalists who use microphones and microphone stands. This repertoire of gestures forms the foundation of a well-practiced language and social code for communication between performers and audiences, and serves as a basis for alternate controller design principles. The chapter explores mapping strategies, early compositional experiments and the use of the eMic in live performance, identifying the successes and shortcomings of the interface and areas for possible exploration and further development.

7.2 BACKGROUND

Contemporary vocal performance is rarely achieved without amplification and the use of a microphone. The microphone has become a performance tool of the contemporary vocalist and a means for extending the voice as an instrument. Given that the microphone is such a prevalent tool and that it is, in a sense, played by the
performer, it is possible to extend this idea to include its use as an interface for real
time electronic music performance by capturing gestures via the microphone and
stand, in order to derive control signals which are sent to a sound engine located in
software on a computer.

The motivation for developing the eMic was to address some of the
problematic technical and aesthetic issues associated with electro-acoustic vocal
performance practices. In contemporary music styles such as rock, pop and folk
music, vocal performers often have limited control over the sound of their voices
through the sound reinforcement system. Once the sound enters the microphone, any
additional signal processing such as filtering, reverberation, distortion, granulation,
delay effects added to the vocal signal, are usually carried out by a sound mixer or
third party. Often these effects are of an intrinsically musical nature and are closely
allied with other vocal production techniques employed by the performer.

The desire for vocalists to harness the available digital signal processing
 technologies to extend the voice as an instrument has given rise to a trend in the use
of computers in performance to carry out real time digital signal processing (see
Figure 37). This practice, however, raises issues concerning the performer’s
relationship to the audience. The most commonly cited ‘deficiency’ in laptop
performance is that, with the performer seated behind the laptop, there is an inherent
lack of gestural communication between performer and audience owing to the fact
that the gesture is so small and often hidden from view. As a result, the performance
can have a detached, non-communicative quality (Cascone, 2002).

Figure 37: Example of laptop performance using live vocal input - Donna Hewitt Impermanent Audio 2002 49.

49 Impermanent Audio, Regular Live Performance Event. Frequency Lab, Sydney, Australia (August 2002)
http://audible.net/impaud/archive cited August 2002
The other perceived limitation of the laptop performance is that the posture of sitting at a computer when trying to vocalise may be physically inhibiting to vocal production. The photographs in Figure 37 and Figure 38 show laptop and desktop computer performances, respectively, where the performer (Donna Hewitt) is using live vocal input. In Figure 37, the performer is seated in front of a laptop, and in Figure 38, the microphone is placed between the performer and the computer screen.

In summary, the main goals in developing the eMic were to:

• increase and improve the control a vocal performer has over the sound of their voice in a sound re-inforcement system;

• allow for extended vocal technique via electronic processing;

• improve for audiences the visual/communicative experience of vocal performances that utilise signal processing; and

• overcome the physical inhibition of vocalising from a sitting position, which occurs in laptop-type performances.

---

7.3 DESIGN RESEARCH

In developing the eMic the following areas of research were undertaken:

- A study of the gestural qualities of vocalists, to identify common aspects of the language.

- Identification of the most effective means of capturing vocal performance gestures by making use of available sensing technologies and hardware.

- Development of the most effective means of mapping gesture onto sound in order to produce a flexible and playable instrument.

7.4 GESTURE

7.4.1 Gesture Principles

The broad principles of gestural control have been discussed in the existing literature (Garnett and Goudeseune, 1999, Rovan et al., 1997, Sapir, 2002, Wanderley, 2001). The term gesture refers to the bodily movements that allow a performer to “interact with their environment, to modify it and to communicate” (Cadoz et al., 1984). Vocal performers employ a wide range of gestures during performance. This thesis is specifically interested in performers who use microphones and microphone stands. This practice is prevalent among vocalists in the popular music domain, where microphones and microphone stands become integral parts of the performance. They are used as props and, more importantly, as a means for the vocalist to influence the sound of their voice through the amplification system. Combining significant observation with personal experience of this type of performance, this study identified and categorised recurring gestures. These gestures were used to help determine aspects of the controller design.

Although the gestural principles were derived from a study of popular music, it is envisaged that the eMic will be able to be used in a wide range of musical contexts. The eMic may, in time, allow for a whole new set of gestural practices to be developed, as has been evidenced by developments of other electronically
extended musical instruments. For example, the sensor bow described in (Bahn et al., 2001) required string players to ‘modify their traditional technique’ and showed how certain techniques were effective for the new sensor bow but not useful for playing the traditional string instrument.

For a vocalist, the body itself is the instrument. Playing the instrument requires control of various body parts interacting with the breathing apparatus, vocal articulators and resonating cavities. Vocal performers, as with most traditional instrumentalists, also move in other ways, which may not be directly involved in sound production. “These gestures have been labelled as expressive, accompanist, ancillary or non-obvious” (Wanderley and Depalle, 2001). Studies show that a wide range of expressive information is present in, and can be drawn from, the bodily gestures of a performer (Davidson, 1993). Gestures provide interpretive cues for audiences and are “by-product of psycho-physical, social and cultural practices surrounding performance” (Davidson, 2001).

The observations in this thesis focused on how the performer approached and/or touched the microphone and microphone stand, and what movements and physical interactions commonly occurred between the performer and the microphone and microphone stand during performance. A comprehensive understanding of the function of these microphone gestures is a vast area for further study, and one that will provide valuable insight into creating an effective mapping strategy.

7.4.2 Microphone Gesture

While every performer possesses a certain number of idiosyncratic movements and gestures, it was possible to identify a number of common interactions and gestures associated with microphone and microphone stand use. These are broadly outlined below:
7.4.2.1 Physical Interactions

These gestures include physical interactions where the microphone stand is physically touched in some way. The main categories of physical interactions follow.\footnote{It should be noted that the gestures depicted in this section are primarily from male performers. It is not within the scope of the study to compare gestures from male and female performers, more to capture well-known and commonly used gestures from prominent performers. The intent was to find gestures that could inform the developments of the sensor based system within the eMic and not to reflect on the gender differences between male and female performers.}

7.4.2.2 Grasping Gestures

Grasping the microphone


Figure 40: Sex Pistols, Johnny Rotten\footnote{Anarchy in the UK, The Filth and the Fury – A Sex Pistols Film. Directed by Julien Temple. USA, Warner Home Video (2000).}
Figure 41: Janis Joplin\textsuperscript{45}

Grasping the stand

Figure 42: The Doors, Jim Morrison\textsuperscript{46}

Stroking the stand (sliding hands up and down the stand)

Figure 43: Mariah Carey\textsuperscript{47}

\textsuperscript{45} Janis Joplin Photograph taken at the Avelon Ballroom, San Fransisco Robert Altman photograph http://www.altmanphoto.com/Instant.JPEGS.byGallery.html


4.2.1.2 Stand Moving Gestures

Tilting the stand

Figure 44: Red Hot Chilli Peppers

Figure 45: Janis Joplin

Figure 46: Midnight Oil, Peter Garret

Figure 47: INXS, Michael Hutchence


50 So You Want to be a Rock Star. Music documentary directed by Ray Argall, Sydney, Australia. Produced by Christina Pzzan, Daniel Scharf, Ray Argall & The Australian Film Commission (1987).

Moving and swinging the stand

Figure 49: James Brown (James Brown throws the stand and reins it back in with the microphone lead)

Straddling the stand between the legs

Figure 51: The Doors, Jim Morrison

4.2.1.3 Tapping

Foot tapping the base

Hand tapping the microphone and stand

4.2.1.4 Other

Altering the stand height

Moving the microphone in and out of its clip/holder

Figure 52: Red Hot Chilli Peppers

7.4.3 Free Arm/Non-Contact Gestures

Vocalists make a lot of free arm gestures, where they do not touch the stand but move their arms, hands and bodies around it. In these instances, the microphone and stand provide a focal point around which the performer works or interacts, and act as a point of spatial reference for non-contact gestures. These gestures include open hand gestures (palms facing toward the stand) and caressing-type gestures (where the hands do not make contact with the stand but move around it).

7.5 FUNCTIONAL AND CONTEXTUAL ASPECTS

Preliminary observations of vocal performers show a number of relationships between intent and physical gesture; for example, the increased grip strength of the microphone and stand most often correlate with an increase in tension in the musical intent. Performers tend to grasp the stand in a more aggressive manner when conveying more violent or angry passages, while delicate stroking seems to occur more often during gentler passages. However, gesture in performance is a complex system, which is mediated by contextual factors. That is, gestures do not always have the same meaning or function, and the mapping of each gesture needs to be considered in its unique musical context.

The congruity between gesture and intent is particularly important for a vocal performer due to the close ties between the body, psychological state and the sound produced, since “the body cues the mental representations of the music” (Davidson, 1994). Singers often employ learned or mimetic gestures in performance, and many vocalists carefully choreograph their movements to achieve various effects such as cueing other musicians (i.e. conducting), or perhaps to create a deliberate expressive effect or to elicit a response from the audience. Singing teachers often teach singers

---

what to do with their hands in order to furnish a performance with expressive intention. Gellrich (Gellrich, 1991) has suggested that these learned gestures can have both a positive and negative effect on a performance. It has been shown that learned, mimetic or choreographed gestures can be problematic for communication with an audience when the gestures are incongruous with the intent (Gellrich, 1991). It may, therefore, be desirable for a performer’s gestures to appear as natural and organic as possible. The eMic, however, does not dictate such relationships.

While vocal performance lends itself to study, valuable insights may be gained by looking at gesture in the context of verbal communication in general. Davidson (Davidson, 2001) has shown that a singer’s gestures correspond with conversation-related gestures. In gesture associated with speech, it seems that the listener relies more heavily on gesture for interpretation when the speech is ambiguous (Thompson and Massaro, 1986), or as background noise increases (Rodgers, 1978). In applying these observations to a musical context and by noting the importance of gesture in situations with higher background noise, it is possible that in musical performance the presence of other musical elements around the vocalist increases the importance of gesture where the intelligibility and the meaning and intent of the lyric text are of prime importance. There is evidence of this in popular music performance practice, where an increase in gestural activity can be observed in situations where the vocalist is wishing to articulate the lyric clearly to the audience. Gesture is thus an important functional and expressive device for making the text intelligible for the audience and is an important means for expressive communication between the performer and audience.

