THE EXTENDED FLAUTIST:

Techniques, technologies and performer perceptions in music for flute and electronics

Jean Penny

Bachelor of Music (Instrumental performance, Honours), *University of Melbourne*

Queensland Conservatorium Griffith University

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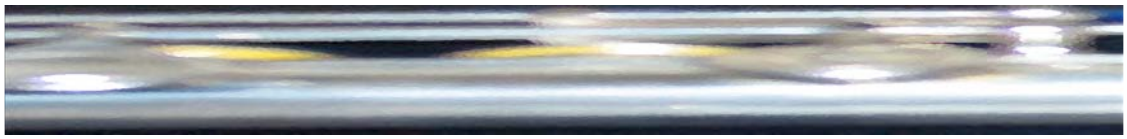

KEYWORDS

Breath tone, Burt, electronics, contemporary music performance, extended techniques, flute, Hajdu, identity, interactive live electronics, Lavista, meta-instrument, micro-sounds, Musgrave, performance, performance analysis, performance practice, performance space, physicality, Pinkston, Risset, Saariaho, Stroppa, self-perception, sonority, sound technologist, spatialisation, technology.

ABSTRACT

As musical and performance practices have evolved over the last half-century, the realm of the solo flautist has expanded to encompass an extensive array of emerging techniques and technologies. This research examines the impact of electronics on the flautist. It explores and confronts this expanding musicological nexus through forwarding the voice of the performer: defining the search for knowledge through the actuality of performance, reflection and narrative.

The investigation is based around two recitals of music for flute with electronics, incorporating ideas of spatialisation and interactive live electronics. These recitals presented music by Jean-Claude Risset, Mario Lavista, Thea Musgrave, Marco Stroppa, Kaija Saariaho, Russell Pinkston, Warren Burt and Georg Hajdu. The structure for the research is based on the model of this experience, a journey of evolving understanding corresponding to the processes of performance: conception, preparation, presentation and reflection. This model proposes a framework for musicological investigation incorporating a comprehensive survey of repertoire and literature, considerations of technological functionality, and personal engagement with specific music, techniques and performance. The use of electronics to reveal elements of electroacoustic performance informs and positions the research, and raises questions for analysis and further explorations and understanding.

The 'site of discovery' here is the performance; the goal is to demystify, renew, and re-evaluate the performer's world. Building on and finding support in research from an emerging body of discourse in the wider field, the discussion and findings are primarily addressed through self-observation, based on the author's experience as performer, as flautist. Thus these findings display significant partiality, as they aim to expand understandings of performance with electronics from within; to articulate knowledge revealed only through engagement with performance itself, and to provide a platform for the performer as writer. The focus on the self in this research approach promotes further understanding of how a performer or listener engages with the sonic, emotional, conceptual and connective capacities of the music.

The project draws together historical perspectives, performance and reflective

critiques, documentation of the processes of performance, the connections to technology, to others and the self. The embodiment of music through learning, rehearsal and performance is a journey that leads to the revelation of otherwise inaccessible performance knowledge. This revelation is approached here through centering the research on this very act. It is the doing, the experience, and the observation of performance with electronics that creates the responses and material of this discourse. The instrumentalist, electronics and space become an entity, a meta-instrument, incited by the microphone to construct new sounds, new expression and new identities. Renewed playing perspectives and actions, the disclosure of intuitive responses and newly evolving partnerships emerge with the knowledge of process and defined approaches. New representations of the self in sound, new awareness and perception of the performative body, connections and exchange, unveil a relocated, reshaped performing persona.

The Extended Flautist traces this performative journey through a discursive musicology, an embodied scholarly encounter of narrative, analysis and performance. An enactive performance practice is revealed, a transformative musicality teeming with renewed approaches to sonority, physicality, performance space, partnerships, self-perception and expression.

STATEMENT OF AUTHENTICITY

The work contained in this dissertation is that of Jean Penny and has not previously been submitted for an award at any other higher education institution. To the best of my knowledge and belief, no material previously published or written by another person has been included except where due reference is made in the dissertation. Selected material drawn from this dissertation that is the original work of the author has been previously published in a selection of conference proceedings throughout the course of completing this work.

Jean Penny, May 2009

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF MIND MAPS

ACKNOWLEDGEMENTS

This has been a project held together by intensity, fervour and an absolute commitment to new music performance and research. My struggles with distance, and the memories of grappling with practical challenges, will no doubt fade as the work remains, but it could not have been sustained without the contributions of many. First of all, I would like to acknowledge musicians I have known, have heard, have read about, have felt inspired by and just know about; the composers who create the material of our lives, the thinkers, writers, artists, and creative provokers of all types: the supporters and listeners, facilitators and challengers – those who create a setting for these pursuits.

I acknowledge those affiliated with the host of this study, the Queensland Conservatorium Griffith University, for the opportunity, encouragement and stimulation to achieve completion. Of course, I particularly acknowledge the valuable contributions of my supervisors, Dr Vanessa Tomlinson and Professor Paul Draper. I will be forever indebted to them for their abilities to push my boundaries of thought, to inspire my writing and to revitalize my approaches. They have had an indelible influence on my emerging thought processes and the structuring of this work. I have received encouragement in my meanderings, and magnificent assistance with pulling these into shapes that others may understand and appreciate.

I would also like to acknowledge officially those who live around me. During this degree my daughters have moved out of home, come back, gone again, studied and worked interstate, planned amazing futures, enriched my life and tolerated my distractions. And then Andrew, who has shown an unbounded ability to believe in me, my musicianship and the worthiness of this research. Not only that, his assistance in so many professional and personal ways – musical, academic, technological, practical and emotional – have made this experience possible, and words of thanks inadequate.

One of the greatest outcomes for me in this endeavour has been my developing love of research, and my commitment to it as a life-long pursuit. Thank you to all those who contributed to this revelation!

PRELUDE

A PERFORMANCE VIGNETTE: Canto del Alba – Mario Lavista

An astonishing sense of anticipation is felt, the imminent connection to notes, the opening multiphonic, the breath that imbues this work with meditative and seductive style; quarter tones, altered tone fingerings, strands of tones linking and separating, spaces in sounds, spaces of sounds. Here in performance, the spinning threads construct the evocative soundscape, transporting us into the music. The breathing reflects a stylized gesture, locating the performer at once in that sound, and coming from that sound. An immersion is created, we glide together: the audience's attention is palpable.

The flute becomes a body extension, part flesh, part conduit, simultaneously directing and following the performance. Dreams again, of perfection and ease. This performance is difficult, there is so much at stake, what if, what if . . . My thoughts become the notes, travellers across the page, the room . . . What a sweet sound, what a beautiful song of yearning, of wafting and dreaming. The music appears to move, to build invisible textures and structures, to draw us in.

The amplification is amazing, it projects strength and colours, it provokes confidence and definition, it is in love with whistle tones so hard to pitch, it throws a resonant phrase to the back wall, it creates amazing whirls of harmonics and glissandi. An unimagined delicacy of tone arrives, a shimmering vibrato slides through the room, a sharp accent penetrates the fragile timbres.

We are in a forest? What a place this is! I will blow on my flute forever here.

Jean Penny, journal entry, March 2007

PART I: THE PROJECT

> In reality the question extends . . . to a complete reassessment of the concept of the instrument and its relationship with the score, in short, of the state of mind of the instrumentalist. This greatest possible degree of facility demanded of the instrumentalist has forced him to rise compulsorily and progressively to the level of a researcher . . . then to participate very closely in the act of creation itself. . . This stimulating interaction is often responsible for the emergence of positive and powerful creations. Indeed, how could one dispense with it if one has the imperious desire to go beyond admissible limits, to violate comfortable territory, to shatter this into pieces in order to recreate the instrument and its language completely? In this conquest, the flute has indeed proved the driving instrument of this century . . . (Artaud, 1994, p.141)

In Part I the parameters of this research project are introduced, and the research methodologies and main reference points are presented. A background to the impetus for the research, the setting from which it springs, and a brief guide to the historical circumstances that have lead to the current electroacoustic performance field are given. The main emphases of this work are revealed here: the impact of electronics on the flautist, the focus on performance, self-appraisal and self-perception, and the development of research strands and priorities. Part I further illuminates the starting points for developing interconnections vital to this project: the nexus of flautist to technology, flautist to performance and the flautist as researcher.

1. INTRODUCTION

The expansion of electroacoustic music over the last half century has changed the flautist's sonic and performative environment[1]. New equipment, new physical and mental demands, and new synthesis have evolved, generating new questions and responses to performance, and new perceptions of self as a performing identity. Flute music can now include the smallest perceivable sounds, the interior of sounds, as well as huge expansions of sound and stunning diffusion. The traditional idea of the flute has transformed into a meta-instrument, an "interface between human and computer technology" (Harris & Bongers, 2002, p. 239), where precisely specified virtual spaces can create new perspectives and shifts in emphasis, where new partnerships form and expanded performance practices are fostered. Simon Emmerson describes French flautist, Pierre-Yves Artaud's[2] performance of Merfano's *Traits Suspendu* (1980) for amplified bass flute as far from the traditional sound world of the flute, clearly articulating "principles of timbral morphology close to the electroacoustic soundworld of the French tradition" (Emmerson, 2007, p. 106). It is these changes in sonority and performance practice that are explored in this dissertation, where the impact of electronics on the flautist's performance practice is shown to create a transformative practice, reflective of emerging techniques and technologies, and changed artistic emphases.

The Extended Flautist is an excursion into the flautist's mind, the performer's body, the musician's response. In this dissertation I explore the evolution of performance techniques and perspectives generated by engagement with flute and electronics performance through a prospective historically based study, performance practice and reflexive discourse. My investigations centre on the story of the performer, ranging from expanded playing techniques and new performance approaches, to microscopic observation of responses and identity transformations. Here the performer is subject, and the performance is the 'site of discovery'. Delving deeply into this world of new sounds and concepts, where performer and technology intersect, engenders a revitalized approach that impels a search for performative

[1] This can equally be said for any other instrument employed in conjunction with electronics, to which some reference is made in later chapters. Here the spotlight is on the flute.

[2] Artaud is a veritable pioneer in the field of contemporary flute music, having performed, taught, written books, articles and performance technique manuals on new techniques.

insight. This transformative experience is articulated here from the performer's viewpoint through performance, reflection and comment.

Two recitals form the pivotal points of this research project. These follow extensive research and rehearsal periods, and direct reflection and documentation of observations and insights towards specific events and musical works. Recordings and videos from these recitals are included in the submission. This personal experience is enhanced by others through literature and questionnaire responses from six flautists[3], information that serves to assist in pinpointing issues of significance to performers, and to offer ideas for solutions and further investigation in the flute performance field. Areas of significance evolving from these processes guide the investigations towards the impact of electronics on sound, performance space, techniques and physicality, interactivity and perceptions of identity.

The principle stance of this research is created by the presence of the performer's voice. This voice dominates the conversation about the performer's experience, identity, ideas and responses. The performer's voice is, indeed, not unknown in musicology – the musical auto-biography is commonly found on many a bookshelf, and traditional musicians' learning and practice method books abound. Such flautists as Jos Zwaanenburg, Elizabeth McNutt and Taina Riikonen have written scholarly articles on flute performance with electronics, and these are referred to in later chapters. The goal here is to develop further insights, and to focus on specific techniques and the influence of these on the transformative performer. Revelations pertain to intimate playing perspectives and actions, intuitive responses and newly evolving partnerships. The research also aims to relate an evolving process, an unravelling of insight and new knowledge. Conclusions may not be clear-cut, but will rather impel engagement with the world of the electroacoustic flute player, illuminate performance connections and lead on to further exploration.

My goals include personal opportunities: the public recital presentations, the transformative experience of doing the research (renewal, repositioning, momentum), publication, and the development of further research opportunities. Exploring and articulating the impacts of electronics on the solo flautist is intended

[3] The questionnaire is presented in full as Appendix 1. Participants are: Anne La Berge, Cleo Palacio-Quintin, Elizabeth McNutt, Jane Rigler, Sabine Vogel and Helen Bledsoe.

to improve the practice and inform the wider professional community; to incite self-questioning and self-understanding; and to reduce resistance to new music styles and participation through knowledge.

Important in this research is the goal to develop a more fluid and inclusive approach to flute sound and performance. A goal of shared musical experience is sought, as new extended performance techniques contribute to and reflect current music experience. Bringing people into this sphere through discourse, familiarization, and normalization of these new elements, breaking down barriers of uncertainty in flute players[4], and evoking recognitions in a listener are important steps this research attempts to address. In this respect, it is hoped to present writing that resonates with others and inspires them to examine their own responses in their own contexts.

Emerging styles: An historical perspective

As is well documented[5], flute music sprang into a new era with Edgard Varèse's *Density 21.5* of 1936[6]. Pierre-Yves Artaud writes:

> In just three minutes three centuries of tradition in which the flute was perceived as a garrulous, pastoral instrument, avowedly its principal distinguishing features from the seventeenth to the nineteenth centuries, are called into question. In just three minutes a new instrument is revealed and an unprecedented trend among composers in which the flute is rapidly raised to the privileged rank of leader in musical creation is set. In just three minutes the overriding course of flute writing which would engulf every future composer is laid bare. (1994, p. 141–142)

Luciano Berio's *Sequenza 1* for solo flute further extended flute techniques and sonority in 1958. These works were the first in Western art music to utilize extended

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[4] Resistance to new techniques and alterations to flute tone have been clear in personal conversations with some flute playing colleagues, and is further explored in Chapters 4 and 5.

[5] For example, in Artaud's *Aspects of the Flute in the Twentieth Century* (1994) and Ardal Powell's *The Flute* (2002).

[6] Written in January 1936 at the request of Georges Barrère for the inauguration of his platinum flute. Revised April 1946. 21.5 is the density of Platinum (score notes, 1966).

flute techniques[7] and with them, the sonic world of the flute opened up to a different sound perspective, legitimately including noises and timbres previously only found in world music styles, or considered bad playing practice. With extended techniques expanding physical, mental and sonic demands, the transition to electronic interventions came as a natural extension and development.

The earliest experimental works for flute and electronics, by Otto Luening and Vladimir Ushachevsky, came about in the early 1950s because Luening himself was a flautist and the flute's sonic qualities lent themselves to manipulation[8]. Their work in turn influenced Bruno Maderna who wrote the first major work for flute with electronics: *Musica su due dimenzione,* in 1952[9]. The parallel developments of electronics and new flute techniques over the subsequent 57 years has resulted in a vast repertoire[10], including examples of works using the full spectrum of combined instrumental and electronic techniques.

The introduction of electronic technology to the flautist's performance practice has created a practice characterised by change. Adapting to the use of devices such as microphones or foot pedals, to highly expanded sounds and diffusion, to new relationships to instruments and colleagues, and to ever changing computer innovations demands a fluid and open approach, a preparedness to change identity image, and to renew and re-evaluate core musical concepts. The need for adaptability is further impelled by the continual evolution of technologies and techniques. Much of the technology utilized in early works has become obsolete over time, and three of the works discussed in this dissertation have been 'modernized' with new processes. David Brooke Wetzel's work in reconstructing obsolete systems for use by performers aims to retain viability and accessibility of

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[7] Varèse used key clicks, extremes of tessitura and non-melodic gestures. (Powell, 2002, p. 272) Berio used flutter tonguing, key clicks, and the first notated multiphonics. (Toff, 1985, p. 276)

[8] Luening's (1900-1996) composition *Fantasy in Space* (1952) featured flute with tape manipulated recordings (metmagazine, 2005) The flute tone's sine wave formation's propencity for manipulation was an encouraging factor here.

[9] This work was written for, and first performed by, Severino Gazzeloni (1919-1992), a renowned new music flautist of the time. Gazzeloni premiered works of such composers as Boulez, Berio and Fukushima, and influenced many more, such as American flutist/composer Harvey Sollberger. (Toff, 1985, p. 279).

[10] The dimensions of the repertoire for flute with electronics can, in part, be guaged by the list of compositions compiled by Sarah-Louise Bassingthwaite (2002) at http://www.subliminal.org/flute where over 500 works from pre-2002 are detailed.

works in the performer's repertoire through establishing a standardized environment for multiple interactive functions (Wetzel, 2006; 2007). Accessibility to equipment and processing has also fundamentally changed and increased with the shift from analogue to digital, allowing broad availability and participation at multiple levels. In general, new emphases have developed, as well as new processes and techniques. The emergence of *The Extended Flautist* as a powerful meta-instrument entity is closely aligned to, and entwined with, the development of such technologies, and the consequent impact on the performer of transformations of sonority, performance space, physicality, relationships and identity generates the impetus for these explorations.

A repertoire survey of compositions for flute with electronics was undertaken early in the research period, providing a base from which to gauge activity levels, technology use, composer involvement and the breadth of styles in extant works. Important influences, such as documentations of evolving music technology and applications, major performer and composer contributions and musicology texts assist in the explorations of these developments and provide a reference for the changing characteristics of flute performance. Many texts have strongly influenced this research, through the provision of a wealth of information on the development, application and significance of electronic music, and generated investigations into flute-related issues. A few are mentioned here.

Literature surveys reveal an emergent and flourishing discourse on electroacoustic music fields, but limited resources of direct application to performers, and specifically flautists. A small array of flute technique sources exist, such as Pierre-Yves Artaud's *Present Day Flutes* (1995), Robert Dick's *The Other Flute* (1989), and Carin Levine's *The Techniques of Flute Playing* (2002). These texts are directed at players and composers, focusing on the fingerings and blowing techniques of extended techniques such as multiphonics and air tones. Published articles by flautists, such as those of Taina Riikonen (2003; 2004) and Elizabeth McNutt (2003), provide succinct material from which to build the understandings of contemporary performance, along with the writings of performers in adjunct fields. These papers are used in parts of this dissertation to generate discussions of impact in interactive set ups and the influences of electronics on performer perception. Riikonen's explorations of flautist identity in the works of Kaija Saariaho are ground breaking in

their focus on the flute performer. The effect of timbre alterations and control, spatial dimensions and gender implications are explored through dialogue with flautists, establishing a source for the directions of this dissertation. McNutt approaches interactive flute and electronics performance from a practical angle, defining interactivity as interaction with instrument, composers, audiences, scores, devices and partners. Her incisive discussion includes the difficulties and stress of dealing with inadequate equipment and performance conditions, deciphering scores, incorporating prosthetic elements, playing with fixed sound, the experience of score following, and the importance of collaboration. Building upon these discussions, broadening out into explorations of the transformative performer through sonority, physicality, performance space, self-perception and interactivity in flute and electronics performance has been significantly impelled by these pioneering writer-flautists. These areas of focus are identified in the specific performance environments central to this discourse.

In the broader arena of electroacoustic music discourse, numerous writers have established a rich contextual understanding of the genre,s and implications, of electronic music performance, and these sources are invaluable as informants and propellants in the search for new insights. Moving through early texts such as Paul Griffiths' *A Guide to Electronic Music* (1979) and Simon Emmerson's *The Language of Electroacoustic Music* (Emmerson, 1986), to Emmerson's *Living Electronic Music* (2007a) and *The Cambridge Companion to Electronic Music* (Collins & d'Escrivan, 2007), it appears that the practice of writing about electroacoustic composition and presentation has made a shift in emphasis that has become more representative of performance and interaction. Emmerson's works address significant performative issues such as the role of the performer and the spaces of live electronics performance – issues of crucial concern in *The Extended Flautist*. *Local/Field – Toward a Typology of live electronic music* (Emmerson, 1996), *From Dance! To "Dance": Distance and Digits* (Emmerson, 2001b), *New Spaces/new places: a Sound House for the performance of electroacoustic music and sonic art* (Emmerson, 2001a), and *Aural landscape: musical space* (Emmerson, 1999) each provoke review and restructuring of performance space. The scene is thus set for multiple alternatives that account for new environments, changing connections, performative and listener relationships, and new sonic influences,

"where a new musicology of musical practice is called for to replace the musicology of the musical work" (Emmerson, 2007b, p. 5).