7.6 INSTRUMENT DESIGN - EMIC

Interfacing the voice and electronic processing requires a) sound capture; b) a gesturing device for control input, i.e. something that the performer touches or moves to create the required control information; and c) a signal processing engine which takes the captured audio and processes it in real time. The instrument is thus a gesturally responsive device that bears a relationship to an acoustic instrument in that the performer touches or moves something in order to produce and transform sound. For a vocalist, the logical signal source for an electroacoustic instrument is a
microphone output. The microphone is generally placed on a microphone stand, making the microphone stand itself a logical choice as a gesturing device. The proposed design, therefore, is an instrument resembling a microphone stand with the parts made active as gestural controllers. The microphone stand resembles a large multi-axis joystick with various buttons, sliders and sensors, and will serve the function of a controller device. The aim is to capture the common gestures that have been identified earlier.

The eMic is a logical adaptation of the device that many vocal performers are comfortable handling. The design aims to minimise “physical retraining” by “retaining a physical interface that is functionally very similar to the practiced instrument” (Garnett and Goudeseune, 1999). By choosing common gestures, the intent is to make the system more intuitive and accessible to a larger number of performers. The microphone stand is an extremely popular, widely used device that has endured historically as a result of its ergonomic suitability. The other advantage of the microphone stand is its familiarity for audiences. This allows the relative social codes and cultural connections associated with the interface and performance to be maintained. By re-integrating the body into the social context of music performance the device is attempting to address the perceived lack of somatic/corporeal presence in the performance of electro-acoustic music, an issue raised by Bahn (Bahn et al., 2001).

7.7 PROTOTYPE FEATURES

7.7.1 Overview

The microphone-stand interface device must provide a range of simple mechanisms to capture the characteristic gestures listed above. The control systems must be simple and intuitive but must not restrict the virtuosic performer. There is no fixed relation between control signal and sound processing.
The transducers employed in the prototype are detailed below.

7.7.1.1  Microphone Holder Joystick

The standard microphone holder allows the microphone to pivot front to back enabling the capture of microphone tilt movements. This arrangement is augmented with a dual axis pivot arrangement with a simple linear relationship between microphone angle and control signal across two orthogonal axes. The microphone holder joystick is fitted with a return spring stiff enough to support the microphone even when the stand is tilted.

7.7.1.2  Slide Sensors

Microphone stand grasping and stroking gestures are captured with two 300 mm linear resistive pressure/position sensors fitted on either side of the stand. These
sensors may be used as continuous controllers or as multi-position discrete switch inputs to be decoded in software.

![Image: Right slide sensor](image1.png)

**Figure 57: Right slide sensor**

### 7.7.1.3 Distance Sensors

Free arm gestures can be captured with a distance sensor that can be played in a Theremin-type manner. Two optical sensors with a range of 400 mm are fitted just below the microphone holder on either side of the stand.

![Image: Distance sensors](image2.png)

**Figure 58: Distance sensors**

### 7.7.1.4 Tilt Sensors

Microphone-stand tilting, swinging and moving gestures can be captured with a dual axis tilt sensor. This custom-made device captures the fixed gravitational acceleration across two orthogonal axes, providing tilt sensing in X and Y planes. In addition to capturing the tilt of the stand this device will also capture rapid acceleration due to impacts on the stand from hitting, kicking or dropping.
7.7.1.5 Microphone Holder Pressure Sensors

Microphone grasping gestures can be captured with two small pressure sensors attached to the microphone holder.

7.7.1.6 Foot Pressure Sensors

Foot pressure on the base of the stand is captured using a simple pressure sensor.
7.8 CONTROL SYSTEMS

Many commercially available and experimental real-time signal-processing devices are fitted with the Musical Instrument Digital Interface (MIDI). In addition to this there is a range of commercially available analogue to MIDI interfaces. The availability and wide use of the MIDI interface is its main benefit. The most significant disadvantage of MIDI is its limited resolution. MIDI may easily be substituted with a floating-point control system such as Open Sound Control or other system-specific messaging systems such as Max/PD (Puckette, 2003). Part of the composition process will be concerned with finding mappings from available physical controls to signal processing parameters. The system must be flexible in providing unlimited mapping arrangements.

7.9 INTERFACING

The prototype system employs a simple interfacing strategy based on ready availability of components, simplicity, and reliability in performance environments. The components can be easily removed to protect them while travelling.

7.9.1 Multi-core Cable

This simple interfacing method provides reliability and low-cost construction. FM radio data transmission devices may replace this method.

7.9.2 CV to MIDI Converter

A low-cost control voltage to MIDI converter made by Angelo Fraietta (Fraietta, 2002) is used. This device provides sixteen inputs for analog to MIDI conversion.

7.10 CONTROL FEEDBACK

The tactile controls employed in the system provide inherent positional feedback. The choice of non-mechanical sensing technology in the tilt sensor provides the user with the familiar ballistic response associated with conventional microphone stands. The non-tactile distance sensor provides no positional feedback. These sensors
require either advanced technique or reduction of sensitivity or resolution in the control mapping stage. Slide position sensors are fitted with tactile detents for positional orientation or multi-position switch use.

7.11 APPLICATIONS

The microphone-stand interface device will find applications in a range of contemporary performance situations. Popular commercial music increasingly employs specialised vocal processing systems. This interface allows these systems to come under direct control of the performer, thus providing scope for new avenues of musical expression.

In the field of experimental electro-acoustic music and performance art, advanced control systems have a long history. This device fits neatly into this field, where the performer is often inhibited by clumsy general purpose computing interfaces.

7.12 MAPPING AND COMPOSITIONAL APPROACHES

7.12.1 Mapping Definition

The term mapping is generally used to describe the relationship between the performer’s input and the associated signal processing parameters, or the relationship of the performer’s gestures and interactions with an instrument or interface to the sonic outcomes.

While there is considerable discussion of mapping in the existing literature, which has identified various issues and approaches to be considered in creating an effective mapping strategy, every mapping strategy needs to be considered in its unique musical and performance context.

7.13 SOFTWARE – CHOICE OF SYNTHESIS OR PROCESSING ENVIRONMENT

The degree of flexibility of the mapping strategy is largely determined by the software environment in which it will be applied. This will depend on the technical proficiency of the individual user and/or the desired musical outcome. Composers
may be drawn to specific processors available in different software packages that are perceived to have unique characteristics, that is, each implementation of a processor has a different sonic quality and one implementation may be more desirable than another.

On the PC platform, lower level programs such as Miller Puckette’s PD (Puckette, 2003) provide more data manipulation and more flexible data structure than higher level programs such as AudioMulch (Bencina, 1997), which may be more user friendly, offer a more intuitive graphical interface and be less time consuming in the creation of patches.

Further, the notion of instrument design and composition in this realm extends to software programming, in that all elements are intrinsically related. This makes the choice of software as critical an issue as hardware design of gesture sensing, and in a sense makes computer software skills part of the composer’s/performer’s technique.

7.13.1 Experimental Compositional Approach versus Fixed and Repeatable Approach

There are two fundamental approaches to the question of control mapping. On the one hand, there are those which see mapping as an integral part of the experimental process of composition, and on the other hand, there are those which identify the requirement for fixed and repeatable mapping of gestural input to system control outcome (Hunt et al., 2000).

The desire for a fixed, repeatable approach may exist among users with less technical proficiency in software, and may, therefore, be useful in a commercial product, which combines ease of use and repeatability with enough scope and challenge for a performer to become virtuosic. Wessel and Wright (Wessel and Wright, 2002) describe this approach as having a “low entry fee with no ceiling on virtuosity”.

A fixed approach to mapping would see the most common gestures and intentional relationships between the gesture and musical outcome forming the basis for the mapping. This approach by nature limits flexibility in favour of repeatability and commonality.
Responses from initial demonstrations of the eMic indicate that there is significant interest from vocalists with little or no experience in electronic media, suggesting demand for such an approach.

In an attempt to balance ease of use with flexibility, the initial eMic mapping experiments embrace elements of both these approaches.

### 7.14 DETERMINISTIC MORPHOLOGICAL RELATIONSHIPS VERSUS ARBITRARY MORPHOLOGICAL RELATIONSHIPS

A morphological relationship is the relationship between the physical gesture and the sonic outcome. A deterministic morphological relationship is one that maintains congruity between the musical intent, the expressive aspects of gesture and the sonic outcome, where, for example, delicate stroking of the microphone stand produces intimate or subtle sonic outcomes and where violent movements produce more dramatic, intense outcomes.

In studies of vocalists and pianists, Davidson (Davidson, 1993, Davidson, 1995, Davidson, 1994), found that in many contexts the audience relies on physical gesture to deliver much of the information concerning expression and musical intent. This would suggest that deterministic morphological relationships play an important role in both vocal and piano performance. Similarly, Wessell and Wright (Wessel and Wright, 2002) contend that in electronic music performance there should be a correspondence between

> the size of a control gesture and the acoustic result. Although any gesture can be mapped to any sound, instruments are most satisfying both to performer and the audience when subtle control gestures result in subtle changes to the computer’s sound and larger more forceful gestures result in more dramatic changes to the computer’s sound.

Both of these arguments are focused on ‘performance as spectacle’ or the spectacular aspects of gesture. A major problem with Wessel and Wright’s assessment, however, is that it does not address the performer’s needs in relation to gesture, which may or may not accord with their subjective (audience focused) judgments. It could be argued that the need for precise control of sonic materials is equally as important as the need for visual stimulation, and that any mapping strategy must offer a high degree of control alongside visual spectacle.
It could thus be said that in some contexts it may be important to strive for compatibility and a logical relationship between the physical gesture and sonic outcome of that gesture. In other creative contexts however, it may be desirable to use more arbitrary, non-correlating mappings which are based on the performer’s need to have precise control of materials. Such mappings may bring about unexpected results from the perspective of the audience, or at least obscure the direct correlation between gesture and sonic outcome. It could further be argued that at times, and as a deliberate performance strategy, it is valid to create tension between what is visible and what is not, and this might be an effective way of maintaining audience interest.

7.15 PRIMARY GOALS IN MAPPING AND COMPOSING FOR THE EMIC

In addressing the goals of the eMic, the mapping strategy so far constitutes a balance between the spectacle of the performance and the performer’s need for control over the sonic space. The audience needs to have a satisfying communicative relationship with the performer, and the performer needs to create a workable relationship with the audience which meets the requirements for satisfactory control of the sound source and allows high-level performance skills to develop. This process of balancing acknowledges both aspects of performance practice as opposed to only one, with a view to engaging with performance in a more sophisticated fashion.

7.16 INITIAL MAPPING EXPERIMENTS – EARLY WORKS

The first composition and mapping strategy for the eMic used a combination of Miller Puckette’s PD and Ross Bencina’s AudioMulch. All of the audio signal processing occurred within AudioMulch, while PD was used primarily for additional signal conditioning of the MIDI data. The rationale for choosing AudioMulch as the signal processing platform for the audio included its ergonomic interface, the ability to utilise VST plugins along with AudioMulch processors, MIDI capability, automation control, the ability to use pre-prepared material or samples, relative low latency, access to the author Ross Bencina, affordable pricing, and familiarity. Familiarity was important because there was limited preparation time prior to the
first performance presentation. At the time of the first work AudioMulch lacked extensive signal conditioning capabilities, so PD was used to carry out the MIDI signal processing.

The initial mappings were primarily one-to-one mappings, that is, one gesture to one parameter, with some additional mappings being one to many, that is, one gesture to numerous parameters. Research by Hunt, Wanderley and Kirk (2000) suggests that mapping strategies that are not one-to-one can be “more engaging to users than one-to-one mappings” and they found that these more complex mappings, although promising more “long term potential, cannot be learned instantaneously”. The rationale for one-to-one mappings with the eMic at this stage of the process was primarily to make the interface easier to use and learn. Complexity was attained through the use of the AudioMulch’s matrix feature to open and close processors along with programmed automation to change the mapping function of the various eMic controls.

Composing for the eMic yielded some surprising results and challenges. Working with heavily processed vocals in live contexts can be challenging for a performer in that the voice, unlike other instruments, is contained within the body, and there is a strong subconscious element in the process because we learn to control the muscles of our voice in early childhood. The muscular motor programming of the voice is mediated by aural and other bodily perceptions and there is a very tightly connected feedback system between vocal production and perception. Introducing electronic processing of the voice interferes with this feedback flow and makes control of the voice much more challenging. A common approach in the compositional phase is to record the voice as a sound file, and then experiment with mapping, using the sound file as a substitute for the live vocal. This has the advantage of freeing up the composer from vocalising while they work on aspects of mapping. A problem arises, however, when one reverts to using live vocal, in that the interference of the processing in the perceptual feedback loop can pose obstacles for the vocal performer and can make it difficult for the vocalist to control the sound they are intending to make. On a smaller scale this is often seen when singers use a microphone for the first time. They often have trouble pitching and controlling the voice because they are not used to hearing their voice back through a sound system, which effectively interferes with the feedback loop they are accustomed to.
Assuming that it is not acceptable for the performer to wear headphones (which would mean no processing is heard) it may be preferable to adopt a different compositional approach, one that would integrate the live vocal input into the experimental/improvisational stages of composing. This would ensure that the vocalist experiences the processed feedback and that the composition accounts for the aural feedback issues. A positive aspect to this limitation is that the body is necessarily re-integrated into the music making process, the body historically having played a ‘minor role in the creation and performance of electronic music’ as identified by Bahn, Hahn and Trueman (Bahn et al., 2001).

Similarly, with the control of the eMic, the musical outcome is likely to benefit from the integration of the body into the compositional process. While the interface is physically independent from the sound source and sound processing engine, the process of mapping and composing are so tightly linked that physical interaction and experimentation with the interface are necessary throughout the composition process; the eMic interface is a “much more gestural or ‘instrumental’ than conventional computer interface devices” (Bahn et al., 2001) such as a computer keyboard and mouse.

7.17 AUDIO CONTROL AND SIGNAL NETWORK

Figure 62 shows the overall signal flow for the initial performances. The performer is at the centre of the technology, both as sound source and controller of sound processing. The eMic controller puts out voltage control messages, which are converted to midi messages via Angelo Fraietta’s Dumb Controller (Fraietta, 2002). The signals then either pass through PD unchanged or have some conditioning, such as smoothing of jitter, applied. PD provided additional midi data control (for example, locking off or holding parameter values (Figure 76 and Figure 75)) that was not available at the time in AudioMulch. The signal then loops back out through the midi converter and back into AudioMulch where it controls the various processors. The live vocal signal processing is performed in AudioMulch, arriving via a small sub-mixer followed by an external USB audio device, the emi2/6.
7.18 MAPPING EXAMPLES

This section shows some examples of the mappings that were used. The right slide controller shown in Figure 63 was used to control the amount of signal being processed. It was used to balance the wet and dry vocal or to control the amount of processing of either the live vocal or pre-prepared material. The left slide controller was used to control the pitch shift parameter in the GRM Tools Shuffler VST plugin.
The Y axis (left to right) of the joystick shown in Figure 65 was used to control a GRM Tools bandpass sweep shown in Figure 64. The joystick X and Y axis were also controlling the GRM tool shuffler fragment and envelope parameters, respectively.
The foot pressure sensor shown in Figure 66 was used to control the amount of vocal affected by the GRM bandpass.

The foot pressure sensor on the microphone clip was used to control the spectral blurring parameter of the Spectral Monkeyage VST Plugin. When the sensor is released the freeze parameter becomes engaged.
The rear pressure sensor on the microphone clip was used to control the frequency parameter of the AudioMulch PulseComb processor.

Figure 68: AudioMulch PulseComb

Figure 69 shows the response curve applied to the front grip sensor controlling the frequency parameter. A direct linear relationship in this case was not desirable from a performance point of view.

---

56 www.shiny-fx.com - cited March 2003
The left and right optical distance sensors on each side of the microphone stand were used to control the AudioMulch Delay parameters. The left hand sensor is controlling the send and the right hand is controlling the feedback. The non-linear output of the distance sensors along with its non-tactile nature proved the more challenging in terms of mapping and was not implemented until the second performance, although audience feedback suggests that the mapping employed was a successful and visually satisfying relationship.

The Y axis of the tilt sensor (Figure 71) was used to control the velocity parameter of the AudioMulch Spatialiser processor shown in Figure 72. The X axis of the tilt sensor, from an upright position to forward tilting position, was used to control the Doppler parameter of the AudioMulch Spatialiser (Figure 72). The X axis of the tilt sensor, from an upright position to a backward tilting position (towards the
performer), was used to control distortion effects via a VST plugin called Electrofuzz.

![Playing the tilt sensor](image)

Figure 71: Playing the tilt sensor

![AudioMulch Spatialiser](image)

Figure 72: AudioMulch Spatialiser

The left push button on the joystick encasement (Figure 73) was used to lock off the joystick parameters while the middle and right buttons were used to increment and decrement through the presets of the AudioMulch Matrix (Figure 74). The incrementing algorithm was carried out in PD and is shown in (Figure 75). The matrix was set up so that moving through the presets would open and close various processors. The transitions between these presets were made smooth by the fade control feature within the matrix.
The front foot switch on the base of the microphone stand (Figure 77) was used to lock off the tilt parameters, while the middle and rear foot switches were used to open and close various processors and files players used for accompaniment. Figure 76 shows the PD algorithm, which enabled locking off the tilt parameters and smoothing the tilt sensor data stream.
Figure 76: PD patch showing signal conditioning of the tilt sensor’s jittery signal and the switch control allowing
the tilt sensor to be locked off

Figure 77: Toggle Switches on the stand base

7.19 INITIAL SOLO PERFORMANCES

The eMic was initially used in the following solo performances:

- ¼ Inch at the Frequency Lab, 16th May 2003, Sydney, NSW, Australia – Regular Experimental Performance event.
- NIME – 03 (New Interfaces for Musical Expression Conference) concert, 24th May 2003, McGill University, Montreal, Canada.
7.20 FEEDBACK AND AUDIENCE RESPONSES

Audience responses and feedback can be considered useful research for the development of the eMic interface. Consistencies in the feedback aid in the identification of successes and shortcomings in terms of audience reception, and some of these are outlined below.

Initial experiments suggest that audiences respond positively to moments where real-time vocal input takes place. One reason for this may be that in the presence of the microphone and microphone stand there is an expectation or pre-conceived notion that singing will occur, and a corresponding disappointment during moments when the performer focuses on sensor control without live vocal input. This reaction is probably the result of conditioning by existing vocal performance practices. It may also be that the connection between cause and effect (gesture and sonic outcome) are most obvious when there is vocalisation, as this is where the audience may get their “clues as to whether there is any essentially ‘live’ (human produced) activity” (Emmerson, 1996).

A number of audience members suggested that in the dense sections of the composition it was not possible to determine what the vocalist was doing and the mapping relationships became obscured to the audience. A consideration of pre-existing contexts may help to interpret this reaction. The voice is traditionally perceived as a solo instrument, which should be heard above a background texture. According to Frith (Frith, 1996), the microphone has “drawn attention to the place of the voice, to the arrangements of sounds behind and around it. The microphone allows the voice to dominate other instruments whatever else is going on.” The role of the live voice in the initial compositions designed for eMic performance however, differs to existing contextual models. The vocal can be transformed into thick textural accompaniments and processing can be so extreme that the voice becomes difficult to recognise. In practice, as the voice becomes more processed, it can start to become a texture as opposed to a line above a texture, thus subverting expectations in relation to familiar musical and performance models.

The composer can decide whether the voice is solo or accompanied by treated vocal or electronic elements. Whatever the compositional choices, the composer needs to consider the communicative experience with the audience. One approach
that was adopted in response to the density issue was to have contrasting sections of
the work where the texture became quite minimal and the connections between
gesture and sonic outcome more transparent.

Another performance issue raised by audience feedback was the necessity for
the performer to look at the screen. Ideally, a developed, well-rehearsed practice
would require minimal visual feedback via a computer screen. If the performer is not
familiar with the eMic, however, the desire to stare at the screen would be attributed
to performance anxiety, lack of practice and familiarity with the interface, habit from
rehearsing without an audience and a need to ensure the software is functioning
correctly. Until the performer is comfortable with the eMic it might be more useful to
situate the screen in a position that requires less head turning, such as in front of the
performer rather than to the side. As the system becomes more stable and reliable the
performer is likely to be more confident and hence independent of the visual
feedback.