New perspectives on music and musical experience reflect the significant and innovative approaches of numerous authors. Katharine Norman's *Sounding Art* (2004) excursions through electronic music present material and formatting of an exquisitely engaging nature, exploring performance, composition, listening and writing in a revelatory journey of intersection and juxtapositions of musical habitation, intimacy and elegance – a deep and inventive approach that inspires review of presentation ideas as well as insightful research. Her observations of the influence of electronics on performance include insights into the perception and meaning of movement, the presence of the performer, and the manipulations of electronic technologies. This book creates windows through which to see 'sounding art' through varying perspectives, inviting self-examination and application to the world of the performer. Thom Holmes (2003) discusses music that exists because of electronics, and the changes incurred to listening and thinking – demanding new ways of experiencing and presenting music; David Toop's (1996 and 2004) writing crosses a wide range of musical paths and perspectives, reflecting and inciting an inclusive approach, encompassing performer, listener and creator responses.

The re-positioning and new functionality and meaning of the musician's body is a major focus in several texts. Nicolas Brown questions the impact of technology on the perceived place of the body in music making, as conventional performances and spaces are set up for the "reconstruction of pre-existent, historical-performative models" (Brown, 2006, p. 38), which predicate the involvement of the body. Performances of computer-assisted performance-realizations may, on the other hand, diminish bodily enaction. Such disembodiment, new assimilations and reassessments of the performer as a sounding body, impel a review of performative paradigms and interconnections.

Jane Davidson's writing is of particular importance to considerations of physical influence in performance, with contributions such as *Communicating with the body in performance* (in Rink, 2002, pp. 144–152) and *Meaningful musical performance: A bodily experience* (Davidson & Corriea, 2001), which have laid the groundwork for further specific investigations of the significance of body movement in

performance – vital to the present discourse. These ideas are furthered by Julie Wilson-Bokowiec and Mark Bokowiec, who define kinaesonics as the "physicalization of sound or the mapping of sound to bodily movements" (Wilson-Bokowiec & Bokowiec, 2006, p. 47). These ideas are explored in Chapters 4 and 6, as physicality issues encountered in performance are documented.

Interactive electronics have generated discussions largely devoted to computer technologies, but an increasing body of work also explores performance. Writers such as John Bowers (2003) have crossed this divide, and begin to illuminate performer issues. Through his ethnographic investigations of improvised electroacoustic music, Bowers describes his own performance experience, revealing new relationships of variable sociality, engagement and interactivity, and new practical configurations in the creation of a performance ecology of musical resources to use in performance. This work incites self-observation and documentation of personal experience.

Literature on performance analysis appears to have evolved new emphases as the needs of players have changed and expanded to encompass new music and altered approaches to their instruments. A structural musical analysis can lead to deep understandings of the meanings of works, and an ability to define objective performance elements, opening up the question of the performer's perceived position (as interpreter or collaborator), and needs (performance and artistic goals). Performance analysis thus manifests in a variety of ways. Jonathan Dunsby discusses the Shenker-Schoenberg divide in performance analysis: Shenker deriding interpretation as an imposition of the performer over the music, and Schoenberg assuming that conceptual understanding of the score is a "prerequisite of adequate performance" (Dunsby, 1989, p. 3). Musicologists such as Nicholas Cook (1982; 1990; 1998) have written and edited many publications on music and performance. In *Music, Imagination and Culture* Cook states that "words and images . . . distort the experiences that they are intended to represent" (Cook, 1990, p. 3). Nevertheless, his writing presents succinct and inspiring thoughts that stimulate the performer to think both more broadly and more deeply about their work. As noted by Stephen Emmerson, however,

> . . . literature on performance from recent years has offered little in the way of practical assistance: . . . it has tended to neglect the concerns of performers themselves … on the whole, insight into the process that leads to a particular interpretation remains limited. One listens to an end-product – a performance or a recording – with very little idea of not just the practice a musician does to prepare for a performance but all the thoughts, intentions, decisions – in a word, research – that has informed and, one must concede, largely determined its nature. (2006, Research Questions)

As a model for performance analysis, Steven Schick's *The Percussionist's Art* (2006) is a most insightful and inspiring source. This book discusses percussion music and performance in such a way that a non-percussionist can immediately identify. Schick evocatively and incisively describes performance imperatives, learning and memory approaches, physical connection to instrument, performance space, musical meaning and what it is to be a performer – the engagements, connections, the experiences of performance. Through metaphor, narrative and exemplars, both specific and universal, Schick creates a striking picture of the self as performer.

The musician's identity and self-perception has emerged as a highly informative and influential aspect of research. Naomi Cumming's *The Sonic Self* (2000) explores musical subjectivity and signification, incorporating astute discourse on the musician's identity, and providing a meaningful basis for the investigations of the flautist's identity. The importance of these explorations to this research largely concerns her approach to the inner and outer manifestations of performer identity, the representation of personality in sound, and her perceptive analysis of performance elements. Cumming states: "To prepare a work for performance . . . is to engage with its many dimensions, to internalize its possibilities, and to allow its complete demands (both technically and expressively) to extend a previously gained capacity." (Ibid, p. 305) Additionally, she incites an awareness of self, and the new possibilities of self presented by differing spatial relationships. My analyses and reviews are personal responses aligned to these concepts. They attempt to elucidate the journey from printed music to performance, the approaches and processes, the defining of pieces, the practising, the changing position of the self, the emerging interpretations and self-examination. My engagement within the performance experience with an enlarged musical setting, from the perspective of my relationship with my flute and electronic interventions, is the main point here. Integral to my

perspective is also my relationship to the music (do I love it, feel inspired by it, think of it as part of me?) and my relationship to the general world of flute performance (for example, sonority goals and new perspectives). The expanded expression of flute with electronics, the playing skill demands and control of technology, the kinaesthetic alterations and renewed identity, the subtle shifts and gigantic transformations of the player are the elements that provide the material for this research.

A number of texts from other disciplines of artistic practice have been of great value to this work – for example, from theatre performance, dance, and architecture. *A Short History of Western Performance Space* (Wiles, 2003) provides a context for the history of performance space, from the finite boundaries of Classical and Medieval space to the so-called "empty space" (Brook, 1995), the adaptable, extendable spaces sought in contemporary theatre. Wiles' discussion reflects performance concerns, such as functionality and meaning, the intimacies or separations, the marginalizations and the controls of technology. These elements are directly relevant to musical performance space, and are explored here in the electroacoustic music context. Barry Blesser and Linda-Ruth Salter in *spaces speak, are you listening?* further explore the performance space as aural architecture, "the properties of a space that can be experienced by listening" (Blesser, 2007, p. 5). Through an awareness of the culture of space, and the applications of new knowledge (from the Renaissance to contemporary virtual spaces), as expounded here, the importance of the meaning of space can be applied to the enhancement of musical presentation.

An exceptional influence to approaches I have taken here came from Susan Kozel, whose perceptive prose provokes deep examination of performance practice. Her experience with dance and interactive technologies is examined through phenomenology in *Closer: Performance, Technologies, Phenomenology* (2008). Her profound consideration of what it means to dance in an interactive environment is explored and articulated, highlighting an intense commonality with the world of the electroacoustic musician. Her objectives include understanding, expressing and extending lived experience, which for her is based in the body. Encounter with technology as a mode of revealing, a set of practices that brings activity into being, and the search for the shifting perceptions and connections between the self and the

digital other, evoke new kinds of thinking, understanding and interpreting. The scope and depth of *Closer* inspires and demands a compelling depth of response to contemporary performance practice research. This work presents a powerful personal ethnography that provokes readers to reveal themselves, to reflect on meaning and communication at a transcendent level, to absorb, reflect and respond to the new.

Connective memories . . . encounters in sound[11]

First meetings: the sight of it, the feel and smell of it, the sound of it . . . and then the music . . . I was in love with this *other* instrument - this flute (at age ten, I had already lived and breathed piano for six years). My first flute still sits in the back of my music cupboard – occasionally rubbing cases with my superbly beautiful top of the range Powell, my alto, piccolo and bass. It brings back vivid memories of encounter as a child, of excited awakenings towards sound, achievement and dreams.

My pianistic background initiated a deep emotional engagement with classical music that intrinsically set me aside from the flute culture I encountered as an undergraduate. My love of the sound, of explorations of repertoire and artistic connection drove me on towards areas that were separate from many expectations. Why was I taking sonority exercises to my lessons - *what is that for?* Why was I drawn to 'modern' (non 19th century) repertoire - *stick to what the public wants - music is just to entertain* . . . My love of Bach was even coming from a different view - I loved exploring authentic styles, and imbuing my playing with these - but to model yourself on flute super stars was the way to success. Australians at the time strove for BIG tone, BIG vibrato for all music: anything else was weak and disagreeable.

> (but wait! I forgot to mention my school flute teacher. He was considered *different* . . . He inspired me to think about sound, and I especially remember performing his music – prepared piano, bits of flutes . . . I thought this was just as normal and wonderful as Bach and Beethoven – I loved it, my musical friends loved it, my mother liked it, but when I got to university people shook their heads in bemusement. My one electronic music experience there was a

[11] These loosely constructed memories attempt to provide a mini-context: a fleeting picture of assorted background influences, transforming moments and connective experiences.

> class visit to the Percy Grainger Museum to hear WHITENOISE. I became vaguely aware of a fascination at the back of my mind.)

Significant musical encounters subsequently left indelible marks – Messiaen won me a flute scholarship, Neilsen put me at the front of the orchestra, Jolivet created amazing opportunities for sonic discovery. Despite these (and many more), I joined the musical establishment, playing in many of the country's best orchestras. My colleagues in the Melbourne Symphony Orchestra, in particular, provided me with fantastic experiences in the regular orchestral repertoire, but these colleagues loved the known, I loved the new. My head was always looking for this other - the deeply engaging AND the artistic connections to contemporary life, the support for new ideas as well as appreciation of the greats of musical history.

Numerous whirlwind tours of Europe, punctuated by performances with percussion, performances with orchestras, performances with a chameleon of musical groups, eventually lead to a chance encounter in Paris: IRCAM and Marco Stroppa. A new work was to be performed by Cecile Daroux and presented by the composer in the Salle Stravinsky at 1 pm one cold January day. This work, this beautiful *little i*, completely blew me away – it seemed to encapsulate everything I loved in flute music: a vast range of colours, intricacy and performative challenges, intriguing ideas that resonate so powerfully, ambiguity, illusions, new sound treatments and amazing emotional involvement. I wanted it!

A resurgence of engagement with new music, an exceptionally forceful drive and uncertainty of how to proceed turned me towards new concert presentation ideas, efforts to influence the local and national flute scene, and, eventually, to this research. My needs to play this style of music, to broaden my engagement with it, to articulate my experience and to develop my personal practice led me here . . .

> (but the electronics? what evolved there? Why did I get into that? For me electronics created an amazing other world, a theatre of characters and new dimensions, of new sounds and moving sounds, of new emphases and altered perceptions, and it was the sounds I loved, and the concepts, and the arcane (to me) systems that created amazing new possibilities in performance.)

Emerging directions: The researcher in transition

Throughout this research journey my aim has been to open the discussion, to uncover new understandings of self and others, as well as the art of flute and electronics performance in general. This quest is limited, as the parameters I have drawn are necessarily narrowed and focused down. I have not attempted a full history of developments in either technological or flute performance fields; I have not attempted to write a how-to manual of performance or an appliance manual; I have not attempted to find solutions to every problem encountered. I have endeavoured to elaborate on my own understandings reached via specific paths of enquiry as outlined in Chapter 2, to recount my responses to selected compositions, performance techniques and situations.

I come to the research as a flute player of repertoire spanning about 300 years, with a specialization in composed music of the last fifty years. This has given the research a perspective grounded in respect for historical elements as well as recent innovations. A search for connection with contemporary thought is a fundamental motivation, and the major influences in this search - the compositions, literature and performers – reflect this stance. In essence, it is the field of new music performance and the opening up of alternative pathways that have driven my work over the last four years.

Changes of emphases have occurred along the way: a more self-centred approach has developed as I have repeatedly turned inwards for answers and impressions. This, essentially, reflects a lack of extant material, and the detection of a distinct hesitancy by many performers to reveal personal approaches. The questionnaire appended to this dissertation has provided some insightful responses from other performers, but a sense of hesitation on the part of some respondents to elaborate on personal feelings is apparent. A more interactive interview style exchange may have allowed for following up and deeper questioning. My choices lead instead to a more personalized account, a 'charting of the territories' of myself as performer, through historical and musical contextualization, techniques and reactions, culminating in three analyses, presented as examples of the intense journey to the performance of three highly individual works: Mario Lavista's *Canto del alba*, Warren Burt's *Mantrae* and Georg Hajdu's *Sleeplessness*.

These performance analyses each reflect a multi-stranded learning path: studies of microcosms in sound, interchanges with instrument, machine and people, and questioning self-appraisals. I look at first impressions, rehearsal developments, spatial dimensions, self-projection, the demands of techniques, the influences of technology, the experience of the body and relationships. I invoke acute self-awareness. The words *performance analysis* indicate to me that the essence of this investigation is the individual – the performer: the instrumentalist who makes the statement, creates the music in real-time, projects a performing persona to be observed and appraised. This is about revealing the activity of performance; the experience, the feelings, the intricacies, and connections.

The works

The following works provide the source material for this dissertation:
Jean-Claude Risset – *Passages* for concert flute, alto flute, piccolo and CD
Mario Lavista – *Canto del alba* for amplified concert flute
Thea Musgrave – *Narcissus* for concert flute and delay
Marco Stroppa – *little i* for concert flute, alto flute, piccolo and electronic chamber
Kaija Saariaho – *NoaNoa* for concert flute and electronics
Russell Pinkston – *Lizamander* for flute and Max/MSP
Warren Burt – *Mantrae* for flute and live electronics
Georg Hajdu – *Sleeplessness* for bass flute, piccolo, alto flute and electronics

These works span a wide timeframe, from 1979 to 2007, demonstrating a significant change in direction both technologically and musically. The two oldest works (Lavista and Risset) retain their original formats and three of the works (Musgrave, Hajdu and Saariaho) have been updated technologically. One work (Burt) was commissioned for this research to provide a new work using movement sensor technology. The main technologies utilized include amplification, accompanying CD, sound diffusion and movement, timbral alterations, pitch and threshold tracking, movement tracking via video camera and sound processing software such as *Plogue Bidule* and Cycling 74's *Hipno*.

Audio files cited throughout the dissertation are accessible via Appendix 5.
Live recordings of the complete works are also accessible via Appendix 5.

2. METHODOLOGY

Constructing the research framework

A musician comes from a world of evanescence, of reviewed learning, listening and playing approaches, and daily adaptations to new perspectives and new potentials. Performance is a process driven activity, in which professional experience and knowledge are accumulated, used, re-newed and articulated under diverse conditions. This situation creates a context in which to chart responses to performance elements through the emulation of familiar territory – the rehearsal to performance journey. Exploring a rehearsal-performance metaphor for research establishes references across these startlingly similar disciplines. Processes common to both include project and program design, identifying areas or repertoire for investigation, developing sets of skills, studying the microcosm, trialing techniques or methods to discover solutions and insights, reflection and adaptation, and adding value to personal and broader performance / research practice through greater knowledge and understanding. In this Chapter I consider the exploration of research priorities and components, and identify and present the methodologies and structures followed in this dissertation.

My research draws together a variety of methods as it explores the world of the flautist in an electroacoustic environment. In establishing this array of approaches, priorities and directions of the enquiry have become defined. My own experience as a performer impelled a search central to my life as a musician, based on information and practice accumulated across a broad spectrum of professional activity. This experience, or 'Arts-informed research' includes what the artist knows how to do, a fusion of qualitative research and the expression of qualitative theories with artistic forms of expression (Colwell & Richardson, 2002). Trends in qualitative research appear to welcome a pluralist, post-modernist and post-positivist approach, accepting a broad taxonomy of research styles – such as music rehearsals – as equally informant and as settings for deep enquiry. These approaches have challenged the praxis of more measurement-based research methods, and have gained favour in progressive research communities. The musician "is the researcher and the studio a

laboratory" states Huib Schippers in *Marriage Arrangement Works* (Schippers, 2005, p. 37).

> On the way from idea to performance, the reflective practitioner goes through clusters of informed decision-making. Part of that process is easily identified as research . . in the artist's studio, various approaches to each phrase are tried, discarded and reshaped. The hundreds of choices in this process are informed in part by conscious, analytical thinking. Other decisions rely on a less tangible but crucial aural library, which in the case of most mature musicians would consist of a reference to 20,000 to 50,000 hours of listening, practicing and performing. (Ibid, 2005, p. 37)

Artistic practice as research is imperative to *The Extended Flautist*, as each part of this dissertation analyses and describes the processes of rehearsal and performance in the quest for knowledge and new understanding. Additionally, reflective action and discourse permeate each part of this project. Donald Schön's *The Reflective Practitioner – How Professionals Think in Action,* presents two kinds of reflection: reflection on action and reflection in action (Schön, 1983). Both of these are crucial in music practice: reflections after the performance / rehearsal / studio session that inform and incite understandings of what was done, and reflection in the midst of performance, where unexpected elements may arise, triggering on-the-spot responses. The reflective practitioner is represented here through the narratives of Chapters 4, 6 and 7, where the performer-in-action is presented, and reflective preparation, performance and critique creates the discourse. This is expanded through ethnographic enquiry in the questionnaire, where flautists are asked to reflect on their practice in relation to specific questions presented.

Research priorities consist of a practice-based approach that includes performance as research; that is participatory and self-observing. The field is defined through music repertoire, and literature from flautists, musicologists and other musicians. The impact of the chosen technologies – spatialisation and interactive live electronics – on the flautist, the new sounds and capacities, and the responses of and to the sound processing create a circulating environment where crucial musical elements can be observed and defined. The recitals, documentation such as the questionnaire, journals and correspondence with composers, and a commission for a new work, each constitute field-work. Observations and insights are drawn together as new understandings and renewed approaches to performance and performative writing.

These components and pathways leading towards the construction of an appropriate framework are illustrated in Figure 1 below.

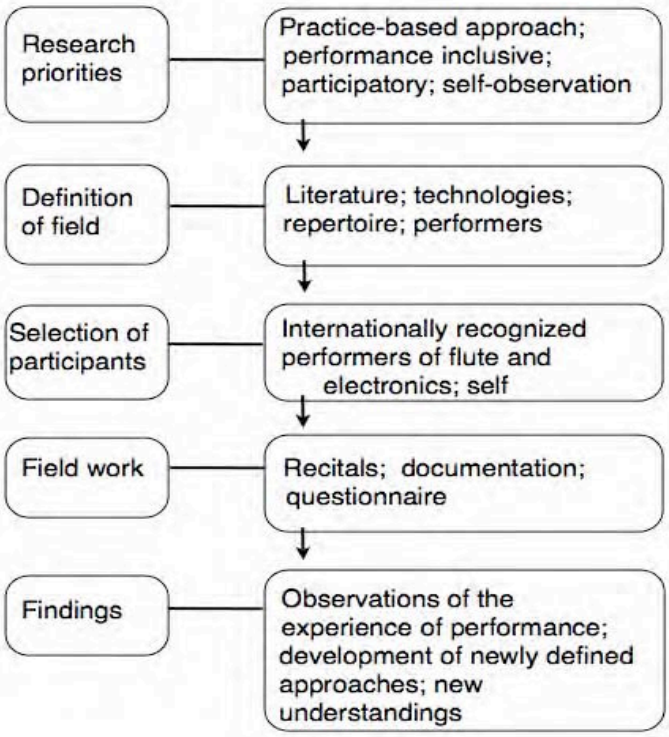

Figure 1: Research components and pathways

The assemblage of methods such as these illustrate some of the scope and diversity of approaches needed in research on musical performance practice, where a kaleidoscope of viewpoints is sought, and a format for flexible, affirmative exposition desired. The actuality of performance, self observation, reflection, references to literature and referencing against responses of others, all bring the work into an artistic, practice-based format that may at times lack preordained or standardized formulae, but perhaps more truly represents the work of the musician in plasticity and multiplicity. This process is manifested in the shapes of the discourse, which are revealed in a propensity for tangents, bias and uncertain emphasis. The challenge is to fit a changeable, interpretative research enquiry into a clarified, communicable format. Finding a framework, that is a consistent and cohesive shape for this dissertation, and that encompassed similar principles and layers of investigation, evolved by identifying the major components and pathways indicated in Figure 1. This, in turn, led to an adoption of the flexibility and objectives of auto-ethnography as a dominant research basis. Within this framework, Liora Bresler's

account of the "I-I" relationship, where identification and identity intermingle, with "no space between the researcher and what is studied", and the "I-Thou" relationship, that acknowledges distance between the researcher and the researched can be enabled (Bresler, 2009).