Responses from the audience suggest that some audience members were
making imagined correlations between the gestures they were seeing and the sonic
outcomes. This generally seemed to happen in the more dense sections of the piece
where direct mappings became obscured. This is obviously a complex issue and
requires further investigation as to precisely why this effect is so widely experienced.
It may be that, due to the unfamiliarity of the gestural interface, the audience are so
actively engaged in the process of reading gesture that they read meaning into non-
functional gesture.

Regarding eMic controls, feedback suggested that the more dramatic gestures,
such as the tilting of the stand, were more satisfying for the audience. Although
useful for the performer as a visual device, such larger gestures take more time to
execute and are less efficient in generating control data. In contrast, some of the
smaller, less visible gestures, such as the pressure and slide sensors, provide much
finer control over the sonic material in that they are highly efficient in generating
control signals. Audience feedback is therefore useful in testing the balancing of
needs described earlier in this paper.
7.21 COLLABORATIONS WITH THE EMIC

The eMic was used to undertake some collaborative work with other artists. Two pieces were performed with laptop artist Julian Knowles. At the time of writing this document, the first composition, *Nodule*, had been performed at the following events:

- *Disorientation* Lanfranchis Memorial Discotheque, 10th June, 2004, Chippendale, Sydney, NSW, Australia.
- *Intercultural Creativity Conference*, 15th July, 2004, University of Western Sydney, Sydney, NSW, Australia.
- *Discollaboration* 2MBS Contemporary Collective@Newtown, 3rd September, 2004, Sydney, NSW, Australia.
- *Sound no Sound*, Bat n Ball Hotel, 5th September, 2004

A version of the work can be heard on Disc 12, track 2.

Snippets of video from the *Nodule* performances are available on Disc 13.

7.22 SUMMARY AND FUTURE WORK - EMIC

To date, two prototypes of the eMic have been developed and third prototype is underway. The second prototype made improvements on the first through the inclusion of a more robust, industrial strength joystick and the addition of toggle switches on the base of the stand. The toggle switches were deemed necessary in order to provide the performer with additional controls during performance. The tilt sensor was moved to underneath the base of the stand for aesthetic reasons and to protect the sensor from damage. The initial experiments of mapping and composing for the eMic were undertaken alongside several performances. The primary strategy has been to balance the performers’ needs with a satisfying visual and communicative experience for the audience. Audience responses to the initial performances were positive overall and useful in identifying areas of focus for future research.
Future work will continue the development of mapping strategies for the eMic and see input from other vocal performers and composers. The intention is to build a replica prototype that can be circulated for use by other vocalists who are interested in working with electronic processing.
8      CONCLUSION

8.1      SUMMARY

This thesis has outlined five major creative projects that represent a map of artistic
development and a window into my ongoing artistic practice. At the outset of this
PhD, my goal was to bring together my background and experience as a popular
vocalist, with my compositional work which, at the time, was created primarily for
fixed media such as tape or CD and was influenced heavily by the traditions of music
concrète and acousmatic composition. As a vocal performer, I enjoyed the
immediacy of live performance and the direct engagement with an audience, while as
a composer, I enjoyed the seemingly infinite possibilities offered through the
application of digital signal processing to recorded sound. The common thread
between my performance and compositional practices was the use of microphone-
captured voice and my desire to work with this material in a more immediate and
fluent way. This goal has been realised in this PhD through the development of real-
time electroacoustic techniques and, in particular, through the development of a
unique human computer interface called the eMic, discussed in Chapter 7. The
compositional approach, therefore, has seen a movement from pre-recorded works on
fixed media (CD, DVD etc), towards live composition and performance involving
real-time digital signal processing of microphonecaptured audio focused on the
eMic.

The portfolio started with Peep Show (Chapter 3), a fixed audio-visual work
that highlighted many of the questions I was exploring about my vocal performance
practice at that time. This questioning of my vocal performance practice led to a
broader engagement with the notion of voice in relation to electroacoustic music; an
exploration of voice demonstrated that it is a term that encompasses many meanings
and usages and thereby provides a rich source of creative inspiration for the
composer. The cross section of artists and their compositional works presented in
Chapter 2, demonstrated the breadth and variety of electroacoustic work utilising
voice and provided a context for the compositional work comprising this portfolio. In
summary, composers and performers working with voice were shown to have used
technology to:
1) expand the voice as an instrument, breaking down the biological constraints, 
such as those imposed by gender, age and the need to breath;
2) combine many simultaneous layers of vocal sound and, notably, to enable a 
voice to accompany itself;
3) manipulate the spatial and acoustic properties through the use of multiple 
speakers and microphones.

The works in this portfolio have also used technology and voice in the above 
ways. Voice has been examined in this folio according to Frith’s categories, voice as 
a character, voice as a person, voice as an instrument and voice as a body (Frith, 
1996). *Peep Show* (Chapter 3) explored human voice, physically, emotionally, 
visually, aurally and as a sound source for generating all the compositional materials 
for the work and allowed me to identify the positive and negative aspects of popular 
music vocal performance practice, thereby informing the ensuing compositional 
works. I identified the lack of creative control and influence I felt I had over the 
music and my own performance and found that well-established constructions and 
stereotypes in popular vocal performance can be problematic for women, in that, 
they are often sexualised and objectified in this context.

*Peep Show* along with *The Mill on the Floss* and *The Selkie Project* all 
explored gender issues and notions of identity, and enabled me to examine the 
concept of voice as identity. *Peep Show* raised questions about the performer’s 
identity in a popular music context, *The Mill on the Floss* centred on the evolving 
identity, and community struggles of the main character, Maggie, while *The Selkie 
project* explored identity through the symbolism in the Selkie mythology. All of 
these works involve women negotiating environments where they either felt out of 
place for some reason or were forced to conform to some existing cultural 
construction. This enabled me to reflect on my own performance experiences as a 
vocalist, as well as my experiences working in the relatively male dominated field of 
electroacoustic music. The exploration of identity in these works provided some 
guidance in my own quest to establish a creative identity or compositional voice.
The Mill on the Floss (Chapter 4) provided an opportunity to examine the voice in a theatrical context where the manipulation of the voice and its presentation via a quadraphonic loudspeaker configuration was used to enrich the thematic content of the play, whilst simultaneously offering an opportunity to explore the concept of voice as identity and to use this as a framework for the compositional approach. This project highlighted the composer’s ability to use electroacoustic techniques to manipulate semiotic principles and thereby enhance the audience’s experience and understanding of the play.

The Selkie Project (Chapter 3) introduced the use of non-human voice in composition and explored the intersections between environmental sound, song and voice. It was the first of the works in the portfolio to use real time processing in performance, allowing me to process my voice live and to use my own voice as accompaniment in both processed and unprocessed form. This project explored the notion of metaphor and transformation in electroacoustic music and used techniques for creating hybrid sounds and transforming sound, in keeping with the themes of the selkie myth. The project demonstrates the differences in compositional approaches using electroacoustic techniques with more traditional folk song techniques and techniques using written notation.

The dance collaborations (Chapter 4) provided an opportunity to develop skills with Audiomulch. The ability of this software to carry out real-time signal processing techniques and techniques normally only available in a studio or non-real time contexts, enabled me to collaborate more fluently and efficiently with the dancers. This engagement between sound and human movement also paved the way for the work with the eMic.

The eMic (Chapter 7) is the major outcome of this portfolio of creative work. It is a culmination of the ideas and research undertaken in the earlier projects and most importantly it represents a union of my live performance practice with my compositional work. The eMic challenges the existing passive stereotyping of the female popular vocalist, in that, it enables the performer to take charge of their own signal processing to a great degree. The eMic project has helped me establish a
unique creative space where as the composer/performer I can comment and reflect upon existing stereotypical male constructions. The eMic in combination with computer software such as Audiomulch and PD offers the potential for an expanded degree of immediacy and fluency in performance and provides a unique solution to the problems outlined in the early works in this portfolio.

This thesis has addressed the research of a number of key individuals, who have informed my work and provided valuable insight into the effects of processing sound (voice in particular) in my compositions, and my evolution towards live processing and performance.

8.2 FUTURE WORK

I intend to continue developing the design of the eMic, the most immediate plan being to build a wireless version using Angelo Fraietta’s Mini CV controller with wireless operation using Bluetooth57. The implementation of a wireless version of the eMic will reduce the restrictions placed on the performer by the current number of cables coming of the stand. Other changes will include the use of longer slide sensors on the side of the stand in order to enable the gesture used to play this sensor to be larger and more obvious to the audience. Some improvements are required in regard to the distance sensors on the side of the eMic in order to make these sensors more reliable and responsive to larger gestures. Adjustments in design are also required for the pressure sensors on the microphone clip itself given that the current design is still a little fragile and prone to damage during performance.

I hope to collaborate with other vocal performers in order to gain feedback and ideas useful for the development of the eMic, and I envisage future performances with multiple eMics and intend to explore the use of the eMic for real time spatialisation of sound, in more depth.

Future collaborations with Julian Knowles will focus on the development of a performative interface between the eMic and a computer based performer controlling audio/visual media. The current project seeks to develop musically meaningful strategies for the exchange of controller data between performers via TCP and/or UDP messages over a wireless network. Much work is still to be done in evolving mapping strategies for the eMic and for this an ever deepening understanding of the relationship between voice, emotion, human gesture and music will be required.
9 REFERENCES


Basil Blackwell/ OU.


KENNEDY-FRASER, M. M., KENNETH (1925) From the Hebrides Further Gleanings of Tale and Song, Glasgow and New York, Paterson's Publications Ltd.


PICKETT, B., PICKETT, K Crystal Mountain's Selkie Sound.

http://www.oz.net/~bpickett/Selkiesound.html


APPENDIX 1 SAMPLE INTERVIEW QUESTIONS FOR *PEEP SHOW*

- What experience have you had as a vocalist and in what contexts/music scenes have you performed in?
- Why is performing attractive to you? Why do you like being on stage?
- Do you ever feel uncomfortable or vulnerable on stage?
- Do you think being on stage is different for men and women?
- What negative experiences have you had as a vocalist/vocal performer?
- Would you be treated differently by managers, agents, roadies, sound engineers than the men in your bands etc.?
- How important do you think your appearance was to your role as a performer?
- Have you felt a pressure to be thin and look a certain way in order to be a successful vocalist? Was that pressure from band or audience members? If so why do you think there is that pressure?
- Do you think men experience the same sorts of pressures as women to conform to a stereotypical look?
- How do you find women respond to you as a vocal performer? Do you feel other women are supportive of you?
- How do your relationships with male members of the band affect your experience of being in a band?
- How did you find going on tour and being in houses with band members that you had relationships with? (only asked in one interview where the vocalist discussed her experiences of being in relationships with the male band members)
- What was it like having another girl in the band/group? (question asked where applicable) Do you think having another girl in the band provided a balancing energy?
- You had some contact with the Riot Grrrl Movement, tell us about that, did you feel connected with the movement in any way?
- As a women musician is there anything that you are angry about? Is it an equitable industry for women?
- Do you think the experience you described, where Courtney Love was crowd surfing and a man put his hand up her dress, is something that would happen to a man? (only asked in one interview). Some may say that Courtney’s image plays with that ‘fire’, do you want to comment on that? How is it different for men?
- In response to a discussion about why some men treat women inappropriately is a matter of control rather than a conception of women?
- As a woman in a band, did you think that you had the same power in making the decisions as the men? Did your ‘voice’ carry the same weight in decision-making?
- Why do you think in a recording studio, you felt your ‘voice’ was less likely to be heard?
- So do you think part of it is how you have been conditioned as a woman?
- What was it like having another girl in the band? Do you think that having another girl in the band provided a balancing energy?
- Does it bother you when women use their sexuality?
- To be successful what percentage is talent and what percentage is attributable to looks/appearance?
- Do you think it is possible for an average/plain looking woman with a great voice to be successful?
- Why do you think appearance is so important?
- Have you encountered women who look great but don’t have much talent whom managed to be successful or get a long way?
- Do you think the expectation for women to look a certain way comes from both men and women?
- Do women ever make you feel uncomfortable?
- Why does competition happen between women?
- Do you get treated differently by agents, managers, roadies and sound engineers as the men do? Do you get treated like you have brain?
- Why do you think women know less about sound equipment?
- What do you wear on stage? What is the sexiest thing you have ever worn on stage?
- Is there pressure on women to wear less on stage?
• Is it the same for men?
• Are men as competitive as women do you think?
## APPENDIX II PEEP SHOW EXAMPLES CD

82 Tracks 15:46:18

<table>
<thead>
<tr>
<th>Track</th>
<th>Title</th>
<th>Artist</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>showitsEQ</td>
<td>Jenny Martin</td>
<td>Show us your tits</td>
</tr>
<tr>
<td>2</td>
<td>showitsstorm</td>
<td>Sharon Bowman</td>
<td>Show us your tits</td>
</tr>
<tr>
<td>3</td>
<td>showwhatL-R</td>
<td>Sharon Bowman</td>
<td>Show us your whatever</td>
</tr>
<tr>
<td>4</td>
<td>breastsb</td>
<td>Mary Wyer</td>
<td>Breasts and a vagina</td>
</tr>
<tr>
<td>5</td>
<td>piecemeatb</td>
<td>Maryanne Camilleri</td>
<td>I just felt like a piece of meat</td>
</tr>
<tr>
<td>6</td>
<td>likebednorm</td>
<td>Jenny Martin</td>
<td>Wouldn’t mind seeing what she was like in bed</td>
</tr>
<tr>
<td>7</td>
<td>nakednorm</td>
<td>Jenny Martin</td>
<td>Or you know what she was like naked</td>
</tr>
<tr>
<td>8</td>
<td>blonde norm-01</td>
<td>Jenny Martin</td>
<td>the blonde girl I wouldn’t mind having a go of</td>
</tr>
<tr>
<td>9</td>
<td>getusedtoib</td>
<td>Mary Wyer</td>
<td>We get so used to it as women</td>
</tr>
<tr>
<td>10</td>
<td>everynightb</td>
<td>Sharon Bowman</td>
<td>Every single night</td>
</tr>
<tr>
<td>11</td>
<td>nicearseb-</td>
<td>Maryanne Camilleri</td>
<td>Hey love you got a nice arse</td>
</tr>
<tr>
<td>12</td>
<td>9/10</td>
<td>Sharon Bowman</td>
<td>You know what they're gonna say 9 times out of</td>
</tr>
<tr>
<td>13</td>
<td>goodfeelinb</td>
<td>Nicole Atkins</td>
<td>That wasn’t a real good feeling</td>
</tr>
<tr>
<td>14</td>
<td>feltviolateb</td>
<td>Mary Wyer</td>
<td>And she felt quite violated</td>
</tr>
<tr>
<td>15</td>
<td>feeluncomf</td>
<td>Katrina Parnell</td>
<td>Makes you feel uncomfortable</td>
</tr>
<tr>
<td>16</td>
<td>rightviolateb</td>
<td>Mary Wyer</td>
<td>It doesn’t give anybody the right to violate her in that way</td>
</tr>
<tr>
<td>17</td>
<td>inout-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>silently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>breath3sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>breathinb180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>breathout150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>sobendo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>laughsendo-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>goodfeelslow-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>sobl/2-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>titl/4/inorm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>uncomflow0sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>viol4/1-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>violategran1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>b6move4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>b6.move4 * oh1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>b6.move4T2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>b6.mv*oh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>n1 copy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>oh3/1moving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>sighrev4/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>b3movingT10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>b6move4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>b6.move4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>b6mvrev</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>breathconv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>n1mv4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>n1mv12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>ohmm-24R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>ohmv-24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>ohmv-36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>ohmvrev-36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>screechesrevL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>screech</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>screechs-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>sighrev-24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>sighrev4/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>b6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>b6move4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>laugh3/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Duration</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>m2</td>
<td>00:14</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>oh * breath</td>
<td>00:26</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>oh1</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>oh3/1</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>pant1</td>
<td>00:13</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>pant1 moving</td>
<td>00:13</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>revbreath-24mv</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>sighrev4/1</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>sighrev4/1mov</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>viol4/1</td>
<td>00:08</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>b6.move4 * oh1</td>
<td>00:10</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>laugh3/1 * sighrev4/1</td>
<td>00:27</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>m2*pant1</td>
<td>00:22</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>oh * breath</td>
<td>00:17</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>oh * breath.T4.P0 3layers</td>
<td>00:16</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>oh * breath.T4.P0</td>
<td>00:16</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>oh * breath.T4</td>
<td>00:26</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>pant1.moving * oh3/1</td>
<td>00:17</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>sighrev4/1 * viol4/1</td>
<td>00:11</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>tits*24</td>
<td>00:12</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>viol4/1 * sighrev4/1</td>
<td>00:11</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>angry1 k2-02</td>
<td>00:10</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>angry2 k</td>
<td>00:46</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>angry3 k</td>
<td>00:43</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>viol k1</td>
<td>00:18</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>viol k3-01</td>
<td>00:31</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>viol k6-01</td>
<td>00:39</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX III: THE MILL ON THE FLOSS CUES IN DETAIL

Cue 1
Duration 1’28”
Sound of the Mill Wheel Stereo CD Track No.1
DVD A Track No 1

Scene 1 Opening (Edmundson, 1994:pg1)
Purpose of Cue/Desired Effect
This cue depicts the sound of the Mill Wheel on the river Floss and served to set the scene at the flour-mill. It is also used throughout the play as a transitional sound to improve continuity between scenes. How the cue was created
This cue was created by combining a range of recordings of running water with recordings of creaking objects. The combination of a deep-water recording with a recording of a shallower trickling stream gave the desired result. For the sound of the mill wheel itself, two different creaking sounds were used, one more metallic in quality and the other more wooden.

Cue 2
Duration 1’29”
The Opening Scene: The Witch Ducking Stereo CD Track No. 2 DVD Version
DVD A Track No 2
DVD plus still version

Scene One (Edmundson, 1994:pg 1) Purpose of the Cue/Desired Effect
Just as the witch ducking imagery underpins the play, so too does the sound cue for this opening scene. This cue provides a foundation for many of the subsequent cues in the play, by revealing some of the key sound themes.
The cue comprises the following important themes:
1) A recording of Maggie reading the witch ducking text
2) The processed guitar that begins underneath the vocal text reading
3) The desperate, gulping, gasping sounds of the female voice.
4) Processed water sounds and bubbles
5) Reversed vocal whisper
6) Processed guitar crescendo
7) Thunder crack
8) Death theme

1) The aim of the cue is to depict Maggie’s imagination as she reads about witch ducking. I decided to record and amplify the opening witch ducking text (fig 1) rather than have Maggie read it on stage. The amplification and addition of reverb assists in creating a sense of fantasy and generates a more distant, removed, dreamy quality. When we read, our imagination often transports us to another place and we tend to lose focus on our immediate environment and the cue was designed to reflect this.

2) I used guitar-derived recordings for many of the cues, particularly in connection with the character Philip Wakem. Philip Wakem is depicted as a lover of the arts and in particular of music. Since the actor playing this part, Nathan Spencer, could play guitar and sing, I decided to use his skills. He played live guitar on stage in a number of scenes and we recorded his playing in the studio to use as source materials for other cues. We recorded gypsy folk songs in keeping with the strong gypsy theme described previously in section bla. The gypsy theme recurs when Maggie does something wrong, such as seeing Philip Wakem without her families’ consent and when she takes a boating trip with Stephen Guest. The recorded gypsy melodies are processed in various ways and used in a number of the cues. The guitar processing is heard in this opening witch ducking cue.

3) The desperate, gasping, gulping sounds comprise sounds recorded during two separate recording sessions:
i) studio recordings of the youngest Maggie
ii) field recordings of vocal sounds made in a swimming pool using both a hydrophone and an in-air microphone. The air microphone was positioned to catch the sounds above the water while the hydrophone recording the underwater sounds simultaneously.
4) Processing of water sounds: Water is a strong aural element throughout the play and hence a library of processed sounds derived from water recordings were produced.

5) This cue is designed to be menacing and is intended to resemble the chanting of some sort of magic spell, almost as if Maggie is somehow being cursed. The ominous, unintelligible, whispered vocal sounds are reversed recordings of the youngest Maggie’s voice. I liked the idea that these voices are actually Maggie’s, since her inner voices and conscience contribute significantly to her demise. This theme recurs frequently throughout the play and alludes to a forthcoming threat.

6) The thunder crack occurs at the point of Maggie’s death in the imagined witch-ducking scene and recurs in the final scene when Maggie drowns in the flood.