Research design: A multi-dimensional enquiry

Charting the experience of the journey between rehearsal and performance, and beyond, forms the essence of this research. The processes of discovery in rehearsal, the substance of a work, of learning and memorizing physical and mental elements, of developing interpretational choices and expression, of negotiations with instrument/s, equipment and scores, and of creating the performance actuality, the "temporal materialization" (Narmour, cited in Dunsby, 1995, p. 51), are examined through the influences of electronics and extended flute techniques. Exploring the impact of technology on the flute player implies significant research of the nature and context of new music practice, and the experience of performance. In this instance, the participation and observation of the author *in situ* draws the methodology towards a multi-dimensional enquiry focused on the self in the musical context. Auto-ethnography creates the setting for such a qualitative enquiry, through the employment of a series of methods in a practice-led environment.

Employing a variety of representations to explore flute and electronics performance practice, layers of investigation have been constructed to encompass a broad contextualization of historical shifts across the last half century, to illustrate personal encounters with technologies and new techniques, and to capture the experience of performance through presentation, reflexivity and analysis. These investigations include auto-ethnographic narrative approaches to show personal explorations and processes undertaken, as well as the more formal voice of historical context.

According to Judith Neuman interpretation in research through narrative "sets us up to be detectives; the narrative offers cues to the kinds of cultural values affecting our judgements", and also grounds the research in the ongoing narrative of professional activity (Neuman, 2000, para. 14). Similarly, this research includes narrative that is reflective of my own position as a flute player, influenced by musical and personal background, encounters, listening approaches, physical and mental responses, and

my experience of new music culture. Feelings and thoughts are inevitably intermingled, as insider / outsider perspectives alternately take the limelight.

The following methods and research tools are fundamental to the research:

Auto-ethnography: Carolyn Ellis and Arthur Bochner, in *Autoethnography, Personal Narrative, Reflexivity*, state: "Autoethnography is an autobiographical genre of writing and research that displays multiple layers of consciousness, connecting the personal to the cultural" (cited in Denzin & Lincoln, 2000, p. 739). It may contain cross narrative, from first to third person, personal essays, journal or fragmented writing of reflections and analyses, contrasted to the passive voice of contextualization of musical genres. Personal connections to the research are established through stories of experience and process. These characteristics are abundantly clear in this dissertation. The experience of self, including background influences, professional activities, and this research locate the author as prime subject / participant. This is emphasized through presenting many of these narratives in the first person: a device foregrounding the performer. The personal voice creates an intimate sense of the journey, a narrative of self in reflective reviews and analysis, in experiential, revelatory responses. The research revolves around the author's acquired knowledge, performance and reflective analyses. As the discussion moves from general to specific, through contextualization and reflection, the edges of the layers blur as different perspectives alternately fade or come into focus. The interconnections of self (flautist), other (instrument, music, composer, technology, other performers) and context (performance) (Spry, 2001) thereby impel the evolution of new insights and understandings as an emergent consciousness. (Dyson, 2007)

Ethnography: If ethnography is in part 'first hand interaction with people in their everyday lives' (Tedlock, cited in Denzin and Lincoln, 2000, p. 456) and current shifts in emphasis include the validity of researchers' influences, then the experience of performance as reported by others provides a rich field of ethnographic observation. The experiences of others and the collection of information in the form of questionnaires both provide empirical material from which to validate and inform

this research. The questionnaire is presented in full as Appendix 1.[12] The role of the questionnaire is to add plurality to the research and to gain a diversification of responses beyond my own experience. Questions pertain to performance issues in the flute and electronics field, perceived difficulties and individual responses to these. Internationally recognized performers working in the field were approached via email, after ethical clearance had been obtained from Griffith University (see Appendix 1G). Previous to this communication the six participants and I were not personally acquainted. Of the participants, Cleo Palacio-Quintin is concurrently conducting research of her own in a composition-based study; Elizabeth McNutt has previously published material on technology and flute performance; Anne La Berge has been interviewed quite extensively on her practice by others; Sabine Vogel is an emerging performer gaining a strong reputation for experimentation, and both Jane Rigler and Helen Bledsoe are established performers (see Appendices 1A – 1F).

Practitioner-based research: Through performance, rehearsal and review, this dissertation presents the practitioner as participant and observer. Locating the self in the research necessitates a somewhat disarming openness, a preparedness to share inner thoughts and feelings. The process feeds on the author's curiosity, the need to acquire knowledge and self-understanding, and creates a strong bias in emphasis. Various methods were undertaken here. Repertoire choices included acquiring an overview of the entire field, the evaluation of technical relevance and varied/contrasting functionality, evaluation of musical styles and compatibility for inclusion in the concert programs, testing works for functionality and practicality (equipment, venue), identifying and evaluating flute playing extensions occurring in the works, and identifying and evaluating characteristics for research of perceptions and identity. A commission was successfully sought for one work. Rehearsal processes included acquiring an overview of individual works: musical character, technical functioning, equipment requirements. Sonic experimentation (acoustic and with electronics), implications of electronics and rigorous learning approaches were applied. Intersections and collaborations were explored, the construction of spaces, the development of the meta-instrument, and reflections on sonority, identity, relationships and physicality. The performances thus established a setting for

[12] Throughout the dissertation reference is made to questionnaire responses with the initials of the participants (for example, ALB), the appendix number (for example, App.1) and answer number (for example, A-1) from which the data is extracted.

investigation of the subject, provided material for research, set up dialogical engagement and new partnerships. Reflective reviews consisted of observations of performances as case studies: expounding the insider view, capturing an emergent consciousness of the performer, and leading to defined approaches to performance and analysis.

Mind maps: Aside from the use of musical examples, audio files, video and rehearsal journals, the other major process of great value in this research was the mind map, or extended stream of consciousness representation. The process of drawing these maps is as revealing as the outcome, a search in which multiple choices and pathways present themselves in extended linear form. My approach to this was entirely intuitive, a brain storming exploration of my own processes and approaches, taking as a starting point some common elements of performance reflection and development. For example, identity explorations discussed in Chapter 4 include exterior identity streams that branch out from style, sound, interface and instrument; the interior identity becomes defined from self-awareness, interpretation, artistry and energy. These pathways then become the areas further explored in the context of specific performance experience. This tool was additionally excellent for the discovery of inner thoughts and responses to elements such as sound alterations, as in the 'Voice and Meaning' map in Chapter 6[13].

Literature: As discussed in Chapter 1, important influences such as documentations of evolving music technology and applications, major performer and composer contributions, musicology texts and wider performing arts references are used to explore technological developments and the changing characteristics of flute performance. Locating the research through historical context, and drawing on the documented experience and observations of others creates the basis from which to delve deeply into specific aspects of the flautist's world and the impact of electronics. In this way personal knowledge is enhanced through understanding the locale, and building on the work of others.

Music resources: The electroacoustic works performed in recital, as listed in Chapter 1, are used as the points of encounter, providing the framework of the investigation

[13] See Mind Map 6, p. 128.

as it applies to my own performance practice. Recordings and concerts of new music are probably taken for granted as resources, but their importance in providing access to the 'real thing', the musical reality rather than the by-product of discourse, are unsurpassable. As noted above, my own performances form the basis of this research.

The following diagram (Figure 2) illustrates the methodology components of the research. The investigation is shown as a multidimensional qualitative enquiry, formulated to study the aims of this work: to research the impact of technology on the performance of flute and electronics. Using a compilation of methodologies, layers of investigation flow through historical contextualization, recital preparations and presentation, reflection and analysis, culminating in observation, review and insight.

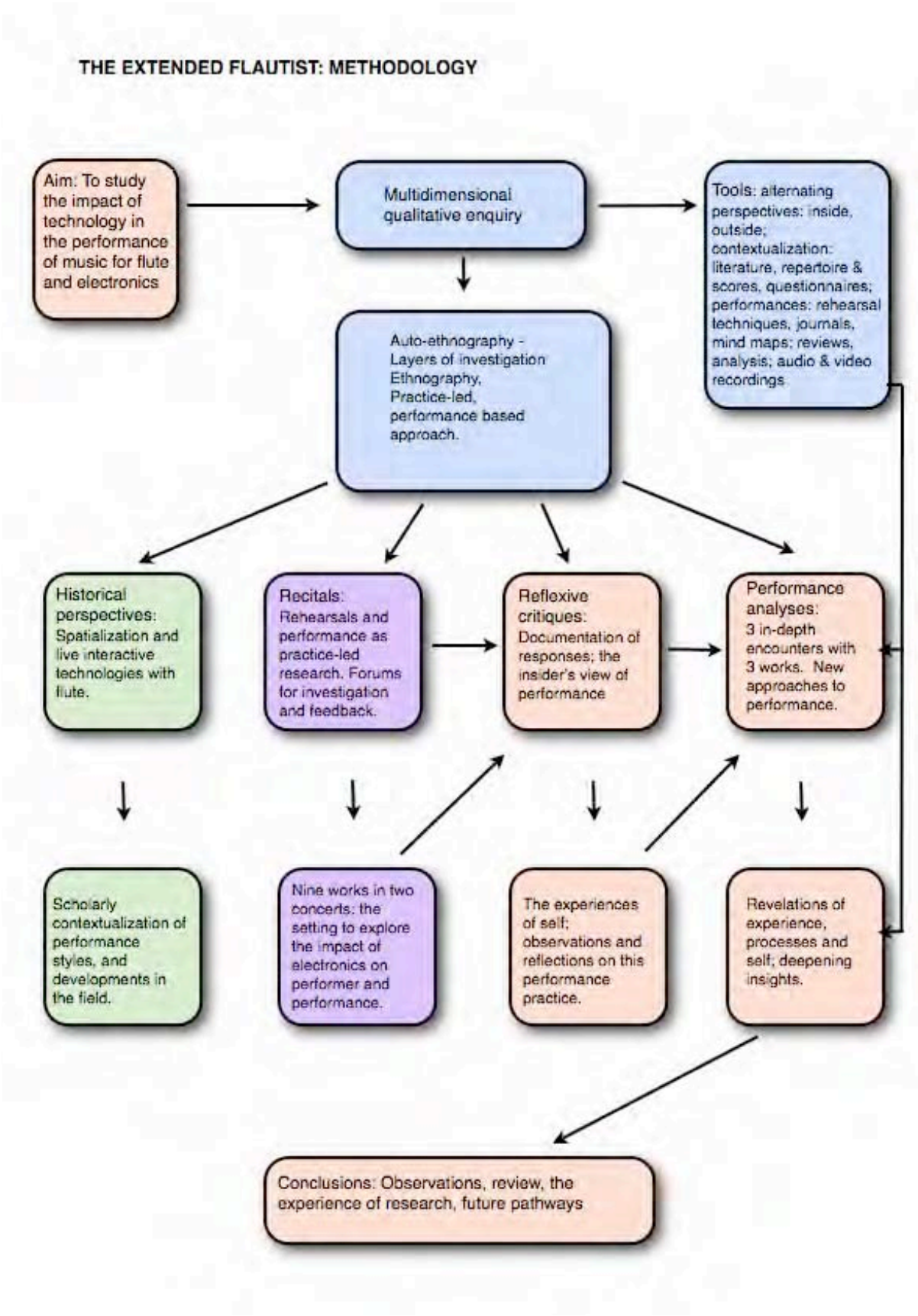

Figure 2: Methodology components

Reference points

As Leigh Landy notes (2007), classification and terminology definition in the electroacoustic field is an unresolved 'argument'. Indistinct and overlapping styles, loosely used descriptors and genre-based generalities trip up the commentator and provoke questions of meaning and connotation. In this discussion, I trace an evolution of flute performance as it intersects with electronics, using a set of terms and definitions that have emerged and, to some extent, reformed to suit the discussion. These include genre, electroacoustic, extended flautist and extended techniques, and it seems appropriate to present definitions of these as they pertain to this study.

I frequently refer to the genre of flute and electronics. Fundamentally, this encompasses music composed for solo flute with electronics, which might include amplification, analogue and digital sound effects and manipulation, computer-based technologies, as well as fixed and triggered CD accompaniment. Solo flute indicates one flautist, playing varieties of western concert flutes: piccolo, concert flute in C, alto flute and bass flute. The 'electronics' in this discussion moves into the more narrow focus of two sub-categories – spatialised sound and live interactive electronics.

'Spatialisation' is a "general term used to describe the means by which loudspeakers are used to articulate or create a spatial musical experience . . it includes formats, . . the placement and movement of sounds in space." (Electroacoustic Resource Site, 2009). This resource, the EARS Internet site, categorizes sixteen types of spatialisation, including ambisonic, diffusion, immersion, loudspeaker orchestra, and surround sound. Spatialisation is closely related to amplification and projection (Emmerson, 2007) and, as such, immensely important as a basic tool for creating sonic opportunities in electroacoustic music for flute.

'Interactive live electronics' incorporates human to computer musical interaction performed in real-time, with the human input in this context consisting of instrumentalist and sound technologist.

'Electroacoustic' is a word that appears to conjoin the two spheres of electric and acoustic sound. My definition here is most closely expressed by Simon Emmerson as: "music heard through loudspeakers or sound made with the help of electronic means . . extended . . to include amplified acoustic music where the amplification changes, in essence, the experience of the sound and is integral to the performance" (2007, p xiii).

'Extended techniques' refers to sounds such as key slaps, breath tone, microtones, whistle tones, and so on, that extend the sound palette of the flute acoustically. These techniques not only extend, but also intrinsically alter the sonic expectations and goals of listener and performer, thereby extending the frame or perception of the flute as a sound source. In addition to flute sounds, these techniques can include vocalization, a significant element in several of the works presented here.

The 'extended flautist' refers to the performer engaged with the use of extended techniques, the acoustic and electronic expansion of the flute sound palette and the use of computer generated technologies with flute. It also refers to the 'extended' awareness of physicality, musical, spatial and self-projection, new techniques, relationships and collaborations.

Dissertation constructs

Central to this research project is the position of the performer. My personal experience and the core of this research focuses on flute playing, however this material extends out into the wider performer world in significant ways. Constructing a framework based around of a pair of recitals, embedding the research within these recitals, implies a reference to all performance, a gathering of responses relevant to all performers, and an invitation for these performers to examine their own performance worlds for interconnecting points. In this way, knowledge is extended through a performance model, the journey of understanding.

This embodiment of music through learning, rehearsal and performance is a journey that leads to the revelation of otherwise inaccessible performance knowledge. This revelation is approached here through centering the research on this very act: it is the doing, the experience, and the observation of performance with electronics that

creates the responses and material of this discourse. The involvement of the self creates the understanding, and the engagement with the music. The perceived self in electroacoustic music can be veiled, concealed, even erased, enlarged or variously altered; the experienced self reveals the content, the encounter, and creates the connections.

The act of performance may be intensely physical, combining pain and pleasure, resistance and yield, the sensory and gestural. Illusions of transcendence may manifest with the employment of electronic technology, but these remain anchored to, and answerable to, the human action and emotions of performance. Barthes writes of the "grain of the voice" in reference to the body in the voice, "the hand as it writes, the limb as it performs" (1977, p. 188). The flute can similarly express the player in the response of the materials of construction, the design, the skin and pressure in the exterior, the breath and moisture on the interior – all perceived by the player as part of the self.

Naomi Cumming states: " A performing artist cannot realistically assume a God-like position of originating his or her own performing 'persona' through a spontaneous act of thought (or imagined self-projection) without any reference at all to received traditions of performance practice" (2000, p. 295). The importance of these traditions is similarly reflected by Luciano Berio: "Musical instruments . . . have a memory . . . they carry with them traces of the musical and social changes and of the conceptual framework within which they were developed and transformed" (Berio, 2006). The flautist's performance practice is grounded in the experience behind and in these elements of tradition – the blowing, finger and musical techniques. The explorations that spring from these, the divergence and experimentation, the willingness to question, to move outside the familiar, to risk changing identity traits, and to accept new sounds and processes as part of one's artistic ecology allows new paths to develop and new interconnections to evolve.

These are the elements confronted here. A struggle for descriptors of this experience may be apparent, as one must reach deep inside, take a risk on outcomes and just allow oneself to be immersed and to re-emerge. *The Extended Flautist* presents these states through a pairing of chapters within Parts II and III, representing context, activity within that context, and response to that activity; through personal and

passive narrative, and through striving for the emergence of insight and direction in performance and research, as seen in Parts IV and V.

Through a variety of approaches I investigate the intersection of flute with two major technology styles: spatialisation and live interactive electronics. These approaches involve preliminary research of historical context, selection of repertoire for investigation and performance, recital presentation and extensive reflective review. The discussion has been prompted by my own performances and responses, but also draws on literature from musicologists, composers, and performers, as well as the wider arts and technological field. My main thrust is to address the impact of electronics on the flautist: the virtual and real performance spaces, new techniques, expanded sonority, new physicality, relationships and interactivity, and evolving understandings of performance and self.

As this is primarily a practice based, auto-ethnographic study, with myself as main subject / participant, it is my experience of performance and the changes that have arisen through new connections and responses that are revealed. The focus, therefore, is on myself as performer, the insider, viewed through the prism of technology and compositions. A shifting emphasis occurs as the writing moves from wider perspectives to a focus on self-reflection. An embodiment of the transformative self is manifest in this alternating perspective, where the use of first and third person narrative attempts to encapsulate the essence of *The Extended Flautist*, the re-located and re-shaped performing persona. Issues are subjectively identified, explored, reviewed, regarded from differing angles, and articulated in the hope of expressing new insights and affirming new understanding. The journey culminates in an aspiration for transparency of purpose and process, and a commitment to deepening exploration of diverse approaches to performance.

Structurally, this dissertation is in five principal parts. Part I is the introductory section, where I state the main elements of enquiry. Part II covers the investigations into spatialisation and flute performance, and Part III interactive live electronics and flute performance. Part IV presents analyses of three works for flute and electronics, and Part V the conclusions.

The research presents qualitative enquiry focused on the impact of technology in the performance of music for flute and electronics. The technologies investigated encompass spatialised sound and live interactive electronics with flute, and each style is the focus of separate projects consisting of multiple layers (contextualization, performance, review, analysis) and perspectives (insider, outsider, other).
The two recitals presented as part of this submission (in March and August, 2007), provide material for reflexive critiques and analysis. The preparations, presentations and reviews of these recitals created a framework from which to explore specific electroacoustic performance practice influences. As such, the performances constitute the pivotal points in the research. They occurred as a result of extensive explorations and preparations, and they initiated reflections and discoveries of self, other and context. The performances also functioned as dialogical engagements with others – the composers, the sound technician, the audience – further informing perception and practice.

The Chapter outline diagram below (Figure 3) gives a representation of each part of the dissertation. Parts II and III contain two closely related subsections: historical perspectives and recital reflections. The recital reflections of Parts II and III relate also to the performance analyses (Part IV) through subject matter and narrative style.

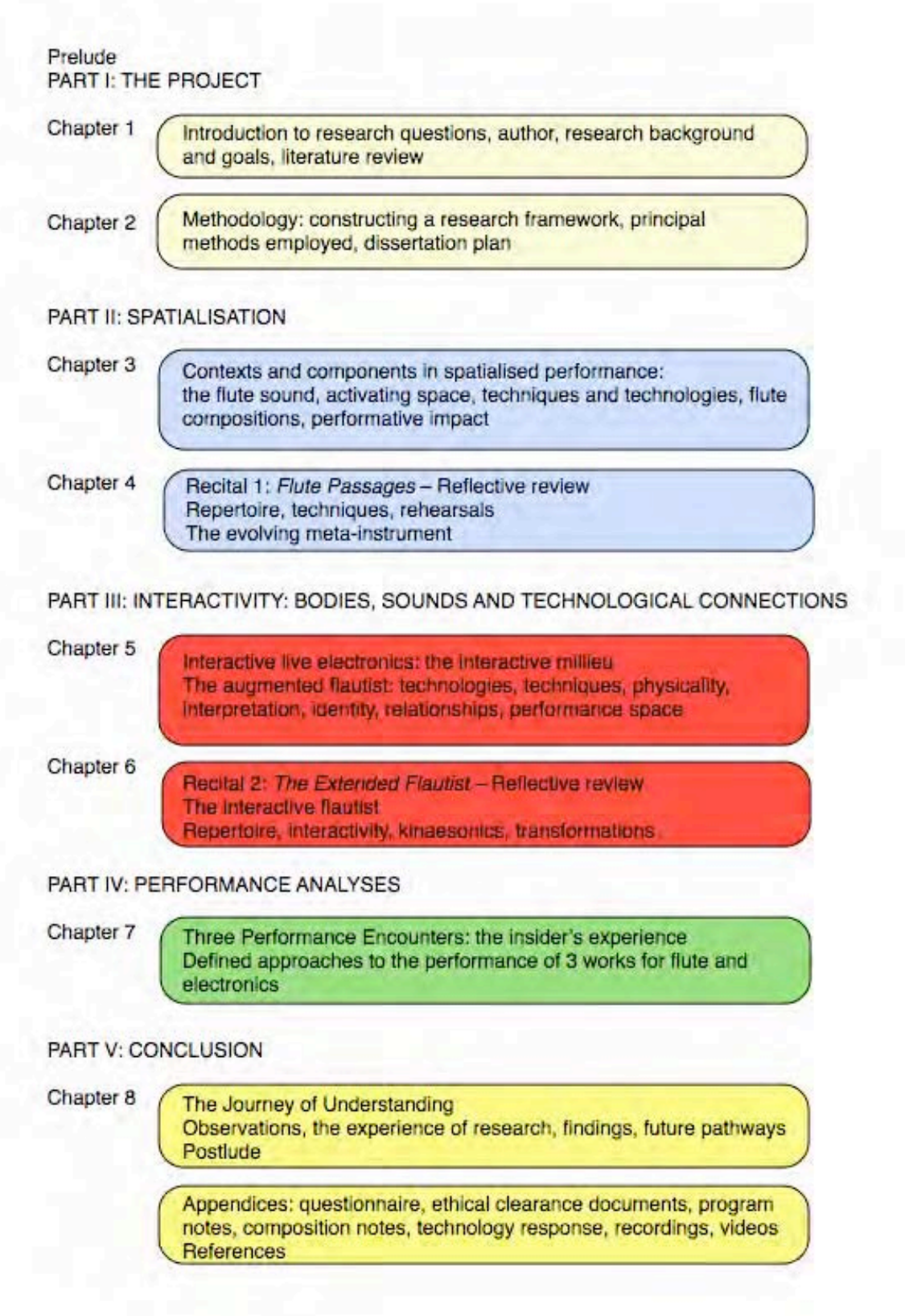

Figure 3: Chapter Outlines

The pairing of Chapters 3 with 4, and 5 with 6 represents the outside and inside perspectives comprising each part. The contextualization chapters (Chapters 3 and 5) present brief reviews of the field (spatialisation with flute and live interactive

electronics), the technologies and techniques commonly used within the field, and the influences of important elements (such as sonority, physicality and perceptions) on the flautist. These chapters are written from the outsider's perspective: the passive, more impersonal voice. The reflective chapters (Chapters 4 and 6) explore specific examples of influence through the prism of the recitals presented. These two chapters are written in the first person, reflecting the insider's view of the experience of performance.

The fourth part of this dissertation (Chapter 7) contains three performance analyses. These documents present concise and evocative demonstrations of encounter, locating the performer / author at the centre of the research in approaches that exploit the multi-perspective stance adopted in the dissertation: a score based analysis, a narrative based exposition and a more traditionally shaped exploration of performative issues. The works are investigated in their entirety to fully express my experience and approach, and to inform others with a 'billboard' to read on individual pieces, to interpret or reflect on their own experience in their own context, in the manner of the work of auto-ethnographer, Tami Spry (2001). Here the rehearsal to performance process is articulated through auto-ethnographic and empirical methods, aiming to reflect the diversity of a musician's approach and the emergence of new consciousness that this research has incited. As such, these analyses are revelations, at a personal and flutistic level.

Codetta

The definition and construction of this research project has become in itself a captivating navigation of self-examination, detection, recognition and evolution. An initial intrigue with enticing new performative responses has developed into an exploration of deep intuitive and personal aspects of performance, of expanded understanding and experience, and a search for diverse connections, the discoveries of new nexus and pathways. The applications of the outlined methodologies are revealed in the following chapters. The nature of these processes in a performative context, and their subjectivity to influence and change, enrich this mission to clarify and illuminate the world of the electroacoustic performer.

PART II: SPATIALISATION

> If music is the inhabiting of time through sound, the inside-out instrument introduces the parameter of being within space. In order to consider space as an instrumental parameter, it is important to question what defines the space: its edges, its density, its lines of activity, or other people within it? Is the 'empty' space still full, but inactive? Sound and light fill a space, but they are also intangible, reverberant and dispersive. Is it an interior or exterior space? Does this inside-out instrument belong equally to the landscape now? The space of music, the concert-hall or acoustic space, is turned outward like a sock, wearing its inside on the outside, the limits extended, no longer a reverberant chamber.
> (Harris, 2006, p. 160)

Part II of this dissertation explores electronic spatialisation of flute sound. Chapter 3 considers the historical context, the development of technologies and techniques for the activation of space, the virtual and real elements of performance. Major areas for investigation emerge for examination, including sonority, physicality, interconnections and performer identity. Chapter 4 presents a detailed reflective critique of flute and spatialised sound performance, as examined and discovered in Recital 1. In this chapter, the insider's voice is heard as the experience of self through observation and reflection on this performance practice.

3. TECHNE: REVEALING SOUND, SPACE AND SELF

The electronic spatialisation of flute sound represents an intersection of acoustic resonance and technology, of ancient sonic imagining and present day cultural imprints. The impact of this technological intervention, and the new responses it stimulates in performance practice, invite rigorous exploration and reflection. This chapter contextualizes these explorations through briefly tracing an historical progression of flute sonority and extended techniques; the development of electronic spatialisation techniques as they impact on flute performance, and the influences of composers and performers on this genre. Performance presentation priorities, the creation of virtual and real spaces, the use of repositioned and moving sounds, the transformation of sounds and the influence of these changes on the flautist are each examined. These influences include the extended sonic capacities of the flute, new physical responses in the performer, a renewed sense of performance space, the synergy of newly nuanced interconnections and relationships, and a transforming sense of musical identity. Brief reference to the wider field is made, for example to the work of Karlheinz Stockhausen, Denis Smalley and others. This contextualization creates a framework from which to investigate specific aspects of the works performed in Recital 1, Jean-Claude Risset *Passages*, Mario Lavista *Canto del alba*, Thea Musgrave *Narcissus* and Marco Stroppa *little i*, in Chapter 4.

The flute sound

Solo flute works characteristically exploit spatial tonal qualities. The flute's resonance has motivated, and perhaps seduced, composers and performers to explore ways of capturing and expanding its translucent sonic qualities into evocative expression. This sonic ethos stretches across the centuries, from the architectural structures of Baroque works, such as J. S. Bach's *Partita in A minor* or Jacob van Eyck's *Der Fluyten Lust-hof*, to the more recent works of composers such as Toru Takemitsu and Kaija Saariaho – in which the resonance and malleability of the tone and breath are a critical element of composition. The influence of composers such as Varèse[14] on flute playing and the subsequent changes of perception of the flute's

[14] See earlier this dissertation, Chapter 1, pp. 3–4.

sonic capabilities stimulated an expansion in acoustic techniques, including many techniques from antiquity and world music[15] that paved the way for diverse electronic interventions. The convergence of these two paths has created a genre that exploits and explores resonance within the music's compositional structure, within the expanded acoustic sounds of the flute and through electronic transformation.

Flute players have traditionally spent vast tracts of their lives exploring and developing a refined and flexible flute tone through studies such as Marcel Moyse's *De La Sonorité* exercises (1934). Moyse (1889–1984) taught the modern flute world to listen in extreme detail to nuance and colour, to achieve homogeneity of tone throughout the range, and to project tonal variety and individuality into performances. He was also one of the earliest flutists to use breath vibrato (although he was scornful of its overuse) (Toff, 1995) and strove for a light, sweet and brilliant tone. Moyse, and his predecessors, including Paul Taffanel and Philippe Gaubert, are largely credited with the resurgence of interest in playing and composing for the flute in the twentieth century, for establishing a rigorous approach to technique and sound, for teaching and for publishing teaching and practice material[16]. It was in this context that Edgard Varèse's seminal composition for solo flute, *Density 21.5* (1936), made its appearance. This work took these beautiful resonant sounds and extended, challenged and redirected them towards new tonal expression through the use of key clicks, dynamics as sound manipulation and extremes of tessitura. As practitioners began to explore and extend these paths, new texts began to appear examining such techniques as microtones, whistle-tones, breath tones, tongue clicks, key slaps, multiphonics[17], harmonics, glissandi, new embouchure techniques, vocalization and varieties of articulation (for example, the texts of Bruno Bartolozzi (1967/1982), Pierre-Yves Artaud (1995), and Robert Dick (1989)).

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[15] For centuries singing while playing has been part of African flute playing, for example, Andean flutes have used air sounds, Indian flute playing has incorporated glissandi and microtones, and circular breathing, used in ancient Greece and Asia, as well as by Aboriginal Australians, was only taken up by Western flute players from the 1950s (see Toff, 1985, p. 87).

[16] The so-called French School of flute playing centred around the Paris Conservatoire, a tradition stretching from Devienne in the eighteenth century to a culmination withTaffanel, around the turn of the twentieth century. A resurfacing of the title occurred with the work of Moyse in the 1960s and 70s (Powell, 2002, pp. 208–9).

[17] The term 'multiphonics' was first used by Reginald Smith Brindle in his translation of Bartolozzi's *New Sounds for Woodwind* of 1967 to more succinctly describe the (polyphonic) multiple sounds available to woodwind players (Bartoluzzi, 1982).

These extended techniques became the source material of composers, scrutinized for their sonic properties and expanded out into the musical milieu through amplification and spatial projection, so reflecting the influence of contemporary cultural imperatives as well as non-Western influences, such as the search for openness in architecture, examination of the microscopic mechanisms of grand design, growth in awareness of self and relationship dynamics, identity shifts and virtual reality, and the growth in human to machine connections[18]. These concerns have provoked the evolution of expanded capacities and creative potential in a genre driven by invention and the re-positioning of sound and instrumentalist. This renewed approach continues to impel performers to analyse their own practice in minute detail, and to develop new capacities and processes in their work. Technologies and techniques, the new performance situation, and the impact on approaches to performance, presentation, and the sense of identity are explored here in relation to these aspects.

Activating space: Sound, technology and performance

From the echo-vases of Vitruvius (Godman, 2004) in the first century AD, to the expanse of cyberspace today, performers have sought to transform the 'empty space' (the theatre, concert stage, outdoor or virtual arena) into a vibrant performance space, to engage the space as collaborator and enhancer, to draw in the audience and empower the performance. This space, the performer's habitat, is influenced by many elements of historical context. The spaces of music (hall, church, outdoors), the forms of presentation (formal, intimate, invisible), the position of the audience (opposite, around, amongst) all have an impact on the performance and performer, often stimulating and sometimes challenging the quest to project and synthesize. The definition of the space may include the components of the music: the location, the acoustic, or the performer and listeners' spaces. These may be integrated, manipulated, and developed via electronic technologies, expanding the boundaries of composition and interpretation through a blend of virtual (composed) and real

[18] Open design housing, scientific research such as micro-biology, self-help publications, cyberspace games such as *Second Life*, and the incorporation of technology into everyday lives are but a few exampes of these shifts in emphasis.

(performance) spatial elements, new flexibilities and illusions, intersections and separations.

The importance of the influence of spatial acoustics has long been recognized as part of the flautist's tools of trade: the eighteenth-century flautist / composer at the court of Frederick the Great in Prussia, Johann Joachim Quantz, for example, advises the flautist on resonant projection of tone in public performances (Quantz, 1966 [1752], p. 200), and new developments in construction, such as the Boehm flute of 1849, (Powell, 2002) and the exquisite refinements of the last half century, have chiefly been generated by the quest for new tonal capacities and mechanical precision. The venues where these flutes are heard, the reverberation characteristics, the diffraction and absorption of materials within them, create acoustics that are unfixed and unpredictable to a degree, but remain largely static, single dimension spaces. In the contemporary arena, new modes of spatial representations produced from technological, architectural and performative means have changed the listening space to something more malleable and adjustable, subject to the forces of imagination and electricity. The nature of these transformations is dependent on the effective combination of specific designs (the physical space, the structures of composition) and sonic properties (source material and technologies).

As the twentieth century progressed, new approaches to sound and composition developed from the use of the microphone as a musical tool, and the construction of virtual acoustic space through loudspeaker placements and diffusion technologies. The development of the microphone evolved through the pioneering work of early generations of engineers and composers (Emmerson, 2007), and the important influence of John Cage's amplification explorations. Douglas Kahn describes silence as "Cage's emblem" (Kahn, 1999, p. 163), but this silence incorporated every audible, potentially audible, and mythically audible sound. "Silence was disallowed", states Nicholas Brown, "the vacuity of inaudibility refuted and the smallest of sounds given voice" (2006, p. 37). These potentials were hinted at in an earlier era when W.H.Preece, in 1878, stated that

> The microphone is an instrument which acts toward the ear as the microscope does to the eye. It will render evident to us sounds that are otherwise absolutely inaudible. I

> have heard myself the tramp of a little fly across a box with a tread almost as loud as that of a horse across a wooden bridge (cited in Cox and Warner, 2007, p. 111).

New ideas and attitudes in music that generated a sweeping shift in musical thinking were consequently opened up. New ways of listening, and new sonic expectations emerged as composers explored the full spectrum of sound as music, stimulated new performance techniques and began to reconfigure acoustic spaces with electronics. The Phillips Pavillion (designed by Le Corbusier with Xenakis, where Varese's work *Poeme Electronique* was performed) (1958), Clozier and Barrière's Gmebaphone (1973), Francois Bayle's Acousmonium, a loudspeaker orchestra (1974), Annae Lockwood's SoundBall, a flying loudspeaker with built-in amplification, 6 loudspeakers, and an antenna (1984), Denis Smalley's multidirectional sound environments and Jonty Harrison's BEAST, a moveable construction of loudspeakers: The Birmingham ElectroAcoustic Sound Theatre (Harrison, 1998), are just a few of the manifestations of spatial music projection and research occurring through the later part of the twentieth century. Technologies such as these inspired a focus towards the systems and processes, the possibilities to change sound timbres and behaviours, and the study of the microcosms of musical elements and perceptual connections. Barry Blesser states:

> Location is an active component of a composition. Antiphony and spatial distribution evolved into a space-time continuum . . . by intentionally sequencing attributes of space, time, pitch, and timbre, a voice can create the illusion of movement (changing position) and transformation (changing size). (2007, p 168)

The complexities of listening are multiplied, as new situations demand that the listener "carries out the mix of all the sonic events", focusing both on immersion and microscopic spectral alterations. (Vande Gorne, cited in Lotis, 2003, p. 258)

Stockhausen was

> . . . one of the earliest composers to recognize that these tools could be used as an aural canvas, something that could create a virtual space: "My idea would be to have a spherical chamber, fitted all round with loudspeakers. In the middle of this spherical chamber, a platform transparent to both light and sound would be hung for the listeners." (Stockhausen [1959], cited in Blesser, 2007, p. 164).

Stockhausen realized these ideas at the Osaka World Fair in 1970. Early works such as *Kontakte* (1959/60 version) use spatial elements with striking innovation. This work explores connections between live instrumental music (piano and percussion) and electronic music.[19] The instrumentalists represent immobile sound sources, and the electronics represent continually changing sources – through rotation, looping movement, alternation, fixed and isolated space points and movements. Hearing *Kontakte* live is an astounding and absorbing experience, as performance gestures as well as the electric and acoustic spatialisation reveal the 'contacts' or relationships between the various elements of this work: the performers, instruments, sound sources and the sounds themselves. Stockhausen's later work *Mikrophonie* (1964), for 6 players (2 percussionists, 2 'microphonists' and 2 musicians working the technology filters with potentiometers for volume, timbre, pitch and rhythm controls) (Moritz, 2007) creates an electronically activated spatial sensation, where the sounds of a tam-tam brushed with 'household goods' are amplified by the two microphones moved in rhythms towards and away from the tam-tam. This work is among the first electronic performance works (Electronic Music Foundation, 2006). Thirty years later, Italian composer Marco Stroppa's explorations of spatial contexts and techniques include the space within sounds as well as physical and virtual space through sound structures of, for example, double bass and metallic percussion amplification up to a billion times of the recorded start of a sound, as used in his work *Zwielicht* (1994–99) (Zlender, 2001).

Pauline Oliveros described virtual acoustic space as "a perceptual phenomenon … created with electronic processing within an actual physical space" (1995, p. 19). This space creation uses amplification, diffusion, sound movement and timbre manipulation techniques to create multiple effects or distortions[20]: including expansion and contraction of the fixed acoustic space, alteration of tonal quality, proximity illusions, magnification of sonic intensity and to set up new relationships,

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[19] Originally composed for four-channel electronic tape, the second (and final) version of *Kontakte* blends the tape with acoustic sounds of piano and percussion (wood, metal and skin) (Program notes, The Stockhausen Electroacoustic Concert, Melbourne Recital Centre, 2009, author unacknowledged).

[20] All electronic music and formats are considered distortion by some, whether in real time or recording, where the spatial dynamic and presence of performers are distorted through absence. Australian composer Ron Nagorcka stated: "The very essence of electronic media is distortion" (cited in Dempster, 2008, para. 5).

dramatic discourse and immersive or remote sensations. Marshall McLuhan describes auditory space as a space 'without fixed boundaries . . . always in flux' (cited in Gow, 2001, para. 10), emphasizing the organic, contingent qualities of electronically driven auditory experience. The virtual spaces of sound art found in works of such composers as Francis Dhomont (for example, *Sous le regard d'un soleil noir* (1979-81)) and Hildegard Westerkamp (for example, *Into India* (1997-2002)) create vibrant and dramatic use of spatialisation technology that often depicts a defined but pliable space. These spaces are equally powerful elements in performance-based works, where the dynamics of the instrumentalist within the space become important elements of expression.

Mixed virtual and real elements create a powerful performative situation: the field of play in which the music can occur, where perceptions are challenged and expectations adjusted. Often the technology will reveal layers and aspects of the music otherwise hidden – such as the inside, the imagination, spaces within sounds and contexts – or act as a mask, only revealing certain facets of the sound or performer, or positioning the performer forward or back. Sounds can be completely out of proportion to one's expectations, as in Gordon Mumma's *Hornpipe* (1967), in which impossible breathing patterns are created through electronic illusions, and the human appears transformed (Reynolds, 2005). Reverberation strongly influences spatial listening perceptions, giving a sound a context and positioning; harmonization effects add layers and relationships between voices, and moving sound cues can encircle and submerge, or dislocate and disassociate.

Amplification is the core electronic process in the medium, providing the technological means by which electronic transformations can occur. Through the expansion of the instrumental sound via amplification two major performative outcomes are instantly apparent: an expanded sound creates a set of new freedoms and powers, and microsounds become audible and thus viable musical elements. Responses from creators and performers can be intense: Westerkamp, in her speech *Speaking from inside the soundscape* describes the microphone as a seductive tool that gives an impression of close contact but is in reality a separation, an illusion (Westerkamp, 1998). Stroppa suggests that the microphone can "grasp the unsurpassed thrill of a performer's inspired gesture" (1999, p. 47). Flautist, Anne La Berge states that "amplification has allowed me to be heard in many more situations

than before. It has also allowed me to use some very special, wonderful, intimate sounds in settings where they would be inaudible if not amplified." (ALB, App. 1A, A-29)

This highlighted awareness or magnification is an essential tool with which to extend the creative possibilities and sounds of the flute. Such hyper-magnification not only introduces the viability of wispy breath sounds and vocalization, but also an expanded capacity to draw the listener into the sound world of the performer. The soundscape is greatly expanded, and listening expectations alter: the flute sound can be stunningly large, or coloured by minute breath or percussion sounds, expanded out into the room; the sounds can be processed to barely resemble a flute at all, or collect layers or mirroring reverberations to increase density or texture; they can traverse across the room, or dart from speaker to speaker, create an immersion, a dry disconnection or illusions of intimacy or distance through panning or delay. These expansions and contractions invoke changed expectations, impose new meanings and alter perceptions of the listener and performer. All of these techniques spring from basic amplification technology.