7) The death theme recurs when Maggie’s father dies and at the end when Maggie drowns in the flood.

**Cue 3**

Duration 1’25
Rage 1

Scene Three (Edmundson, 1994:pg 11)  
Purpose of Cue/Desired Effect  
Throughout the play Maggie experiences what the author describes as ‘deaf rages’, where she hears ‘terrible booming sounds in her head’. These rages represent an extreme, anxiety related, internal experience.  
How the cue was created  
The basic cue consists of:  
1) a booming sound create by close miking a large bass drum skin  
2) a sawing sound derived from a recording of a band saw tool that was subjected to electronic processing  
3) a heartbeat sound to indicate the internal nature of the experience

There are slight variations each time Maggie has one of her rages. The first one includes granulated screams, cries and text ‘nobody loves you anymore’. Maggie is desperate for he older brother’s approval and affection hence when he tells her he does not love her anymore she is deeply affected.  
Through the use of Maggie’s internal voice, and the granulated text help to reveal the devastating impact of her brother’s taunts.

**Cue 4**

Duration 0’48”
Tom Born Aloft

Scene Three (Edmundson, 1994:pg 9)  
Purpose of Cue/Desired Effect  
Note: This cue is an arrangement of an existing recording and is included for context and so the spatialisation can be heard.  
The scene is the work of the youngest Maggie’s imagination. She imagines Tom’s birth and how he leaps down from his father’s shoulders to lovingly to embrace her. The theme uses a recording of a gypsy ensemble and was chosen for its passionate, uplifting, celebratory quality. The uplifting and slightly uninhibited quality is in line with the young Maggie’s spirit.  
How the cue was created  
The cue starts with the music box and the sound of water splashing and merges into the gypsy ensemble and then into the tail end of the witch-ducking theme. The music box was chosen for its connection with childhood. Water is used throughout the play as a significant theme since it both gives and takes life in this play.

**Cue 5**

Duration 0’49”
Rage 2 fight 1

Stereo CD Track No. 3  
DVD A Track No 3  
DVD plus still version

Stereo CD Track No. 4  
DVD A Track No 4

Stereo CD Track No. 5
Scene Three (Edmundson, 1994:pg 17)
Purpose of Cue/Desired Effect
Repeated Cue, see Cue 3 for description
Variation
Addition of a low groaning sound created by extreme pitch shifting and time stretching a vocal scream.

Cue 6
Duration 1’48”
Fishing Arrangement Trout 1

Stereo CD Track No. 6
DVD A Track No 6

Scene Four Opening and throughout (Edmundson, 1994:pg 12)
Purpose of Cue/Desired Effect
This theme is accompaniment to a scene where Maggie and Tom are fishing together on the river. The simple arrangement is designed to be light and playful in mood and so that text is easily discernible. The cue was an important indicator to the audience of the scene given there was movement back and forth between two scenes on the one stage area. How the cue was created
The cue uses the melody from Schubert’s well-known Quintet, Op. 114 “The Trout” and is accompanied by water recordings used to represent the flowing water where Maggie and Tom are fishing.

Cue 7
Duration 0’23”
Lucy Doll

Stereo CD Track No. 7
DVD A Track No 7

Scene Four (Edmundson, 1994:pg 14)
Purpose of Cue/Desired Effect
This theme is associated with a large, frilly doll called Lucy. The doll features in an absurd scene with Maggie’s somewhat shallow aunts. In a child like display of suspended disbelief, the adults interact and talk to the doll as if it is human. The doll happens to share the same name as Maggie’s adored cousin Lucy who makes an appearance later in the play. The author has made a direct connection between the doll and the real person and this could be interpreted in a number of ways. The director of this production saw the real Lucy as almost a little unreal, she tends to be slightly frivolous, extremely kind and ‘nice’ but naively optimistic and she always sees the best in everyone. She is almost too ‘nice’ to be real. How the cue was created
The cue consists of a solo harp, playing a folk melody, combined with the cuckoo clock sounds. The recording is speed up giving the harp a toy like quality. The cuckoo is added to achieve a sense of absurdity, almost silliness.

Cue 8
Duration 0’18
Rage 3/ Family scorn

Stereo CD Track No. 8
DVD A Track No 8

Scene 4 (Edmundson, 1994:pg 19)
Purpose of Cue/Desired Effect
Repeated Cue with a slight variation in the addition of processed laughter, see Cue 3 for description

Cue 9
Duration 0’26”
Maggie runs away

Stereo CD Track No. 9
DVD A Track No 9
DVD plus still version

Scene Five Opening (Edmundson, 1994:pg 20)
Purpose of Cue/Desired Effect
This is the scene described earlier when Maggie runs away and meets a mysterious gyspy-looking man. In this brief runaway scene, I tried to capture a combination of Maggie’s defiant will, her
Youthful naivety, her sense of relief at escaping the taunts and the voices in her head, and a hint of the erotic in order to make a connection with the erotic boating scene with the 3rd Maggie and Stephen later in the play. It also aids in making the connection between the ‘gypsy-man’ and her lover Stephen Guest.

How the cue was created
The cue consists of:
1) A recording of a folk melody played on the piano accordion (played by John Pohl). The piano accordion was chosen for it’s common use by the gypsies.
2) Soft, repeated, high-pitched, plucked, guitar recording – taken from the Blacksmith theme that follows. While the sounds are only barely audible, they are persistent and incongruous with the piano-accordion melody indicating that all is not well beneath the surface.
3) Recordings of Maggie 1 whispering texts ‘She’s certainly like a gypsy now’. The taunts about Maggie being like a gypsy resound in Maggie’s head. Her internal voices remind her of the constant taunts, that drove her to runaway and she repeats these to herself almost as if justifying her decision to run away. The taunts were deliberately recorded in Maggie’s own voice rather than the voices of the actual offenders, to indicate her ‘inner voice’.
4) Breathing sounds; there are numerous common associations with breathing sounds that this cue attempts to draw upon, such as: the sound of breath exhalation as a sigh of relief, an indication of being relaxed, as well as the more erotic associations. The same breathing sounds recur in the later scene where Stephen Guest entices the third Maggie out on the boat. The parallels between these scenes are that Maggie is giving in to her desires. The same actor plays both the role of the gypsy and Stephen Guest.
5) Bird sounds – outdoor environment Intended add a sense of peacefulness to this scene.

Cue 10
Duration 0’31”
Blacksmith/Gypsy Man

Scene Five (Edmundson, 1994:pg 21)
Purpose of Cue/Desired Effect
This cue accompanies Maggie’s encounter with the man who looks like a gypsy. The guitar transformation represents Maggie’s horror as the gypsy-man’s appears to transform into the devil. As the guitar theme reaches a climax Maggie screams for her father who rescues her. The audience is left with an indication that something untoward happened to Maggie.

How the cue was created
The cue consists of layered, granulated guitar and voice, the granulation and panning assist in heightening the sense of drama.

Cue 11
Duration 2’38”
Magolylay/Mill

Scene Six Opening (Edmundson, 1994:pg 22)
Purpose of Cue/Desired Effect
This cue is heard as Maggie leaves the Mill. It is used to aid in the transition between scenes.

How the cue was created
The melody is a Hungarian Gypsy Folk song chosen deliberately for its connection to the gypsy theme. The melody was first sung in 3-part harmony, live on stage by the three Maggie’s at the beginning of the play prior to the witch-ducking scene. This version is a slower solo version sung by the youngest Maggie. It is sad and melancholic, in contrast to the more upbeat, version heard during the opening of the play. Maggie is sentimental about leaving the Mill.

Cue 12
Duration 0’36”
Rage 4

Scene Seven (Edmundson, 1994:pg 26)
Purpose of Cue/Desired Effect
Repeated Cue, see Cue 3 for description
Variation
Maggie’s voice HA HA Miss Maggie granulated voice layered on the saw sound

**Cue 13**
Duration 0’49”
Short Witch Dunk

*Stereo CD Track No. 13
DVD A Track No 13*

Scene Eight (Edmundson, 1994:pg 28)
Purpose of cue/Desired effect
This cue is a shortened version of the first witch ducking; cue 2. It serves to remind the audience of the witch ducking and alludes to the impending flood. This cue merges into Cue 14 Lucy’s theme in the stereo CD version.

**Cue 14**
Duration 0’49”
Lucy’s theme/ Lucy real

*Stereo CD Track No. 13
DVD A Track No 14*

Scene Nine Opening (Edmundson, 1994:pg 28)
Purpose of Cue/Desired Effect
This is Lucy’s theme. In contrast to the earlier Lucy Doll theme, this theme is more mature and serious.
How the cue was created
This cue is based on a folk melody played on solo harp. It is the same melody heard earlier but is played at the natural speed, unlike the earlier version, that had been speed up.

**Cue 15**
Duration 1’28”
Mill Wheel

*Stereo CD Track No. 1
DVD A Track No 15*

Scene Ten (Edmundson, 1994:pg 29)
Repeated Cue: see Cue 1 for description

**Cue 16**
Duration 1’18
Rage 5, 6, 8 saw/HB1

*Stereo CD Track No. 14
DVD A Track No 16*

Scene Twelve (Edmundson, 1994:pg 33)
Purpose of Cue/Desired Effect
Repeated Cue, see Cue 3 for description
Variation
Heartbeat and moving saw only – intended to be a milder more controlled version of the rage.

**Cue 17**
Duration 1’19”
Rage/Morph

*Stereo CD Track No. 15
DVD A Track No 17*

Scene Twelve (Edmundson, 1994:pg 34)
Purpose of Cue/Desired Effect
This cue accompanies the transformation of Maggie 1 into Maggie 2 at the end of scene thirteen. Maggie runs to the attic. She is sobbing and the rage is booming in her ears. Gradually, she calms and goes to the mirror. She looks at herself, trying perhaps, to see herself the way others see her. She feels the weight of Tom’s words and knows she will have to change. Life isn’t how she thought it was. She was wrong. Scene 13 (Edmundson, 1994:pg 34)
How the cue was created
The cue starts out with the rage theme that signifies the young Maggie, it gradually slows and morphs as Maggie calms. The rage theme morphs into warbled, processed sounds of a music box; symbolic of Maggie saying farewell to her childhood. This cue explores the idea of transformation
Cue 18
Duration 1’57”
Circus 1/Auction

Stereo CD Track No. 16
DVD A Track No 18

Scene Thirteen (Edmundson, 1994:pg 35)
Purpose of Cue/Desired Effect
Auction/Circus scene
This cue accompanies the auction of Maggie’s family possessions. It is played at a level that the auctioneer needs to raise his voice to an excitable level in order to be heard.
How the cue was created
The sound source for the cue is the recording of a circus environment. The environment contains audience responses, including laughter and clapping as well as the sound of horns and brass instruments. This recording is subjected to granulation and a variety of pitch speed changes and time stretching. This material is blended with a recording of a tuning orchestra. These two cues weave in and out of each other through the use of layering and cross-fades.