The diffusion of sound through speakers to articulate or create a spatial musical experience can range from stereo (usually two speakers facing the audience) to spatial orchestra (many speakers) and the use of ambisonic techniques (Malham, 1998). The technologies allow the creation of auditory space as a set of flexible environments, defining the sound world through creating precise virtual spaces, with the configuration of speakers or computer generated outputs enabling, for example, geometric sonic patterns, circles of immersion, or circles of exclusion with the audience observing from a distance. Strategies for diffusion underline this multiplicitousness: sound placement and movement, distance, volume, spectrum, intensity, clarity and relationships between sounds.

Sophisticated illusions within spatial fields can give musical ideas new and revealing expression. The techniques underline the significance of the manipulated or moving sounds, give clarity to the projection of the structure and layers of the composition, and create an interface that may suggest musical ideas and representations such as ambiguity, disembodiment and illusions of dialogue or presence: "But when sound is moved in space – taken conspicuously away from the site of action – suddenly

there is another intelligence involved, another person in the room" (Griffiths, 1999, p. 1).

Denis Smalley describes spatial movement as unidirectional, bi-directional, reciprocal, centric/cyclic and multidirectional, and motion styles as synchrony and asynchrony, continuity and discontinuity, conjunction and disjunction, periodic and aperiodic (cited in Landy, 2007, p. 99). He terms the dynamics and interchanges of composed space and listening space spatiomorphology. Smalley's spectromorphology concerns the shaping of sound partials and frequencies that imply spatial experience; spatiomorphology explores spatial properties and spatial change (Smalley, 1997). Spatial illusion, allusion and implied spatial occupation is further discussed by composer Natasha Barrett in her article, *Spatio-musical composition strategies* (2002). Approaching spatial issues in music as either intrinsic (the spectrum, its morphology and structural organisation) or extrinsic (the sound's capacity to imply, refer or associate), she stresses the importance of multiple elements in the implication of place, of the characteristics of a performance space, the sound movement and reverberation.

Composers across the spectrum have delved into the potential applications of these fields, of the melding of techniques and richness of musical outcomes. Jean-Claude Risset, for example, described his composition with computer thus:

> The computer has helped me reach certain aesthetic goals, to fulfill some yearnings which I may describe as follows: resorting to a large vocabulary of sounds, including and going beyond those of musical instruments; sculpting and composing sounds, with due regard to the harmonic dimension; stimulate perceptual mechanisms to produce auditory paradoxes and illusions; staging close encounters between acoustic sounds, audible traces of a visible world, and immaterial sounds suggesting an imagined, illusory world, a separate, internal sonic reality. (2007, para. 53)

Risset's work for flute and electronics, *Passages*, discussed in the next chapter, explores many of these elements.

New spaces – New balances

> The play–as-text can be performed in a space, but the play-as-event belongs to the space, and makes the space perform as much as the actors perform. (Wiles, 2003, p. 1)

The artistic application of these developments has strongly influenced the performer of electroacoustic music, creating new dimensions for discourse, expression and research. Altered sonic environments such as immersion or diffraction, illusion or magnification have become a vibrant element of composition, influencing the location of performer and focus of performance. The shifting relationships of the performer to the space, to the sound, and to the audience become part of the presentation, elements that are vital to expression. With live electroacoustic performance including an instrumentalist, the visual focus will normally remain with them, but invisible sound movement may imply dichotomies that disrupt expectations and extend listening demands.

Conventional concert configuration of the stage facing an audience in straight lines can suggest a formal separation. A more interactive and intimate set up can be achieved with the audience placed closer to the performer, more in the style of the ancient Greek's cosmic circle (Wiles, 2003). The inner and outer fields of live electroacoustic performance have been discussed by Simon Emmerson in his paper, *Local/field - toward a typology of live electronic music* (1994), which describes the balance of the instrumentalist's control (or local control) with control of an environment (or field). These fields are linked through technological transformations, which can blur the definitions of space as well as create it. If the flautist is the inner (or local) field, this would encompass the physical body of the performer, the sound source, the launch of musical explorations and interpretation, perceptions and creative responses, the visual focus - in other words, the performance centre. Sound transformations created via the sound technician's operation of electronic equipment, and technological synthesis, project the music into an outer field, or audience, where evocations are received, experiences shared and responses invoked.

That the dynamics between live performer and recorded or manipulated sound have become an important expressive field is reflected in significant contemporary writing. Katharine Norman's discourse about Luigi Ceccarelli's *Birds,* for bass clarinet and tape, describes the different sense of location and emanation produced by a live instrument (physical) and electronic sound (invisible), and the creation of a sonic universe for the performer on the stage. In the case of this work, the clarinet sounds are extended, but essentially remain clarinet sounds, blurring the distinctions through placement, and creating a sense of space which encompasses up, down, and 'aboveness' all at once (Norman, 2002, pp. 34–38). Marco Stroppa describes the relationship between instrumentalist and electronics as a "dialectic relationship, where each realm remains what it is, yet, interacts with the others . . " (Trigueros and Tascon, 2008). Several of his works, for example *Traiettoria…deviata* (for piano and electronics) and *Auras* (for percussion and electronics), explore this concept through spatial configurations on stage, amplification and loudspeaker placements. The influences of the projection of the instrument and the electronics on each other, and the quest for symbiosis or morphology are integral to his compositional approach in these works (Ibid).

Through varying balances and emphases, the focus of performance can be diffracted, creating situations where the responses and permissions granted to audiences may change. Simon Emmerson discusses the importance of electroacoustic music in reviewing the quality and concentration of listening, and the revitalizing of performance spaces and performance practice. The standard concert space, he states, is challenged to allow for flexibility of media and audience intersection (Emmerson, 2001, pp. 13–20). In a concert in Melbourne's Federation Square in 2007, two percussionists performed on glass instruments in a continuous work[21]. The players were positioned within the structures of the building, behind the windows, often high up the wall, moving to several different locations during the work. The use of the public space (atrium) for this performance meant that people were free to move about, some choosing to follow the performers as closely as they could, others choosing different listening positions to experience the sound spatialised through multiple speakers. Some watched from the sidelines, observing the differing reactions of people who came to hear / see, and people who happened upon the

[21] The Glass Percussion Project, 2007.

performance as they traversed the square. Different permissions are granted in this environment, including permission to chat throughout the whole performance. An interesting blurring of the position of the performer, whether conceived as foreground or background, occurred as the balance between sonic and visual elements intersected.

In the performance just described, the audience and performers are on a very different, separate plane. This occurs commonly in electroacoustic instrumental works, and in more formal settings the hardware required can set up distinct barriers that emphasize this separateness. Music stands, microphones, computer screens, speakers, mixing desks and pedals create the physical environment for the performance. Often one sees a conglomeration of black boxes, wires, and devices spread all over the stage area, creating a mini obstacle course through which the players carefully step and play. The visual aesthetics strongly influence the dramatic style of the performer and synaesthetic responses of an audience, and the separations that occur are equally forceful.

Flute compositions: Extensions, expansions and integration

Spatialised sound manipulation technologies in extant flute works include amplification, delay, filters, panning, reverberation, multi tracking and digital signal processing (modifying digital representations of audio material, both live and through sound files, samples or recorded sounds). Source material may be live instrument, pre-recorded or computer generated sound, and real-time control over sound levels, equalization and placement of sound can occur. Multiple sonic choices and altered expectations generated by amplification, in particular, have lead on to new freedoms, new sound discoveries and new understandings of performance and creative solutions.

The desire for an expanded flute sonority, and the simultaneous development of applicable electronic procedures encouraged experimentation on both sides: extended flute techniques and electronic technologies. Many of the flute techniques have become almost synonymous with new music, and further manipulations and

extensions seem a natural development. A new set of sonic goals has been incited, far removed from the traditional resonance of the flute.[22] Microsounds are a major part of this new approach to sound, invoking new expression and a new sense of sonic identity in the player. Multiphonics create depth and colour, strands of voices and instability; microtones blur conventional note distinctions and scalic structures; glissandi smudge and meld, giving a new sense of placement and movement of flute tone. Works that exploit these techniques abound, and some are listed here: Mary Finsterer's *Ether* for amplified solo flute (1998), written almost entirely for amplified whistle tones; Kaija Saariaho's works (for example *NoaNoa* (1992) and *Laconisme de l'aile* (1982)) amplify minutiae including whispers and voice sounds; Drake Mabry's *5.4.88* (1988), for amplified C flute uses muffled micro-sound throughout in a percussive soundscape; Nicola Sani wrote *I binari del tempo* (*Tracks of Time*, 1998) for flute and tape for Roberto Fabbriciani, an evocative work that uses electronic sounds sourced from different flutes, transformed by digital sound processing to create an expanded world of flute and air sounds. It is a "sort of sound-time intersection and its projection into space...represents…. meditation on the sounds of air and the pulse of memory. The flute is seen as a filter through which our breathing 'passes' as time is transformed into sound. The rhythm of the flutist's heartbeat … accompanies the tempo of the sound material… What we hear is not the instrument's traditional sounds but transfigurations in a universe of sound qualities that are dilated, expanded and launched into sound space." (Girardi, 2000, p. 7).

Other works use spatialisation to compliment musical ideas inherent in the composition, such as Salvatore Sciarrino's vastly spacious flute works, Andrew Ford's piccolo piece, *...les debris d'un reve* (1992), which uses "massive reverb so that at certain points it is as though the instrument has walked into an enormous cathedral. Then the reverb suddenly drops off and it's actually quite shocking" (personal email from the composer, 11/3/04), and Chris Dench's *Caught Breath of Time* (1981/2004). The electronic version of Dench's work pans the sound from the flautist towards the audience, past and back to the performer again as a radiant metaphor for the passing of time.

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[22] These new goals, and their impact on performance are explored in detail in Chapter 4.

Examples of the broader application of electronic techniques expanding the territory of flute performance include such works as Karlheinz Stockhausen's *Solo* (1965), and Brian Ferneyhough's *Mnemosyne* (1986), which explore the spatial relationships between the soloist and prerecorded flute. Stockhausen's *Solo* for instrument and multi-channel tape delay creates spatialisation effects through sensations of sound movement, by recording the flute at various delay intervals, and playing these back with the live flute. *Mnemosyne*, the last part of *Carceri d'Invenzione*, for bass flute and pre-recorded 8-track tape, creates chordal patterns which unfold as a backdrop of pitches surrounding the flautist who plays material derived from these. The multiplication of bass lines in the tape part from 4 to 8 creates the space for the soloist, magnifying the sense of the bass flute within progressively decreasing and 'imprisoning' material (Toop, R., 1995). Pierre Boulez' *Dialogue de l'ombre double* (version for flute, 2002) was originally written for clarinet in 1985. The concept of a double shadow is explored, with live instrumental passages moving against an electronically spatialised double. Spatial relationships between the soloist and the shadow sound of the prerecorded flute, often the alto flute, are developed. "The performer records a series of 'Transitions', a 'Sigle initial' and a 'Sigle final', which are played on 6 loudspeakers surrounding the audience. . . . The recordings and the soloist only overlap at the beginning and end of their respective sections" (Geelhoed, 2003). Originally for surround sound with six speakers placed around the audience, and a distant seventh, the work uses tape players, mixers and switching matrixes, plus an undamped piano to resonate with the soloist in certain sections of the work. The sound spatialisation and resonant effects have since been simplified to allow use of a laptop computer with a multi- channel sound card and composed software.

Real time spatialisation of sound occurs in numerous flute works, including Laurie Radford's *A Florus Exchange* for flute and DSP (2004) and Christopher Morgan's *Octophonic Etude III* for flute & Live Computer Music (1996). *Octophonic Etude* combines live flute with real-time spatialisation, as the composer explains:

> . . . all of the computer music timbres were samples of different extended flute techniques. These samples included key clicks, jet whistles, multiphonics, and the sound of simultaneously singing and playing a note on the flute. A MAX program generated all of the MIDI information during performance . . . the MAX patch controlled the K2000 panning as well as the real-time processing of the live flute. The live flute processing included stereo echo effects and panning in the Yamaha ProMix 01

> automated mixer (Morgan, 1998, para. 14).

Live manipulated and spatialised flute sound is teamed with radical timbre alteration in Radford's *A Florus Exchange*. The 'exchange' is manifest in the treatment of the musical material of the flute part by the computer (through Max/MSP[23]), and the consequent responses and dialogue between both performers. The predetermined spatialisation of the sound through the Max patches creates a spread of sound, and specific movements from speaker to speaker. The solo flute line itself provokes multiple opportunities for timbral variation by the instrumentalist, and these are augmented to new dimensions through digital signal processing techniques: Delay Pitch Shift (flute signal is delayed and shifted in frequency), Pitch Shift/RM (flute signal is doubled by two harmonizing voices and then ring modulated), Multilooper (audio is captured/recorded and then looped. Controls for loop direction, length, frequency) and Granular Synthesis (audio is captured/recorded and then granulised with controls for various parameters). A dichotomy is revealed in the way the sound effects follow the flute sound, changing and developing it, instantly or through improvisation, commenting and manipulating.

Important developments have been influenced by the work of flautists in the field, as significant players have collaborated with composers and sound technicians to develop ideas and resolve problems. The collaboration between Roberto Fabbriciani and Luigi Nono, for example, is well known. Fabbriciani speaks with emotional and colourful language in his recollections of this time in *Walking with Gigi* (1999), describing the explorations of new flute sounds and electronic treatments. This long citation gives a vibrant picture of this important relationship as we move into the performer's view of electronic procedures.

> The urge to take new paths was constant: Nono would ask me to realise extraordinary sounds on the very edge of the audible/inaudible. Within these sonorities he would then look for stimuli to new ways of thinking and listening. I used to experiment on the basis of his requests and often I created systems for realising futuristic sound worlds by means of the flute. We began long experimental sessions which lasted up to two weeks, recording, cataloguing and refining the products of our experimentation, with a view to

[23] Max is a graphical programming environment for music and multimedia, originally developed by Miller Puckette in 1986 as control software for the 4X synthesizer (Winkler, 1998).

> using them organically in the drawing up of a piece. The executant proposed and the composer chose, and though conscious of the beginning, we were never certain of the end. Sometimes, after days spent in the studio in Freiburg, we abandoned all the work done and set off again in the direction of an extraordinary and beautiful universe, with the desire to explore the amazing undercurrents of sound. With humility, we were spurred on by the desire to experiment to the utmost limits with our instruments, and with ourselves and the instruments, in playful and reciprocated provocation. Simple banalities would disappoint and Gigi . . . would throw it all away.
>
> Nono was cautious in his use of live electronics, not to produce effects which were all end in themselves, since these could create a superficial listening. His aim was in fact to produce a more conscious listening, a readiness to savour every little change loaded with significance and to generate strong emotions against any established, traditional form. . . . Technically, the live electronics consisted of only a few sound treatments, how- ever they were used with such a variety of applications and in such varied contexts, that often the original score was unrecognisable. Such treatments would include: amplification, spatial projection, delay, pitch shift (harmoniser), filtering and mixing. The novelty of being able to take advantage of these techniques in real time, generated new ideas and opened the way to numerous innovations. (Ibid, p. 9)

Transformative influences: A performer's view

The transformative elements of performance with electronics, the influence on the listener, and the role of familiarity in reception and perception of this music are responses that underline the performer's world, in which spatialisation stimulates new expression and searches for micro and macro elements. The overlapping layers of instrumental performance and extended practice created through electronic techniques evolve into a complex, yet compelling search for interpretative cohesion. Observation of these transitions adopts a hierarchy based on personal priorities and musical aesthetic. It is an exacting process to dissect and analyse one's own performance practice, as a momentum develops, the self is forced to observe the self as other. As Brian Ferneyhough stated in describing the documentation of his own composition processes: "a sort of objectivization of a subjective reaction . . not being oneself, but more oneself because more aware of oneself not being oneself" (cited in Boros & Toop, 1995, p. 274). The following subsections summarize observations of importance as I (as flautist) prioritize: transformation of sonority, performance space, physicality, interactions and identity. These aspects are

introduced here in descriptive sequence, in anticipation of specific investigations in Chapter 4, as they pertain to Recital 1.

Sonority

The new sonority possibilities created by the combination of flute with electronic spatialisation generate a new re-evaluated soundscape. A great diversity of expression is achieved as sounds become imbued with new meanings, change and meld into interpretative forms, are separated from the player, treated as sonic units, dislocated within the space and from past associations. The basis of these sonic transformations is amplification.

The role of amplification as the paramount effect in this transformation is indisputable. The power of the player is magnified through a projection of sounds impossible at the acoustic level, giving a hugely expanded range of expression choices to the player. Amplification of very soft, intimate sounds can magnify effects or change emphases; amplified breath sounds (explored in detail in Chapter 4) can create a breathless, tense and dissonant sensation in the listener. Vivid effects can be created through amplified multiphonics, which are often unstable and swinging. They can sound indirect and evoke uncertainty in player and listener, and can also create forceful exclamations at high volume levels. Amplified whistle tones suggest distance and ethereality, often used to depict a distant character or thought. Changes in vibrato intensity and speed can give shimmering colour variation with amplification, especially in combination with reverberation. Combined flute tone and voice or breath can introduce a grainy, indistinct tone that is quite malleable with amplification, and varied emphasis of these colours can have very differing effects. Amplified microtones and overtones can be mixed together effectively to distort pitch; and magnified percussive sounds bring completely contrasting sonic worlds into play with, for example, sharp, metallic key slaps or muffled articulations. Techniques such as tongue rams (which sound lower harmonics) expand the sonic range of the flute, and can disorient a listener, especially if the sound is given a broadened spatiality through amplification.

Cleo Palacio-Quintin's description of her relationship with electronics and the importance of minutiae in sound provides further insight into the flautist's position:

> For me, the electronics is (sic) used as an extension of the acoustic performance. While working for years to control precisely each sound I produce, I developed a very special hearing and feeling for my acoustic flute sound. Each little sound becomes a complete world. I can analyse and be conscious of the micro-structure of the sound I produce. Each sound includes many components, even a simple pitch played with a 'classical' sound . . These micro-components of the sound are not so easily hearable for someone who does not play the instrument himself. The advantage of using electronics is that you can amplify them, exaggerate them so they become audible for an external listener. Besides of trying to conceal the noise and variations in the sound, I prefer to use them as expressive tools (CQP, App. 1B, A-3)

Anne La Berge describes her response to amplification:

> It has enhanced my skills to use soft and intimate flute sounds in diverse musical situations. It has given me great power to be heard in situations where the amplified acoustic flute still wouldn't penetrate the ensemble volume. It has kept my imagination vitally active in coming up with sonic material for my own work and for working with others. It has encouraged me to dare to play whatever comes to mind and to see how that can be further enhanced or changed through the electronics. (ALB, App. 1A, A-24)

Physicality

> A movement is learned when the body has understood it, that is, when it has incorporated it into its 'world,' and to move one's body is to aim at things through it; it is to allow oneself to respond to their call, which is made upon it independently of any representation. (Merleau-Ponty, 1962, p. 139)

The emergence of sonic identity through gesture and shaping of musical material is founded on physical actions (posture, breathing, throat and mouth shaping, arm and hand movement, emotionally reflective body language) learnt over many years of practice. This physicality of the performer in the space is significantly impacted by electronics: new techniques have emerged, such as microphone and pedal triggering; new playing emphases are demanded, such as refined embouchure adjustments or variations of tone and intensity; new breath techniques and muscular demands with new finger, arm and hand movements are frequently required. New freedoms arising from the release of projection difficulties are balanced with further constraints created by equipment set up, and the sense of enclosure or openness achieved.

Physical aspects of aural adjustments are equally critical, with the hearing ability of the performer in a re-configured sound space subject to challenging alterations. An implied detachment from reality can occur, with blowing and muscular movement opposing electronic forces. The physical demands of controlling and managing computer and hardware additionally changes the performance activity, requiring adjustment and familiarity.

Anne La Berge states:

> As the performance nears, I try to create the setup that I will be using on stage. That is, getting the physical coordination and orienting myself to how the physical setup and the sonic situation function is important. In the end I run the works many times to be able to feel comfortable and creative with the setup before I use it in public. (ALB, App. 1A, A-10)

Kinaesthetic awareness is examined in Chapter 4 as it highlights micro and macro dimensions and new approaches to gesture.

Performance space

The distinctive properties of acoustic and virtual spaces generate new rules of sonic behaviours and responses. The virtual space becomes a player in the performance, controlled in the main by the technologist. It is an element of expression and communication, changing the relationships and positioning of performer and sound. Sound sources can become entirely mixed up through live and pre-recorded sound sources, creating ambiguity, the sense of invisible presence and unexpected interconnections. The player can treat the space as a collaborator or an opposition. A sense of enclosure, or disorientation, uncertain proximity and passing of time can result, (for example, in Risset's *Passages*), or a dialogue with spatialised voices (for example, in Hajdu's *Sleeplessness*). The performer can be magnified or obscured, empowered or reduced, thus altering the listener's perception of the performer and the performer's own relationship with the space.

Immersive diffusion techniques can draw both listener and player into the space, heightening the sense of participation, and intimacy. The 5.1 or 7.1 surround sound systems of cinematic origin, and the virtual environment simulations with real-time

multichannel spatialised sound processing that create virtual reality, such as the CREATE auralizer (Pope & Lehman, 2001), are well established, recognizable listening conditions. Significant research on music spatialisation continues in many parts of the world, including the University of Wollongong's CHESS studio anechoic environment (Ritz, Schiemer, Burnett, Cheng, Lock, Narushima, Ingham & Wood Conroy, 2008).

Spatial environments such as these create specific reactions in listeners: to be immersed is to become completely involved; the performer feels a sense of dissolve in the music, a merging of person with sound, a virtual acquiescence (Norman, 2004, p. 161). The intimacy of some techniques – such as whispering – can enhance this effect, with a sense of closeness and inner connection. The 'feeling' in the room can be manipulated through this expansion and contraction, immersion and emergence, the discreet and the extrovert. Electronic reverberation can add to a sense of immersion, through allowing the build up of textures, or sense of enlargement of the tonal space, the contrapuntal or harmonic layers giving a strange sense of support to the player, and dialogue with the musical material or implied hidden persona. Reverberation, Norman suggests (Ibid), puts a sound in a place, the echo confirming its existence. This situation is a feature in much of Saariaho's flute music, where the influence of reverberation on perception of space and placement is vibrantly demonstrated.

Interactions

In the context of spatialised flute performance, interactions specifically occur between the sound technologist and flautist, through an exchange of responses, such as software processing, recording and play back, amplification, diffusion, and techniques such as delay and timbre manipulation. This performance interaction has developed in a somewhat *ad hoc* manner, with changing roles, changing demands and input balancing working around the needs of individual performances and the vagaries of electronic equipment. The balance, projection, and coherence of the instrumental sound are frequently in the hands of the technologist, as the flautist is unable to judge the full effect from the playing position because of the placement of speakers behind, to the side and in front. It becomes a shared production, where the aural judgment and ensemble decisions depend on trust and common artistic goals.

Perception of the audible result can vary quite largely from technologist (optimal) to audience (depending on seating position) and instrumentalist. The acoustics of the hall can influence this, of course, and rehearsals and explorations are needed to maximize effectiveness. The electronics inform, and allow the use of sounds, continuity, nuance possibilities, and they also expand flexibility of aspects such as balance, volume, and dispersion of sound. Static elements, including pre-recorded sounds that exist already and do not adjust, are still human based, the body is always present in this relationship, and the controller is always human. The human direction for successful balance and cohesion is a search for a fruitful alliance with machinery that is not necessarily built with a particular performance in mind.

At times it can be challenging, as a performer, to 'stay in the moment' when working with technology, the wider activity schema often diverting attention from pure musical concerns. This is particularly so in rehearsal, where either malfunctions or changes to technology procedures can take so much time and energy away from the music and performance preparation. Setting up in new venues can also see the focus move away from the playing. Practical issues such as getting equipment, setting it up appropriately and getting it to work successfully are all time-energy-intense activities – essential to the success of the event, but often exhausting to achieve.

Identity

The performer's identity is a combination of multiple interior and exterior factors[24], and is strongly bound up with being a particular type of musician, making specific musical sounds. The outward identity (style, sound, interface, instrument) and inward identity (self awareness, interpretation, transformative potentials, musical background) blend to form the performing persona. This persona is a projection of the self, intermingled with compositions and artistic goals. The sonic self "comes into being with sound", Naomi Cumming states, "and the tone is central to creating the impression of musical personality" (2000, p. 23). As an extension of the self, the instrument acts as an amplifier (Emmerson, 2000) displaying inward and outward identity through musical performance, revealing aspects of inner processes and

[24] Illustrated in the identity maps of Chapter 4 (Figures 12 and 13).

thoughts, responses and emotional connections through interpretational signals. This self-projection creates a perception in both player and listener, imprinting both visual and aural impressions on a listener, and a sense of positioning and potential to the player.

Jean-Claude Risset has written: 'What matters in music is not intrinsic complexity, but the complexity we perceive, complexity in us' (2008, para. 4). This includes the perception of influences on the self, generated by spatialisation techniques. Simply enlarging the sound gives an immediate sense of power of projection and flexibility to the flute player; adding effects such as reverberation or delay alters the location of self and ensemble symbiosis; exposure of small body sounds out into the hall can give a sense of self discovery and also unveiling. Crucially, these influences provide a vastly increased range of musical elements to activate, thus enlarging the personality in sound. "In the process of changing my relationship to space, I discover a new possibility of 'self': . . . a new construction of my embodied position and relative dominance . . ." (Cumming, 2000, p. 13).

Taina Riikonen argues that reverberation affects the embodied identities of flautists, sets up ambiguities, creates new power relationships and experiences of self, as identities implied through voice, of live and recorded flautists, become difficult to distinguish (2003). The use of voice with flute introduces a vibrant strand to research: the personal, human perspective of the performer is projected directly, and often surprisingly, through these techniques. The impact of melding voice or whispering, or of using the voice as narrative in disembodied projection immediately changes the expression: it becomes a recognizable human, located within, or distant from the player. The position of the player immediately becomes subject to distance perception, to reality challenges and identity questioning.

The melding of techniques, an enhanced freedom of expression, sonic empowerment and flexibility creates an expanded sense of identity and energy source in the player expressed through gestures, breath, and interpretational vibrancy. There is a new sense of ensemble, and at times a spatialisation of solo playing into layers and illusions of other presences, a spatialisation of the self: Artaud discusses a schizophonic spatialisation of self which can occur with pre-recorded multi-tracked music combined with live performance (1995, p. 139). There is a magnification of

the micro, intimate elements of playing, which can move the audience into the performer's sound space, the proximity of the sound source, and the possibility to mask and confuse with links to the known and unknown sound source. Even the sense of the flute itself can be expanded through enlargement of the sound, projection, and spatialisation – the diffusion giving an illusion of a physically larger instrument. The placement of the sound away from the player can extend the illusion of the flute across from the visual to the heard. The new sound worlds and new techniques become elements integral to the self, part of one's own 'vocabulary', a representation of personality in sound. In Stockhausen's words: "New means change the method; new methods change the experience; and new experiences change man" (cited in Ball, 1998).

Summation

This chapter has set the scene of spatialised performance through creating a context from which to explore specific performance situations. An historical perspective has traced developmental strands of music technology and applications, performer and composer contributions and musicology texts. The new spaces of music, the new compositional techniques, and the influences on the transformative performer lead now to explorations of the experience of performance in this context. The next chapter explores many of these issues as they arose in Recital 1 preparation, performance and reflections.

4. RECITAL 1 REFLECTIONS

The recital

FLUTE PASSAGES

Sunday 18th March, 2007, Basil Jones Orchestral Hall,
Queensland Conservatorium Griffith University

Program

Jean-Claude Risset	*Passages* for flute, piccolo and CD
Mario Lavista	*Canto del Alba* for amplified flute
Thea Musgrave	*Narcissus* for flute and digital delay
Marco Stroppa	*little i* for flutes and electronic room

Performers

Jean Penny, flutes
Andrew Blackburn, electronics

This chapter presents a personalized depiction of performative issues encountered in the preparation and performance of works for flute and spatialised sound presented in the recital, *Flute Passages,* on 18th March, 2007. Having explored in Chapter 3 many intersections in the wider field, in this chapter I offer personal reflections on explicit experiences in performance. The recital provided a forum for detailed explorations of the imperatives of the specific works, and a reference for new understandings of my own performance practice. I begin the discussion with repertoire choices, techniques of the chosen works and rehearsal processes. Secondly, I explore new elements as they formed during these processes: the development of the meta-instrument, transformations of space and sonority, new perceptions and interactions. Finally, my observations of alterations to my sense of self, and the impact of this journey of exploration are articulated. The program notes presented for the audience can be seen in Appendix 2.

Through this discussion it will be noted that I place strong emphasis on aspects of *little i*. The complexity and richness of this work lends itself well to extensive analysis and certainly incited my engagement at a deep level. In general, the three other works each use one dominant style of spatialised sound (dialogical, amplification, or delay), whilst *little i* presents a wider range of techniques (dialogical, amplification, sound movement, reverberation, timbre alteration, computer generated sounds), and thus many opportunities for discourse in this review. This contrast between the pieces was an important element in making the repertoire choices.

Repertoire choices and rationale

My repertoire search focussed on works that showed optimal potential for the demonstration of expansion and manipulation of the flute sound in the performance space, as discussed in Chapter 3. It was a journey of obstacles and the occasional serendipity: a long period of exploration, trial and change. My evaluation process consisted of the following procedures:

- An overview of the entire field;
- An evaluation of technical relevance and contrasting functionality;
- An evaluation of musical styles, and compatibility within the concert program;
- Testing for functionality of equipment and practicality at the venue;
- Identifying and evaluating flute playing extensions occurring in the works;
- Identifying and evaluating potential for research of perceptions and identity.

The search revealed a limited number of composed works available for performance: some scores are for hire with complex arrangements through agents, some are not available at all, and others are difficult to track down. The final program included two works sourced directly from the composers. Including contrasting examples of technologies within the field was a vital focus, to elicit as wide a variety of responses in performance as possible. Problems of functionality occurred with several works, and although I was able to identify these early on in the process with some works, others kept their allure for months.

As an example of this process, I cite explorations of Laurie Radford's *A Florus Exchange*, for flute and Max/MSP (2003). This is an interactive piece that explores various techniques, such as improvisation of player and technologist, digital signal processing and real-time spatialisation. It was sourced from the composer in 2005, and its distinctive style showed excellent potential for inclusion in this recital. *A Florus Exchange* worked brilliantly for us except for two sections where the capturing of the flute sound and forward propulsion would not function. Despite much work on this, and contacts with the composer, we could not satisfactorily resolve the error in time for the performance in March. It was deleted from the program and replaced by *Narcissus,* a beautiful but more conservative work. Contrastingly, the preliminary explorations of Mario Lavista's *Canto del alba* unveiled a work imbued with excellent opportunities to explore amplified extended flute techniques, and a technological format that could be activated with minimal accoutrements, giving the work an immediate and secure place in the program.

Compatible musical styles were also critical in my search, as the recital would need to function well as a musical entity. Final choices set up a movement through a series of dramatic locations: an inhabited journey, a silent mountain, a pool of water, an abstract encounter. The works are all fully composed, and the composers all belong to the Western art music tradition, albeit with different backgrounds: French, Mexican, Scottish and Italian. There was a distinct aesthetic to this music, a considerable resemblance of mood and timbre, with substantial emphasis on the long sound or phrase. The opportunity to explore sound and the experience of the sound arose from this aesthetic in the manner of Terry Riley's reflection on tone in Indian raga as expounded by Pandit Pran Nath[25]:

> He (Pandit Pran Nath) always said the first lesson was you go inside the tone. You're in the tone and the tone is in you. To really feel when you're singing, like you are that note, it has a physicality about it. That was a very big thing for me (cited in Toop, 1996, p. 189).

The flute tone of each work was emphasized as a space within itself, a place of change and new experience. Differentiation between works was in the detail, the

[25] Pandit Pran Nath, North Indian vocal master and the teacher of important Western new music composers (Otherminds, 2009).

composer's approach and techniques used.

Technical functionality was an imperative in the evaluation process, with a need to be able to move smoothly from piece to piece with a minimum of disruption. Limitations of the electronic equipment available in the venue were uppermost in my mind, and protracted uncertainty with equipment arrangements ultimately channelled me into a program demonstrating a variety of techniques, but with minimum equipment needs. Compromise was a vital element in negotiations in this area: the potential of the performance space would only be revealed to me two days before the recital was to take place.

The final program included works composed between 1979 and 1996, a period of substantial activity in the development of the genre. My explorations of the flute playing demands, the extended techniques and the richness of technological impact revealed exciting potentials in these works. I found qualities in each that were compelling and stimulating: the discovery of the music, the learning processes, the experience of producing each work, the relationship of the performer and fixed pre-recorded sound, the choices of diffusion and speaker placement, the movement of sounds, the alterations of the sounds, the adaptation of technology and the interpretational challenges. The four works thus provided distinctive opportunities for performance response, enabling meaningful scrutiny of spatialisation techniques, impact on performer, transformation of space and the new relationships these processes invoked.

Techniques in the recital works

The spatialisation of sound for the *Flute Passages* program required a seven channel speaker system and subwoofer. A headset microphone was used for amplification of the flutes, and a Yamaha 03D mixing desk. The works presented employed a range of acoustic and electronic techniques briefly described here.

Jean-Claude Risset *Passages* (Appendix 5, Track 1)
This work introduces a procession of sonic characters with whom the flute interacts. The flautist plays with a pre-recorded CD throughout the piece. These recorded sounds are quite separate and identifiable, with the solo flute line an equal partner.

The recorded sound is diffused evenly through the speakers at the sides of the stage, and the live flute sound is directed through centre front. In *Passages* the amplification is light, to balance the flute with the CD and to clearly project micro-sounds. The synthesized sound provides a shifting environment through which the flute travels. The performer is surrounded by the recorded sounds, immersed in this sonic journey. Extended flute techniques include breath tone, headjoint finger glissandi, pizzicato, key slaps, embouchure glissandi, multiphonics, whistle tones, harmonics, altissimo register (up to very high F), vibrato trills, bisbigliando (altered timbre through varied fingerings), tongue ram, and singing and playing together. These sounds meld into and exchange characteristics with the synthesized sounds. Concert flute, piccolo, alto flute and an extra concert flute headjoint are used.

Mario Lavista *Canto del alba* (Appendix 5, Track 2)

This work uses amplification of the flute to gently reinforce the audibility of the micro sounds that are played almost continually throughout. Multiphonics, microtones, breath tone, altered timbre fingerings, whistle tones, harmonics, glissandi, voice and flute tone, varied vibrato, and the occasional resonant passage all become balanced and effective through the amplification. The composer suggests light amplification, leaving the system of diffusion up to the performer. A surround system would give a feeling of actually being in the forest space; a detached sound field would invoke a more separate space, distant from the listener, belonging only to the player. The sense of place and stillness is created through the amplification, enhancing the fragility and luminosity of the gentle flute sounds.

Thea Musgrave *Narcissus* (Appendix 5, Track 3)

This work demonstrates live manipulated and spatialised flute sound through digital delay, with the character of *Narcissus* represented by the solo flute, and his reflections by the delay effect. The work begins with an extended flute solo, which gradually becomes entwined in the echo and responses. The mental chaos of *Narcissus* is depicted with a build up of the echoes and resultant harmonisation effects. For the performer, this creates an engagement with self-immersion, spatialisation of self through the reflective layering, dialogue, distortion and harmonisation of the tone. The delay sits at times at an easy distance, at others extremely close, and at others in harmonization and altered pitch. The live sound is sent through the front and back speakers, the delay through the four side speakers.

Narcissus was originally composed for the VESTA KOZA DIG411 DELAY, a system that is now obsolete and unavailable, which required the flautist to use a foot pedal with 3 controls: an on/off Bypass, an on/off Hold and a volume control for the outgoing delay signal. In this version, the flautist also controlled the delay system by hand (feedback control, modulation depth, delay time). In more recent Max/MSP versions, the delay and control interface, with six digital delay parameters – delay times, repeating echoes, close delay with pitch oscillation, capturing of sounds and creation of loops, fades, and on/off – have been reconstructed in the software, and the physical controls are all operated through the computer.

Marco Stroppa *little i* (Appendix 5, Track 4)

In this work the relationship of the musical partners – the instrumental soloist and other invisible presences – is explored, as the flute and the two sources of electronic sound (the technologist and the pre-recorded material) participate in an imaginary trio. The pre-recorded sounds (synthesized sounds and processed flute sounds) are an 'immaterial' part of the instrumentalist who 'sees' and communicates with the invisible sound partners (Stroppa, 1998, personal email)[26]. Part of the spatialisation effect emanates from the locations of the flute player, who takes four different positions in the performance space, creating echo effects, multiplication and separation of the flute from both sound source and the electronic material. The sound diffusion is composed and actuated with real-time control over sound levels, equalization and placement of sound creating interplay with the virtual and real. The movement of player and sound sources is designed to give the illusory element presence and a sense of the unexpected. The processed pre-recorded flute sounds present a wide spectrum of colours and pitches, sometimes merging with the live flute, or in dialogue and, in a sense, expanding the flute outwards into multi characterizations. Flute sounds are disembodied and moved through the spatial field separately, blurring the conventional cause and effect expectations, through obscuring the source of the live and pre-recorded sounds, the dispersal of the canonic

[26] My approach to *little i* was deeply informed by extensive email communication with the composer, from whom I had sourced the music in 1998, in which he elaborated on interpretation and presentation ideas, giving me a deep insight into the work and a great sense of bonding with the music. This rewarding process assisted immensely in setting up the work for the intense learning processes it needed, and the difficulties that would be experienced getting the correct console and equipment for its presentation.

style dialogues, the disparate sound associations and the composed movement of the sounds through the six speakers.

The demands of these technical elements are confronted and documented in the following rehearsal processes discourse.

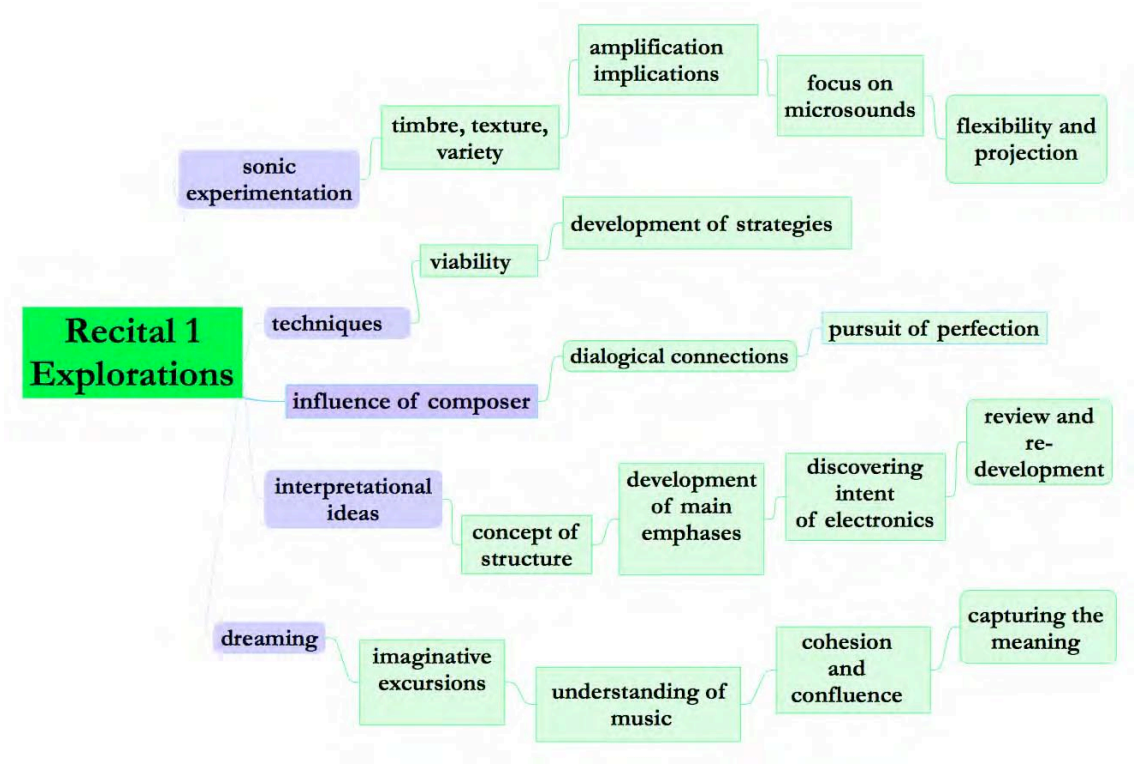
Rehearsals

My rehearsal methodology encompassed cyclic and linear principles in four main areas:

- Preliminary explorations;
- Learning approaches;
- Intersections and integration;
- Meta-instrument construction: spaces, partners, extended soundscape.