Cue 19
Duration 0’40”
TA Kempsi

Stereo CD Track No. 17
DVD A Track No 19

Scene Seventeen (Edmundson, 1994:pg 41)
Purpose of Cue/Desired Effect
The second Maggie discovers the writing of Thomas A Kempsi, whose words of wisdom seem to provide some clarity for her enabling her to feel a sense of peace.
How the cue was created
Recording of a synthesiser pad setting playing a descending chord. This merges into a processed recording of a watery environment. This watery environment is repeated at the end of the play just following Maggie’s drowning when Maggie is finally at rest. It represents her transcendence.

Cue 20
Duration 0’37”
Organ/Bells

Stereo CD Track No. 18
DVD A Track No 20

Scene Seventeen Opening (Edmundson, 1994:pg 41)
Purpose of Cue/Desired Effect
This cue is the opening of Act II. The second Maggie has turned to religion as a guide for how she should behave and live her life. The organ playing a religious Hymn signifies this as does the church bells.

Cue 21
Duration 1’03”
In the Red Deeps

Stereo CD Track No. 20
DVD A Track No 21
DVD plus still version

Scene Seventeen, Eighteen and Nineteen (Edmundson, 1994:pp 42, 43, 45)
Whisps/dly repeated 3 times
Purpose of Cue/Desired Effect
The Red Deeps is the name given to a place where Maggie loved to take a walk. It was the site of an old overgrown stone-quirky where Maggie would retreat for solitude. It was here she met up with Philip Wakem, who shared her adoration for the natural beauty of the Red Deeps’. Maggie began to meet secretly with Philip in the Red Deeps until her brother Tom discovered this and put an end to their meetings.
How the cue was created
The cue is made up of the following:
1) Maggie’s singing the melody of a gypsy song (reference for melody – gypsy song album). The recording was subjected to first to delay and then layering.
2) Recordings of Maggie calling for ‘Philip’ and Whispering ‘to the red deeps’
3) Philip whispering the words from a gypsy folk song.
**Cue 22**  
Duration 0’16’’  
Short witch dunk repeat  
Stereo CD Track No. 20  
DVD A Track No 13  
Scene Nineteen (Edmundson, 1994:pg 48)  
Purpose of cue/Desired effect  
This cue is a shortened version of the first witch-ducking, cue 2. It serves to remind the audience of the witch-ducking and alludes to an impending danger.

**Cue 23**  
Duration 1’18’’  
Rage 5,6,8 saw HB1  
Stereo CD Track No. 21  
DVD A Track No 16  
Scene Twenty page 50 (Edmundson, 1994:pg 50)

**Cue 24**  
Duration 1’17’’  
Mag morph 2  
Stereo CD Track No. 22  
DVD A Track No 22  
Scene Twenty Ending (Edmundson, 1994:pg 52)  
Purpose of cue/Desired effect  
This cue accompanied the transformation of the second Maggie (played by Susan Prior) into the third Maggie (played by Marta Dusseldorp). As Maggie farewells her fanatic religious stage and opts for a more refined and less excessive demeanour, we hear the sound of the church organ, the symbol of Maggie’s religious phase, also being transformed.  
How the cue was created  
The organ heard earlier in Cue 20 was subjected to Spectral processing using the mutation algorithm in Sound Hack.

**Cue 25**  
Duration 1’28’’  
Mill Wheel 1  
Stereo CD Track No. 1  
DVD A Track No 23  
Scene Twenty One Opening (Edmundson, 1994:pg 53)  
Repeated Cue: see Cue 1 for description

**Cue 26**  
Duration 0’34’’  
Father’s death  
Stereo CD Track No. 23  
DVD A Track No 24  
Scene Twenty Two Ending (Edmundson, 1994:pg 56)  
Purpose of cue/Desired effect  
This cue accompanies the death of Maggie’s father following a fight with Mr Wakem.  
How the cue was created  
The cue consists of a convolution between two environmental wind recordings.

**Cue 27**  
Duration 0’23’’  
Lucy Real 1  
Stereo CD Track No. 7  
DVD A Track No 25  
Scene Twenty Three opening (Edmundson, 1994:pg 56)  
Repeated Cue See cue 14 for information

**Cue 28**  
Duration 2’52’’  
Ball  
Stereo CD Track No. 24  
DVD A Track No 26
Scene Twenty Eight (Edmundson, 1994:pg 68)
Purpose of cue/Desired effect
Accompanies the ball
How the cue was created
Time adjusting the orchestral theme to fit the drum loops.

**Cue 29**
Duration 0’50”
Stephen Boat 1

| Stereo CD Track No. 25 | DVD A Track No 27 |

Scene Thirty One (Edmundson, 1994:pg 73)
Purpose of cue/Desired effect
Stephen entices Maggie to take a boat trip with him and she impulsively relents to her desire.
How the cue was created
The cue consist of:
1) water lapping against boat hull
2) breathe exhalations
3) chirping birds
4) Strings borrowed from the previous Ball scene-cue 28.

**Cue 30**
Duration 0’52”
Dream 1

| Stereo CD Track No. 26 | DVD A Track No 28 |

Scene Thirty One (Edmundson, 1994:pg 74)
Confused conglomerate of many of the sounds used throughout the play. The actors were on stage simultaneously contributing vocalisations to this cue.

**Cue 31**
Duration 9’39”
Short Witch Dunk & Storm

| Stereo CD Track No. 27 | DVD A Track No 29 |

Scene Thirty Three Opening (Edmundson, 1994:pg 78)
Purpose of cue/Desired effect
Repeated cue.
This cue is a shortened version of the first witch ducking; cue 2. It serves to remind the audience of the witch ducking and alludes to an impending danger of the flood. This cue merges into the next cue in the Stereo CD version.

**Cue 32 & 33**
Duration 9’39” & 2’19”
Storm and Drowning

| Stereo CD Track No. 27 & 28 | DVD A Track No 30 | DVD plus still version |

Scene Thirty Six until the end (Edmundson, 1994:pg 81)
Purpose of cue/desired effect
This is a lengthy cue that starts out with the sound of rain, wind and a distant storm. The reversed, whispered voices sporadically enter, alluding to the forthcoming danger. The cue contributes to the sense of urgency as the flood approaches. The music and the action on stage simultaneously build, gathering more and more momentum as the flood approaches. The scene reaches its climax at the Mill as Maggie tries to save Tom from the rising waters. The granulated voices support her desperation and there is yelling and screaming above the music from the actors on stage. The cue reaches its climax with the thunderclap and as Maggie drowns, the music transforms and takes on a peaceful, yet eerie atmosphere.
The sound operator adjusted the levels of this cue as required, particularly early on to ensure the important text could still be heard above the storm. The cue assisted in the momentum of stage since the levels of the storm playback forced them to speak louder contributing to the sense of urgency.
How the cue was created
The cue consists of the following sounds:
Storm sounds: Wind, Rain, water, waves
Reversed whispers
Drowning section remix: granulated voices
Heartbeat
Thunderclap
gasping
synth pad watery sounds (End section repeat of the ‘death theme’ from earlier)
APPENDIX IV DISCOGRAPHY OF SELKIE RELATED RECORDINGS

• Solas (1997). Sunny Spell And Scattered Showers, Shanachie.
• Baez, J. Joan Baez Volume 2. Santa Monica, Vanguard Records. Track 4 Silkie 3:18
• Bok, Gordon Peter Kagan and the Wind Sharon, Conn.: Folk-Legacy Records FSI 44 1972
APPENDIX V MILL ON THE FLOSS STEREO CD TRACK LISTING

Stereo CD - Disc 4  
28 Tracks in Total  
Duration in Total 41’15”

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mill Wheel</td>
<td>01:28</td>
</tr>
<tr>
<td>2</td>
<td>Main Witch Dunk</td>
<td>01:19</td>
</tr>
<tr>
<td>3</td>
<td>Rage 1</td>
<td>01:25</td>
</tr>
<tr>
<td>4</td>
<td>Tom Born aloft</td>
<td>00:48</td>
</tr>
<tr>
<td>5</td>
<td>Rage 2</td>
<td>00:49</td>
</tr>
<tr>
<td>6</td>
<td>Trout fishing</td>
<td>01:48</td>
</tr>
<tr>
<td>7</td>
<td>Lucy Doll</td>
<td>00:23</td>
</tr>
<tr>
<td>8</td>
<td>Rage/family's scorn</td>
<td>00:18</td>
</tr>
<tr>
<td>9</td>
<td>Runaway</td>
<td>00:26</td>
</tr>
<tr>
<td>10</td>
<td>Blacksmith</td>
<td>00:31</td>
</tr>
<tr>
<td>11</td>
<td>Mill Wheel/Folk Song</td>
<td>02:38</td>
</tr>
<tr>
<td>12</td>
<td>Rage Miss Maggie</td>
<td>00:36</td>
</tr>
<tr>
<td>13</td>
<td>Short witch Dunk/Lucy theme</td>
<td>00:49</td>
</tr>
<tr>
<td>14</td>
<td>rage no voices</td>
<td>01:18</td>
</tr>
<tr>
<td>15</td>
<td>Rage/Morph</td>
<td>01:19</td>
</tr>
<tr>
<td>16</td>
<td>Auction theme</td>
<td>01:57</td>
</tr>
<tr>
<td>17</td>
<td>TA Kempis</td>
<td>00:40</td>
</tr>
<tr>
<td>18</td>
<td>Bells Organ</td>
<td>00:37</td>
</tr>
<tr>
<td>19</td>
<td>Red Deeps</td>
<td>01:03</td>
</tr>
<tr>
<td>20</td>
<td>Sht Wtch Dunk</td>
<td>00:16</td>
</tr>
<tr>
<td>21</td>
<td>rage saw only</td>
<td>01:18</td>
</tr>
<tr>
<td>22</td>
<td>Mag morph</td>
<td>01:17</td>
</tr>
<tr>
<td>23</td>
<td>Fathers death</td>
<td>00:34</td>
</tr>
<tr>
<td>24</td>
<td>Ball</td>
<td>02:52</td>
</tr>
<tr>
<td>25</td>
<td>Boat</td>
<td>00:50</td>
</tr>
<tr>
<td>26</td>
<td>Dream</td>
<td>00:52</td>
</tr>
<tr>
<td>27</td>
<td>Witch Duck &amp; Storm</td>
<td>09:39</td>
</tr>
<tr>
<td>28</td>
<td>Drowning</td>
<td>02:19</td>
</tr>
</tbody>
</table>
APPENDIX VI MILL ON THE FLOSS DVD AUDIO TRACK LISTING