My major performance imperatives were to demonstrate spatialisation as an artistic tool to reveal the intent of the music, to enhance emotional engagement with the music, and create a strong impression of soundscape, media and performance space. Additionally, the scope for experimentation with sound, and to observe my personal responses to the changes, was prioritised. I began with a multi-stranded planning and investigative rehearsal process, culminating in two intensive weeks of rehearsals, both acoustic and with electronics.

The diagram below (Mind Map 1) indicates, in part, the general linear methodology principles I undertook to fulfil my major aims for performance construction and the evolution of ideas. A sequence of explorations, learning processes, intersections and revelations: a similar pattern to any performance preparation, with the inclusion of electronics and explorations of technological processes extending and provoking renewed interpretations and sonic possibilities. These illustrated processes necessarily involved a good deal of overlap, of moving from one sphere of activity to another and back as aspects called for attention.



Mind Map 1: Recital 1 Explorations

The goal was to develop a rehearsal methodology that allowed these flexible, animate processes to follow unpredictable leads and ideas for experimentation and resolve. I strove to "reach the back of (my) mind" (Norman, 2007, p. 10) as well as the back of the composer's minds, to "chart territories" (Ibid) of performance, and to enrich my experience through these methods. An example of the beginning of one of these encounters:

> 31/01/2007 (Risset, first rehearsal response)
> Opening phrase: a declamation – here is the flute!
> Quickly morphs off in air
> Headjoint gliss – a startling, unsophisticated noise …playful
> Picc pizzicato – uncertain, but the ensuing short solo establishes the piccolo as a game player / character.
> Flute gliss – extreme soft; multiphonic flash; rapide staccato, flutter – humour
> Picc aeoliens, air tones, bisbigliando, normal tone – quick, fluent, changeable
> Flute whistle, harmonics, altissimo introduced, extended solo that needs conceptual direction from p. 9 to p. 14 – an entity
> Flute and percussion duo – familiarity here, relief, trad rhythms – dissipates, as becomes more intermittent
> Flute solo – a bit disparate

> Voice (flautist and tape) adds new human dimension towards the end, new interest.
> Ends in flight. A study of timbre.
> GAME PLAN – techniques – siphon off into exercises; memorize phrase by phrase; explore timbres
> (1/2/07) First play through with CD – reveals an environment, drive and colours - and the challenge of co-ordination with a fixed entity. An amazing sense of the journey created! Colours and characters to feed off, and counter. (Author, journal notes)

Explorations and sonic experimentation

Having made repertoire choices, established musical characteristics and a diverse set of technological methods, rehearsal equipment for each work was then sourced, enabling the transition to sonic experimentation. The scope and assortment of flute timbres, the textures created by technologies and the implications of amplification came together to help define structural, tonal and emotional imperatives, and the whole exploratory process was accompanied by threads of dreaming, with imaginative excursions through each work sparking an abundance of performance ideas. This was a joyous exploratory period, where magic seemed possible and any challenge surmountable.

> 4/3/07: Lavista - an image of perfection – supple lips, peaceful interior, smooth slides, clear fingerings, vocal stability, infinite breath, convincing fantasy – paradise . . . (Author, Journal notes)

The trail traverses images of emotion in sound, location and expectation, kaleidoscopic colours and interaction.

> 8/1/07: Risset - Identifying the scenes: the tape – flux and flow, water and whistle characters, wire of the spheres; vibrations – clusters, flute vibrato merging with vibraphone; door bell chimes, flutes in counterpoint, swinging, arches, clarinets too and brass – held together with strand chord; flute against picc, percussion drums; floats off, celestial - a floating surround above which flute line fragments into short, high splats; water ripples – waves; bells – angular. Canons and mirrors; interchange; new partners. Timing practice! Stamina! (Author, Journal notes)

An emergence of new physical responses occurred as sonic qualities were deciphered and developed, demonstrating important interconnections as the magnified sound removes the stress of projection, but intensifies the attention on the acoustic manipulations of sound. Experimentations in rehearsal, searching for new effects and solutions, built renewed curiosity and attentiveness in the search itself and physical insight. A vigorous focus on micro techniques highlighted muscular awareness of embouchure flexibility and fluidity, throat relaxation, internal mouth shaping, and air pressure control, all of which require a relaxed and alert condition. For example, in *little i*, the whistle tones at the end of the first movement are extremely difficult to pitch and project. Picking these micro-sounds up with the microphone was also a challenge, but when accurately placed the result was spectacular. In addition, the feeling of hearing the sound projection allowed me to relax with the technique, thereby enhancing the result further, with less tension and more resonance at the source. This sense of freeing up created by amplification proved to be a major influence with all of the works. In this instance, the composer's suggestions (and encouragement) were a major assistance:

> The final whistle tones are hard . . . especially on the G flute. If some are missing, do not insist too much, so as not to loose the overall contour of the phrase . . . it is important to give the impression of a kind of distant, lonely whistling. When performing this passage (b. 23 to 27) you should move as close as possible to the microphone near the mouthpiece and be EXTREMELY cautious with breathing (absolutely no noise, take your time). You're here very much amplified . . . this means that your whistle tones will be definitely heard, but if you inspire just "normally", this will sound like a "thunder storm". (Stroppa, personal communication, 6 July, 1998)

Exploring the diversity of complex techniques required by these works demands patience, time and determination, as well as an artistic commitment to authentic performance. I discuss my development of technical strategies below, my dedication to which thrived only in the accompaniment of motivation and excitement about the music. To take a further example from Stroppa, *little i* is a work that requires an intricate arrangement of equipment, performer and sound placement, with highly innovative diffusion and projection elements. Another example:

> These are some general, sketchy remarks concerning the relation between you and the tape. Although the tape is fixed (this means that it is Andrew who is listening to you

> and taking the musical decisions and not a machine!), the result can be much more musical than if some real-time processing was going on (because the sound quality and variety of real-time technology is very poor at the moment). But you have to learn to tape very well and to get used to listening to it throughout the piece. The tape is a sort of "immaterial" part of you: each time you have a rest, fall back unto its character, try to make it part of your sound world and to find a correspondence in your playing and in your more general attitude as a performer. When this is achieved, then the relationship between your playing and what is coming out of loudspeakers can be a very musical one, as if you're "seeing" and communicating with your invisible sound partners. (Stroppa, personal communication, 12 July, 1998)

Of greatest importance in the exploration period was the search for understanding the way the electronics would potentially articulate the meaning of the music, and how they influenced my understandings and goals of projection. Revelation revolved around processes of review and redevelopment in the pursuit for definitive interpretative ideas.

Learning processes

Music learning processes for me are always cyclic: every day the whole or part of the cycle is revisited and renewed, added to and progressively stabilized. Initial priorities include the identification of technical difficulties and the employment of note learning strategies, including memorization. Memorizing crucial sections, where difficulties are most evident, and simultaneous physical mapping of each performance manoeuvre, gesture, breath and projection, is a repetitive procedure that embeds the music in my mind and body. A current of rhythmic energy and flow ensues, focussing on doing the task, creating a secure space for the music, for the addition of electronic elements and preparing for the "exposed role" of flute soloist (Green, 2003, p. 67).

To enable rehearsal with the electronics, a home studio sound system and computer set up was initialized, providing good access for arbitrary rehearsal opportunities. In my experience, the electronics are most often added to acoustically prepared playing. The appropriateness of this approach can depend on the style of music: if there is a complex score to decipher it is advisable to spend time acquiring familiarity with the sounds and constructions; if the style is more improvisatory or transparent, it can be

illuminating to begin in tandem with the electronic effects. On this occasion, I established an acoustic viewpoint, which then evolved, reacted and responded to the electronic processing.

Gradually a sense of cohesion and flexibility led to a sense of the spatialisation: an understanding of the musical potential and goals this technology highlights. An important element enabling this transition was knowledge of the technological processes: an ongoing pursuit, ranked on a 'need to know' basis. Immersion in the sound world of each work, and defining the characteristics of each, was assisted by my basic, but increasing, understanding of how the technology worked – both functionally and conceptually.

Each early rehearsal with electronics demanded a virtual reinvention of the performance, as my sound technologist[27] and I experimented with processes and effects. For example, practice requirements with the Lavista were overwhelmingly acoustic, focussing on difficult flute techniques such as extremely subtle embouchure control, critically adjusted airstream angles, and stamina demands. Once amplification was applied, expansion of the micro-sounds was revelatory; strongly informing the playing and bringing renewed energy and malleability through increased freedom and ease of projection. It became possible to trial differing techniques, shaping of notes and phrases, and emphases of colours by reappraising playing gestures, such as tongue positions, and lightness of breath. Finding a solution for the accurate projection of the harmonic glissandi towards the end became open to renewed, unconventional approaches in this permissive environment. Evoking a sense of solitariness and meditative spirit became the major goal for this work in final rehearsals in the hall, and adjustments to the amplification, such as the addition of slight reverberation, were made through the desk effects to enhance the gentle, enveloping atmosphere. In this way, the acoustic techniques were transformed by the technology, as the physical skills were extended and altered to produce new effects.

A continuum of evolving strategies and responses thus constituted the learning processes, with periods of gestation, evaluation and renewal. Evolving sonic goals

[27] Each of the recitals presented for this degree included collaboration with sound technologist musician, Andrew Blackburn.

emerged as the combination of electronics and flutes, virtual space and real space became more defined and converged, and this development of a meta-instrument, consisting of all these elements together, is further discussed below. The learning processes did not stop here, of course, they continued on indefinitely up to, during and after the performance.

Intersections

In developing the confluence of performance elements, the integration of the technologies with flute playing was a central objective. Each work presented separate challenges in this regard, and I give here a few examples of these: developing confluence and quick responses, evolving sonority in combination with effects, and the shared musical experience of technological functioning.

The timings for ensemble and some fast instrument changes became my priority with the Risset, along with the repetitious practice needed to embed the accompanying sounds in memory. The ensemble in this work generates a sense of meeting and engaging with each sound as it passes, a dramatic roaming mobility, but the fixed nature of the CD demands precision and even presentiment in passages such as that illustrated in Figure 4, below. Emphasis fell to achieving balance and flexibility for changing characters and associations: quick responses, dreamy merging, rhythmic engagement and independent dialogue.

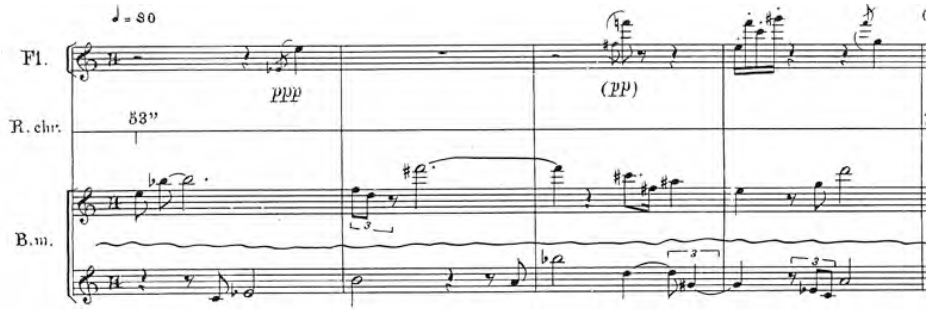


Figure 4: Risset Passages, p.13, system 2 [28]

Rehearsals for the Musgrave centred on exploring the intersections of sonic dialogue and balance, sound placement and merging layers. The spatialisation of one voice (the flute) merging into two and more voices (still the flute, but representing

[28] Cited with the kind permission of the composer

mirrored images), as seen in Figure 5, impelled a search for dialogue and identity.

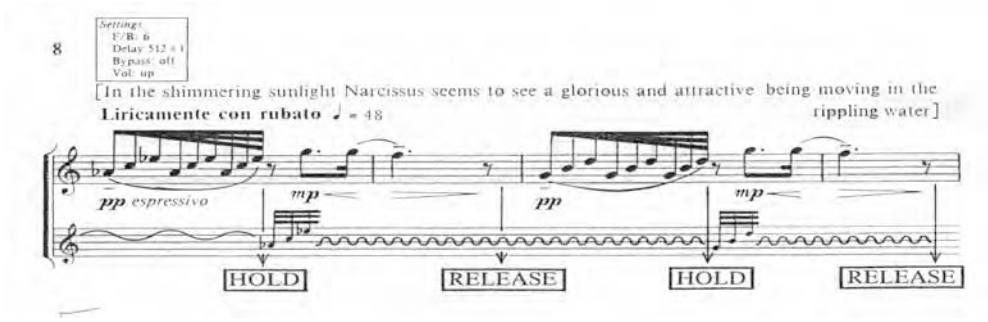


Figure 5: Musgrave, Narcissus, p. 8, system 1[29] (App. 5, Track 14)

The impression of my own sound coming straight back at me as a new voice was astonishing at first, but served as a brilliant underpinning of the dramatic character of the piece. This revelation was an empowering moment, intensifying the sense of deluded megalomania evoked by the personality of *Narcissus*. In rehearsal, the updated version, described in the techniques section above, took considerable time to settle in, the echo effects and timbral alterations needing adjustment to capture the sense of space and response from the computer to the flute playing. Length of the delay was increased slightly to enhance this characteristic. These adjustments became a significant issue for the rehearsals in the hall: balancing and softening the tone, searching for the essence of the sound and effective solutions.

As an example of spatialised music in the flute repertoire Stroppa's *little i* is unique. The processed sounds are fixed, but triggered and balanced by the sound technologist in chamber music style: as a performer in an ensemble setting, where adjustments are made *in situ*. The balance of recorded and live sound, speaker placement and sound diffusion requires great refinement and sensitivity, and intensive and protracted rehearsals explored these interconnections, physical responses (fingers, head position, arms and neck, embouchure sensitivity, tonguing, breath, stage movement), mental processes (comprehension, cohesion, expression), sonic elements (tone colouring and shaping, dialogue), and technologies (amplification, diffusion, ensemble, balance, scene changes). Co-ordinating the scene changes[30] and recorded

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[30] Scene changes are pre-sets of routing, volume, effects and other parameters such as equalization (EQ) for each section which are recalled instantly at the desk

material[31] also needed tenacity in rehearsal, as immediate response was essential in many parts of the work, and success or failure provoked quite extreme reactions in the performers. The complexity of the flute part is such that slight distraction, or mistimed sonic events felt like crashing avalanches, and my sound technologist was similarly impacted by slow or malfunctioning procedures. On the other hand, when success occurred, the impact was sublime. Building the musical space and new instrument, the combined flute and electronics instrument, involved such shared experiences as these, and I explore this aspect in the next section.

A meta-instrument: New spaces, new partners, new possibilities

The importance of creating the space through instruments, hardware and diffusion is vital to understanding the electroacoustic performing environment. The set-up process is, in a sense, a construction of the space and the instrument: the instrument here being not just the flutes, but also the hardware and software technologies, and the resultant combination of these elements. This third element, the melding of flute with electronics, the mix of real and virtual, creates a new instrument in a newly defined performance space – a kind of meta-instrument. This meta-instrument expands roles: it involves the space as an integral part of, and contributor to, the performance; it embraces acoustic and electronic machinery; it includes the instrumentalist and technologist as musical counterparts. In this extended sphere of performance action, where the body, instrument and electronics are joined, familiarity develops and an understanding of potentials and limits evolve. The existing performance practice expands to incorporate new performative patterns in the body and new cognitive processes and responses. The creation of the meta-instrument for this recital begins with the hall in which the event took place.

The space

The Basil Jones Orchestral Hall[32] is a moderately large rectangular room, with wooden floor and plastered walls. There is a large organ at one end, a piano, a

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[31] Digitally generated sound material recorded as accompanying CD sound files.

[32] Situated within the Queensland Conservatorium, Griffith University, Brisbane. Seating capacity of up to 120 free standing chairs; total area 250sq m inclusive of audience and performance areas.

harpsichord, a collection of chairs and music stands, some adjustable acoustic wooden panelling, and black curtaining that can be used to cover one wall, but was removed for this recital to allow the sound from the rear speaker to bounce off the wall. My decision to orient the performance to the side wall of the hall was based on acoustic, visual and ambient considerations, and to achieve a simple, more intimate, design. Aiming to enhance the narrative of the performance and balance the fields, the stage set up was arranged according to Stroppa's instructions for *little i*. This set up, in effect, enclosed the performance area with music stands, speakers and microphones, with the seating arrangement forming a double triangle, separated by the pathway to the mixing desk in the centre (see Figure 6, below).

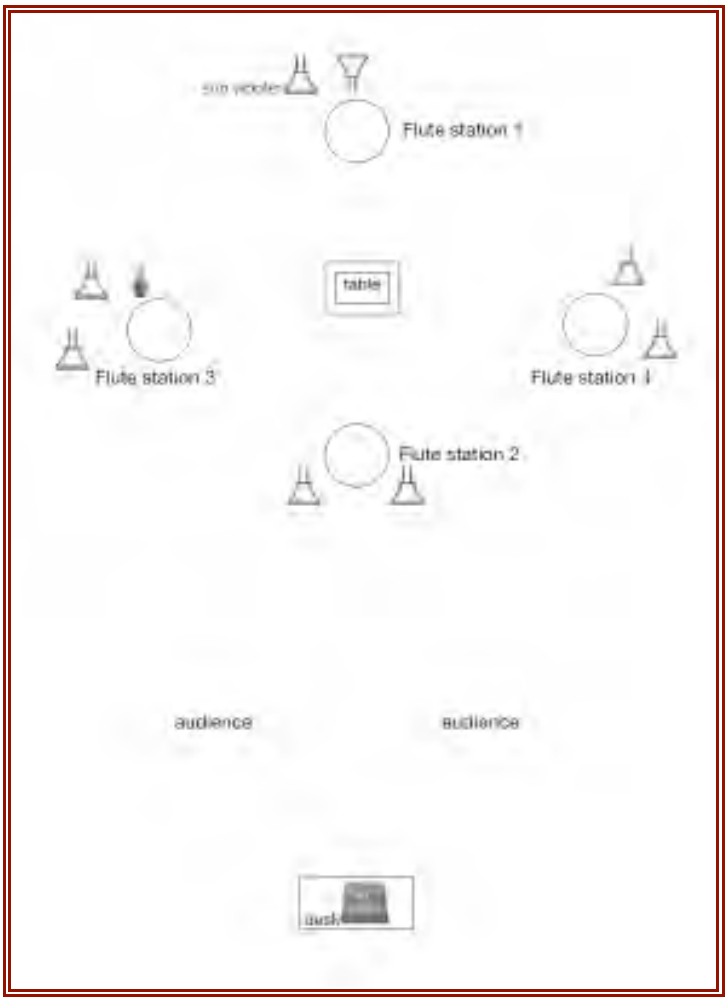

Figure 6: Recital set up in Basil Jones Orchestral Hall, QCGU

The electronic equipment requirements for the recital were quite straightforward: a console, seven loudspeakers, a subwoofer (sadly, the sub woofer was not connectable to the diffusion system provided by the Conservatorium for this recital), microphones and cables. This set up worked well for all four pieces, enabling quite a unique

soundscape and reasonable definition. My decision to use a headset microphone for amplification plus one stand microphone for the alto flute tongue rams, key slaps and pizzicato, contributed to a clean performance space and greater physical freedom, largely negating the need to remain close to the stands.

The needs of the console were specific. The Stroppa work was composed using a Yamaha O2R desk, and the functions of this desk were integral to the work. These included individual control of inputs (microphones, stereo input from cd player) and outputs (loud speakers plus subwoofer) and appropriate crossover separation. The controlled routing of each input to the whole range of outputs had to be adjustable on the fly, with instant recall of presets – routings, levels and EQ (memory scenes) required. For this performance a Yamaha O3D was used, and the seven fixed microphones were changed to a radio headset microphone and one additional pair for collecting the sound of key slaps and tongue rams, thereby reducing the number of inputs from nine to five. The CD input (stereo) was also used. The speaker out requirements remained the same, as did the controllable routing of each input to the whole range of outputs and instant recall of presets.