DVD Audio - Disc 5
30 Tracks in Total

1. Mill Wheel 01:28
2. Witch Dunk 01:29
3. Rage long one 01:25
4. Tom Born Aloft 00:48
5. Rage 00:49
6. Fishing – ‘Trout’ 01:48
7. Lucy Doll 00:23
8. Rage Ha Ha voice 00:11
9. Runaway 00:26
10. Blacksmith 00:31
11. Mill Wheel/Oylay 02:38
12. Rage ha ha miss Maggie 00:36
13. Short witch Dunk 00:49
14. Lucy Doll – ending 00:49
15. Mill Wheel 01:28
16. Rage Saw/HB 01:18
17. Maggie/Morph 1cross fade 01:19
18. Circus/Auction 01:57
19. TA Kempis 00:40
20. Organ/Bells 00:37
21. Whisp Delays 01:03
22. Mag Morph 2 01:17
23. Mill Wheel 01:28
24. Father’s death 00:34
25. Lucy Real 00:23
26. Ball 02:52
27. Stephen Boat 00:50
28. Dream 00:52
29. Short witch Dunk & Storm 09:39
30. Storm & Drowning 02:19
APPENDIX VII  EXAMPLE SEAL RECORDINGS

Stereo CD - Disc 15
51 Tracks In Total
Duration In Total 30’53”

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New Zealand Fur Seal - 'Julius'</td>
<td>00:16:65</td>
</tr>
<tr>
<td>2</td>
<td>New Zealand Fur Seal - 'Julius'</td>
<td>00:12:68</td>
</tr>
<tr>
<td>3</td>
<td>Australian Fur Seal - 'Suzie'</td>
<td>01:06:22</td>
</tr>
<tr>
<td>4</td>
<td>Australian Fur Seal - 'Wanda' De-Noised</td>
<td>00:47:58</td>
</tr>
<tr>
<td>5</td>
<td>Australian Fur Seal - 'Averill'</td>
<td>02:07:05</td>
</tr>
<tr>
<td>6</td>
<td>Australian Fur Seal - 'Tinker'</td>
<td>00:59:39</td>
</tr>
<tr>
<td>7</td>
<td>Sub Antarctic Fur Seal Pup - 'River'</td>
<td>00:07:05</td>
</tr>
<tr>
<td>8</td>
<td>Harbour Seal - 'Darwin'</td>
<td>02:38:21</td>
</tr>
<tr>
<td>9</td>
<td>Antarctic Leopard Seal</td>
<td>00:10:58</td>
</tr>
<tr>
<td>10</td>
<td>Antarctic Leopard Seal Mlow</td>
<td>00:08:59</td>
</tr>
<tr>
<td>11</td>
<td>Antarctic Weddell Seal</td>
<td>00:10:12</td>
</tr>
<tr>
<td>12</td>
<td>Antarctic Leopard Seal De-Noised</td>
<td>00:14:52</td>
</tr>
<tr>
<td>13</td>
<td>Antarctic Leopard Seal De-Noised - Non-Standard</td>
<td>00:11:11</td>
</tr>
<tr>
<td>14</td>
<td>Antarctic Leopard Seal Vlow De-Noised</td>
<td>00:08:56</td>
</tr>
<tr>
<td>15</td>
<td>Antarctic Leopard Seal Vlow De-Noised - Non-Standard</td>
<td>00:10:58</td>
</tr>
<tr>
<td>16</td>
<td>Antarctic Leopard Seal De-Noised - Non-Standard</td>
<td>00:18:11</td>
</tr>
<tr>
<td>17</td>
<td>Elephant Seal Adult + Pup</td>
<td>00:09:60</td>
</tr>
<tr>
<td>18</td>
<td>Elephant Seal Male</td>
<td>00:22:70</td>
</tr>
<tr>
<td>19</td>
<td>Elephant Seal Male</td>
<td>00:11:11</td>
</tr>
<tr>
<td>20</td>
<td>Elephant Seal</td>
<td>00:04:55</td>
</tr>
<tr>
<td>21</td>
<td>Elephant Seal</td>
<td>00:04:00</td>
</tr>
<tr>
<td>22</td>
<td>Elephant Seal</td>
<td>00:04:00</td>
</tr>
<tr>
<td>23</td>
<td>Elephant Seal</td>
<td>00:04:00</td>
</tr>
<tr>
<td>24</td>
<td>Elephant Seal Adults + Pups</td>
<td>00:17:30</td>
</tr>
<tr>
<td>25</td>
<td>Elephant Seal Harem</td>
<td>00:16:66</td>
</tr>
<tr>
<td>26</td>
<td>Elephant Seal</td>
<td>00:06:18</td>
</tr>
<tr>
<td>27</td>
<td>Arctic Bearded Seals - Hydrophone</td>
<td>00:48:00</td>
</tr>
<tr>
<td>28</td>
<td>Arctic Bearded Seals - Hydrophone</td>
<td>00:40:00</td>
</tr>
<tr>
<td>29</td>
<td>Arctic Bearded Seals - Hydrophone</td>
<td>00:24:00</td>
</tr>
<tr>
<td>30</td>
<td>Arctic Bearded Seals - Hydrophone</td>
<td>01:04:00</td>
</tr>
<tr>
<td>31</td>
<td>Grey Seals</td>
<td>00:04:00</td>
</tr>
<tr>
<td>32</td>
<td>Grey Seal - Pups De-Noised</td>
<td>00:04:00</td>
</tr>
<tr>
<td>33</td>
<td>Grey Seal - Pups De-Noised</td>
<td>00:04:00</td>
</tr>
<tr>
<td>34</td>
<td>Grey Seal</td>
<td>00:18:12</td>
</tr>
<tr>
<td>35</td>
<td>Grey Seal - Pups</td>
<td>05:34:29</td>
</tr>
<tr>
<td>36</td>
<td>Grey Seal - Pups De-Noised</td>
<td>00:04:27</td>
</tr>
<tr>
<td>37</td>
<td>Grey Seal</td>
<td>00:09:44</td>
</tr>
<tr>
<td>38</td>
<td>Grey Seal</td>
<td>00:07:61</td>
</tr>
<tr>
<td>39</td>
<td>Grey Seal</td>
<td>00:07:47</td>
</tr>
<tr>
<td>40</td>
<td>Grey Seal - Hydrophone</td>
<td>04:45:02</td>
</tr>
<tr>
<td>41</td>
<td>Grey Seal - Hydrophone</td>
<td>01:44:73</td>
</tr>
<tr>
<td>42</td>
<td>Grey Seals</td>
<td>00:18:12</td>
</tr>
<tr>
<td>43</td>
<td>Grey Seal</td>
<td>00:13:19</td>
</tr>
<tr>
<td>44</td>
<td>Grey Seal - Lyrical</td>
<td>00:20:59</td>
</tr>
<tr>
<td>45</td>
<td>Grey Seal - Swish</td>
<td>00:06:68</td>
</tr>
<tr>
<td>46</td>
<td>Grey Seal – De-Noised</td>
<td>00:04:00</td>
</tr>
<tr>
<td>47</td>
<td>Australian Sea Lion - Pups</td>
<td>00:05:11</td>
</tr>
<tr>
<td>48</td>
<td>Australian Sea Lion - Pups Playing</td>
<td>00:10:41</td>
</tr>
<tr>
<td>49</td>
<td>Australian Sea Lion - Female</td>
<td>00:04:00</td>
</tr>
<tr>
<td>50</td>
<td>Australian Sea Lion Adult + Pup</td>
<td>00:11:55</td>
</tr>
<tr>
<td>51</td>
<td>Australian Sea Lion - Adult + Pup</td>
<td>00:09:12</td>
</tr>
</tbody>
</table>
## APPENDIX VIII LIST OF SENSORS USED IN THE EMIC

<table>
<thead>
<tr>
<th>No.</th>
<th>Sensor Description</th>
<th>Supplier</th>
<th>Part No./Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>SHARP GP2D12 Distance Sensor</td>
<td>Manuco Electronics</td>
<td>GP2D12</td>
</tr>
<tr>
<td>1</td>
<td>Motorola MC333204P Quad Opamp</td>
<td>Farnell</td>
<td>791684</td>
</tr>
<tr>
<td>3</td>
<td>DPDT PB Momentary Switch</td>
<td>Jaycar</td>
<td>SP0714</td>
</tr>
<tr>
<td>1</td>
<td>Analog Devices Accelerometer</td>
<td>Unique Memec</td>
<td>ADXL202JE</td>
</tr>
<tr>
<td>1</td>
<td>Saka J90 Joystick</td>
<td>Crusader Electronics</td>
<td>90JAM-YO-20R2G</td>
</tr>
<tr>
<td>1</td>
<td>Junction Box</td>
<td>Dick Smith Electronics</td>
<td>I2921</td>
</tr>
<tr>
<td>3</td>
<td>DPDT Toggle Footswitch</td>
<td>Jaycar</td>
<td>SP0764</td>
</tr>
<tr>
<td>2</td>
<td>Infusion Slide Sensor</td>
<td>Infusion Systems</td>
<td>Slide V2.1</td>
</tr>
<tr>
<td>2</td>
<td>Infusion TouchMini Sensor</td>
<td>Infusion Systems</td>
<td>TouchMini</td>
</tr>
<tr>
<td>1</td>
<td>Infusion Touch Sensor</td>
<td>Infusion Systems</td>
<td>Touch</td>
</tr>
</tbody>
</table>