No adequate mixing desk was available at the Conservatorium, and sourcing one was a difficult process to deal with in the weeks before the recital. Several respondents to my questionnaire touch on equipment compatibility and availability, indicating that performers frequently experience a high level of difficulty with this issue. Getting what you need in an environment that is often inflexible, even in a music institution or concert hall situation, can be a great challenge (or extremely expensive), and often involves providing one's own equipment, or calling on personal favours. The artistic goals and importance of authenticity in performance are elements that remain at the forefront in these negotiations.

In developing and exploring the narrative of the space – journey, place, drama, time, textures, emotions – I sought a vigorous and vibrant image of the musical structures, flute sounds and manipulations. A vital aspect was the articulation of the space as either an open or enclosed location to enhance sonic awareness of the musical dimensions and designs. Although I was able to minimize the visual and physical impact of technological machinery through reduced microphone hardware, the effect of multiple music stands in the front, unavoidable in practicality, felt to me like a

significant barrier to the audience. There was a sense of isolation and inwardness; I could only see my fellow performer and visual communications with the 'desk' felt like coming up for air, an anchor in reality. The spatial imagery of the performance circle evoked an integrative, focused, almost trance-like illusion, with the stage area becoming the central focus, separated from the audience observing from outside. There was an illusion of immersive ambience, with a degree of intimacy between audience and player, but with clear separation of inner and outer fields[33].

Thus, the performance area or field was defined by the hardware: speakers, stands and table, creating a sense of enclosure, a set of shapes created for the confluence of the musical elements, and a launching place for sound. A sense of movement occurred in the implied forward and backward relationships with the pre-recorded material and manipulations, between playing positions and instrument changes, in the sweep across the score (stands), visual and electronic connections to the desk, the musical and instrumental gestures and the punctuation of audience responses (applause).

This implied space of performance created through the physical hall set up, the location and blurring of sound sources, physical gestures and the manipulations of timbre and time provoked (in myself at least) a multitude of thoughts and ideas, including expectancy, surprise, synchrony, plurality, uncertainty and discourse. The separate and overlapping sound fields and directional diffusion alluded to shadow puppetry in my mind: musical characters and auras passing through, imprinting a vivid image or presence before moving on. These dramatic sequences were articulated in the space via the sound modification techniques, the reverberation, placement of invisible voices, and expansion of flute tone. The symbiosis of flautist with sound technologist, instruments, hardware and software thus created the meta-instrument as facilitator of new performance dynamics and musical possibilities.

The partnership

For this recital my associate artist was Andrew Blackburn, with whom I worked in tandem to create the flute/electronics/space meta-instrument, suggesting,

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[33] See discussion of fields earlier this dissertation, Chapter 3, p. 41.

experimenting, reviewing and deciding on needs and priorities throughout the process. The relationship of the technologist and acoustic performer is a very carefully balanced, yet vigorous dynamic with the potential for fantastic collaboration or total disaster. The divergent experience a technologist brings to this relationship was, on this occasion, embellished with the sensibilities of the acoustic new music performer. This innate confluence and understanding of my performance practice priorities allowed for joint immersion in both worlds, and in a sharing of the musical and aesthetic ideals. In this happy situation, the context does not need redefinition: there is an equality of input, with a tilt towards the soloist's 'right' of artistic license or leadership.

These issues were influential in the aural judgement and ensemble decisions. Balance and coherence became a shared responsibility, as I was unable to judge the full sonic effect from the playing position because of the placement of speakers behind, to the side and in front. Critical elements include balance, timing of sonic events and a sense of confluence between both players. Equipment functioning is also vitally important, especially the speed with which the desk can respond. This was, indeed, an issue in the performance of the Stroppa work. There was a startling moment when the canonic structure became unstable. It was impossible for me (at the side of the stage and facing away) to hear distinctly where the recorded material (coming from the opposite side of the stage) was up to, so a slow response of the desk at this point, and the inability of the machine to adjust on the run, caused a few bars of devastating (to me) imprecision.

Comments from flautists via my questionnaire indicate an intense approach to the collaboration issue, with core requirements: collaboration, co-operation, musical sensitivity and patience!

> Jane Rigler on working with a sound technician: (I look for) People who want to COLLABORATE!I'm looking for being on a team, to create an environment . . I try to get them involved by asking them questions about what they like, what they hear, how would they make it better, getting their advice, asking questions and being straightforward with what I want and need. (JR, App. 1D, A-33)

> Cleo Palacio-Quintin: I mostly try to control everything myself. Technicians not knowing my music cannot really know what sound I look for, and generally, they never

> have heard something resembling it. So it is always difficult to make them understand what I want. (CPQ, App. 1B, A-32)

> Elizabeth McNutt: Collaboration is the key! Also, I need to trust they understand what I need, what sound I want, etc . .I try to work with people I trust! I always credit them in program and verbally. This issue can be so problematic, and is typically misunderstood by many. (EM, App. 1C, A-33)

Appendix 4 contains reflections from my sound technologist[34] that give a picture of this performer's world in relation to one work. The following excerpt provides a glimpse of this response:

> In controlling the CD the role (of the technologist) was as a musician managing a most ungainly and sometimes unresponsive musical instrument - a CD player - making it respond to the flexibilities and musical needs of an ensemble - sometimes leading, but often acting in concert with the flute - moving in and out of the sound adding musical points, undercurrents or highlights around a complex flute line. (Blackburn, 2008, Appendix 4)

Extended soundscape

Transformation of the sonority of the flute was generated through electronic and mechanical means, with the prolific use of extended flute techniques providing a timbral sphere from which the electronic manipulations could emanate. This produced a magnification of the sonic diversity overall, and an expansion of the intimate to the extrinsic. Immersion in this sound world, and in the physical and mental demands of producing the sounds, strongly influenced interpretation and playing. I felt drawn into the space and atmosphere, and found that the amplification allowed the microcosms of performance and expression to take on a vivid prominence. Tiny whispers, inflections of pitch, tremulous notes and half breath sounds were exploited to suggest an ethereal language.

The timbral aspects defining, for example, the Lavista work and various sections of the Stroppa, have a fragility and luminosity which achieve audibility (and thus validity) only through amplification. The amplification as projector of micro sounds

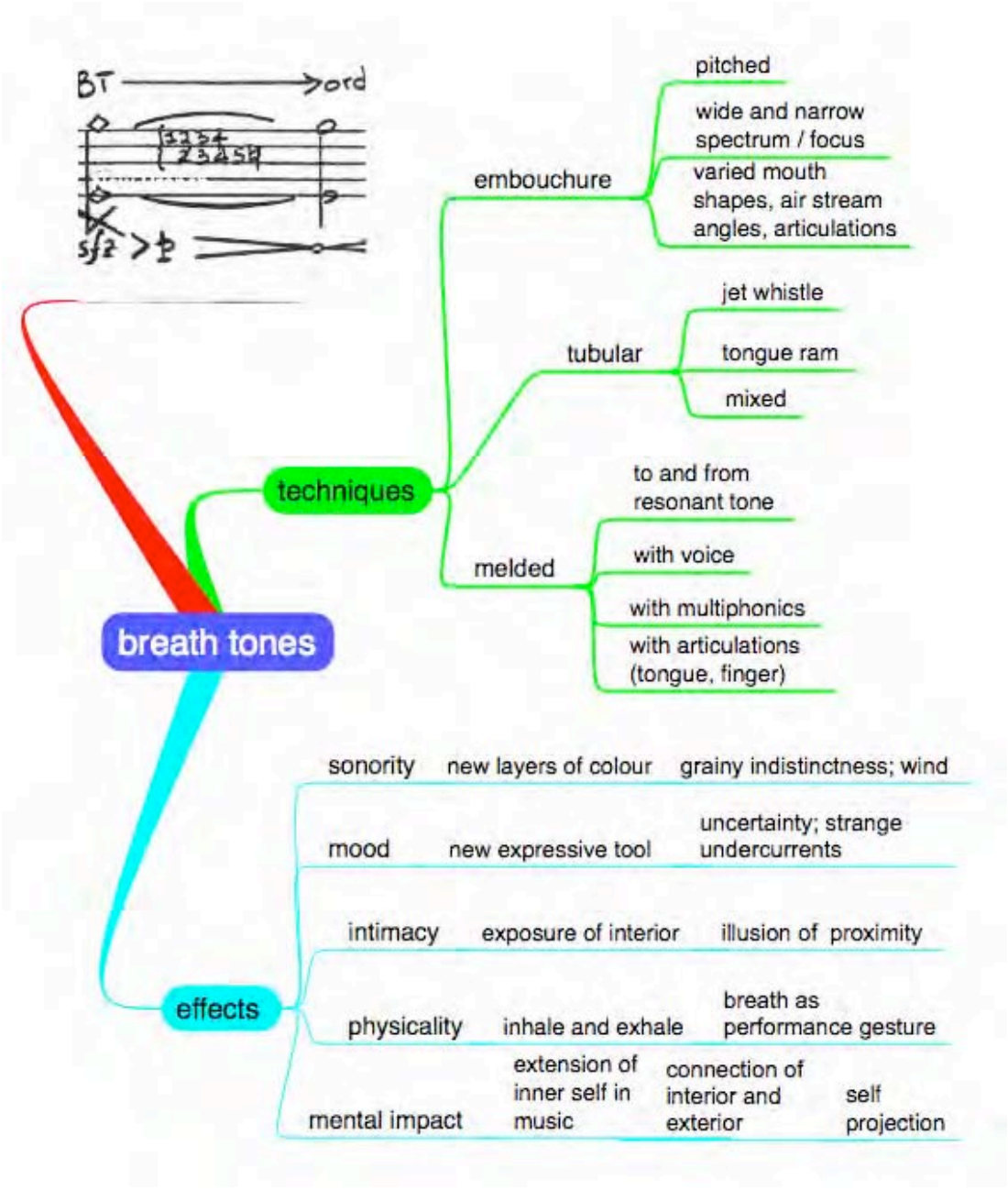
[34] Blackburn: *A Sound Technologist's Perspective in Marco Stroppa's little i.*

demanded a keen sensitivity to the shape of sounds and their structure. This technique proved to be the most influential and dominating element of the performance from my perspective. The influence of the amplification on the sonic properties of individual extended techniques used in these works is profound.

Breath tones, for example, add a grainy, indistinct sense to the music. They can expand into enormous wind sounds, meld with normal flute tone or create tentative wisps of sound. In combination with sound diffusion techniques, such as movement or unexpected placement, the effects of these sounds can be intense. Working up the technique for breath tones is remarkable, full of variety, potential and surprising effects. The very intimacy of the use of breath as a direct sound source places this technique in a different plane from normal resonant tone. Hearing this sound projected out into the room, shaping it and colouring it through minute mouth and blowing movements encouraged much play and experimentation.

I insert here an example of this layered process of evolving this technique: the breath tone (see Mind Map 2, below). This is a short but momentous journey from its lowly position of extraneous noise needing eradication (as expected in conventional flute music) to exquisite sonic material imbued with significance. The breath tone becomes a highly suggestive expressive element, which, in my view, even becomes eloquent and absolutely beautiful in itself.[35]

[35] A short example of one version of this sound can be heard at Appendix 5, Track 15.



Mind Map 2: Breath tone explorations; notation from little i, fifth movement

Three main varieties of breath tone were utilized in the recital, and are included in the diagram. These are all subject to variation from such elements as air stream velocity. Embouchure based techniques include pitched sound (combined with specific fingerings), wide unfocussed or narrow spectrum sounds, lip pizzicato, and a variety of mouth shapes and air stream angles. Tubular breath tones include jet whistle (where the embouchure hole is completely covered by the mouth producing a sharp, explosive or drawn out whistle of varying pitch), tongue rams (where the embouchure hole is also covered and the tongue rammed into the flute very sharply), and mixtures of fingering combined with the closed tube. Melded breath tones

balance with various quantities of normal resonant tone, or voice, multiphonics, or articulations, creating a profusion of sound choices.

The effects of these techniques are wide reaching:

- a new layer of colours to create a grainy, indistinct sound or whooshing moving sound;
- a new expressive tool to convey a sense of uncertainty, or strangeness and the opening of new possibilities in expression and interpretation;
- a changed illusion of proximity through exposure of physical interior and the evocation of intimacy;
- a new physicality through inhalation and exhalation changes and associated mouth movements; development of new performance gesture;
- a sensation of extending the inner self into the music and hence out into the hall; connection of inner and outer identities.

Similarly, glissandi and microtones remove the music from conventional expectancy. On the flute these techniques can be achieved in a variety of ways. Fingerings of microtones take some experimentation to discover optimum precision and glissandi can be finger or embouchure driven. Both of the techniques add a distinct flavour to the style, which at times resembles a slide, and at others a rather awkward traversing of the flute (see Figure 7, below). With amplification these effects become more prominent, again encouraging a more experimental approach to balance and projection.

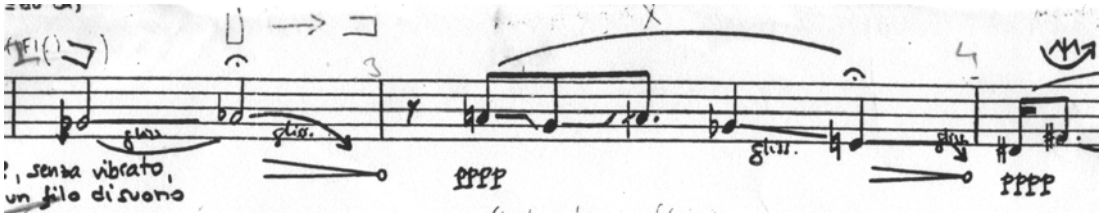


Figure 7: Glissandi and microtones in Stroppa's little i, first movement, bars 3-4[36] (App. 5, Track 16)

Percussive sounds are usually key slaps or tongue clicks, often used in combination with breath tones. A most astonishing soundscape results from extensive use of

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amplified percussive sounds, as seen in the third movement of the Stroppa: *Moderato Percussive - Molto Minuzioso*. The characterization here is somewhat mechanical, with amplified percussive articulations emanating from the two sources: live flute and pre-recorded flute. The various combinations of pizzicato, flutter tonguing, tongue ram, key slaps and breath tone is sent through speakers away from the player, generating a sense of mystery and uncertainty (see Figure 8, below). Hearing the flute in this percussive way encourages a different playing approach. Hitting the flute, for example, demands a repositioning of finger and arm, even a new physical stance, a physical sharpness of attack to elicit 'noise' not encouraged in normal playing. Articulations can be explosive, for example, and include tongue rams which sound below the flute range, creating a resonant thud effect not normally associated with flute. Using a highly directional, closely positioned microphone is critical for these tongue ram sounds, with resonance best achieved if very near the end of the instrument. This compares to the piccolo tongue rams in the Risset, which were amplified in the general context, projecting a slightly explosive, but quite high pitched, thud.

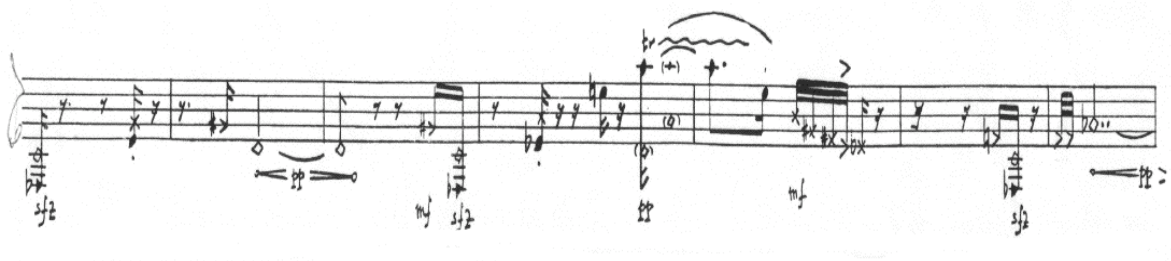

Figure 8: Percussive articulations (including tongue rams) and breath tones in Stroppa's little i, third movement, bars 20 – 26 (solo line)[37]. (App. 5, Track 17)

The amplification allows a balance of the live and manipulated sound, which implies an equality and interaction as well as immersion and overlay. An example of this is at the start of the Stroppa, where the alto flute's widely undulating C sharp begins alone, with the pre-recorded C sharp emerging from within, taking over and propelling the solo line forward (see Figure 9, below). The sense of the flute itself is spatialised in this way, and through live amplification. Adding to the impact, different sounds from different ends of the flute, such as very big, low pitched

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booming tongue rams from the lower end of the flute, and pizzicato tonguing from the top end, are sent to varied speakers to suggest distance and other presences.

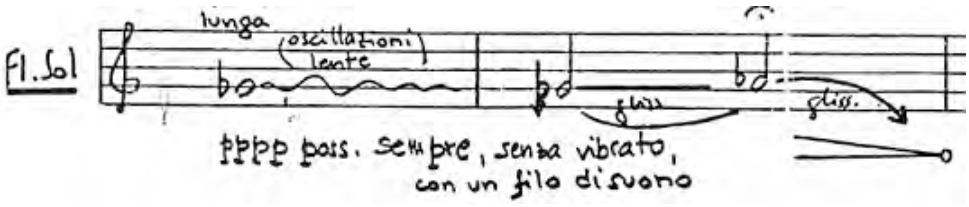

Figure 9: Stroppa, little i, opening[38]. (App. 5, Track 18)

The capacity to transform threads of sound into viable sonic material was also evident in the *Canto del alba*, where fragile techniques compel interconnection with the inner self, both as player and interpreter. The act of performing this work is in itself a meditation, a connection to the solitary oneness goal of an Eastern philosophy captured in the poem on which it is based[39]. Deep breathing and very fine embouchure and finger control is essential to execute the subtle staticity of the lines, especially the altered fingerings and sustained multiphonics. Without amplification the sounds themselves have an inherent weakness; with amplification they appear to become imbued with the performer's inner strength and projection.

Reverberation could be considered the flautist's best friend. Once acquainted with the feeling of playing in a beautifully resonant space, it becomes a goal of all performances, and its absence loathed. Virtual reverberation has a similar effect, and can be something of a saviour in some projections, removing the worry of not being heard, and a musical tool in itself. Extreme conditions can arise: Pauline Oliveros has described massive reverberation as

> . . . a very challenging space . . . it's hard to tell direct sound from the reflective sound.. You're hearing the past, of sound that you made; you're continuing it, possibly, so you're right in the present, and you're anticipating the future, which is coming at you from the past...so it puts you in the simultaneity of time. (Cited in D. Toop, 1996; pp. 148–9)

[38] Copyright @ Universal Music Publishing Ricordi
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[39] This work is extensively explored in Chapter 7.

The positioning of the speakers in this recital gave a limited sense of aural immersion to me, but did achieve a sense of reflection and dialogue, and a successful confusion of sound source. The lingering delayed sounds of the Musgrave easily fused with the live flute, with the layering and textural build up replicating a mirrored identity, a reproduction of self. The resonance in this work is vivid, and based on conventional flute tone with reverberation. We elected to enhance the usual stereo (Left – Right) configuration of *Narcissus*, sending the live sound through the front and back speakers, the delayed sound through the four side speakers, the layering of voices and reverberation evoking immersion, confusion and disturbance. Playing techniques became focussed on the shaping and colouration of sound. For example, whether to cut off or linger on the ends of phrases became a crucial playing choice, creating sharpness or enfolding as desired. Shimmering qualities of tone and varied vibrato speed and width provided colour in conjunction with the multi-layered effects. With these mesmerizing sonic effects, I sought to draw the listeners into the work.

Identity imprints

Exploring the diversity in the relationship of myself as flautist to the spatialisation technology through performance, lead to a vivid sense of identity, manifest in exterior and interior elements. The projection of the self, through performing style, the disclosure of inner perspectives, thoughts, responses and emotions, creates a self-perception, a sense of position and artistic persona. Cumming suggests that 'Musical sounds impinge on the senses to be perceived as signs of "inner" states' (2000, p. 276). The diagrams below (Mind Maps 3 and 4) explore these principles, illustrating in linear form progressions of major presentation dynamics.

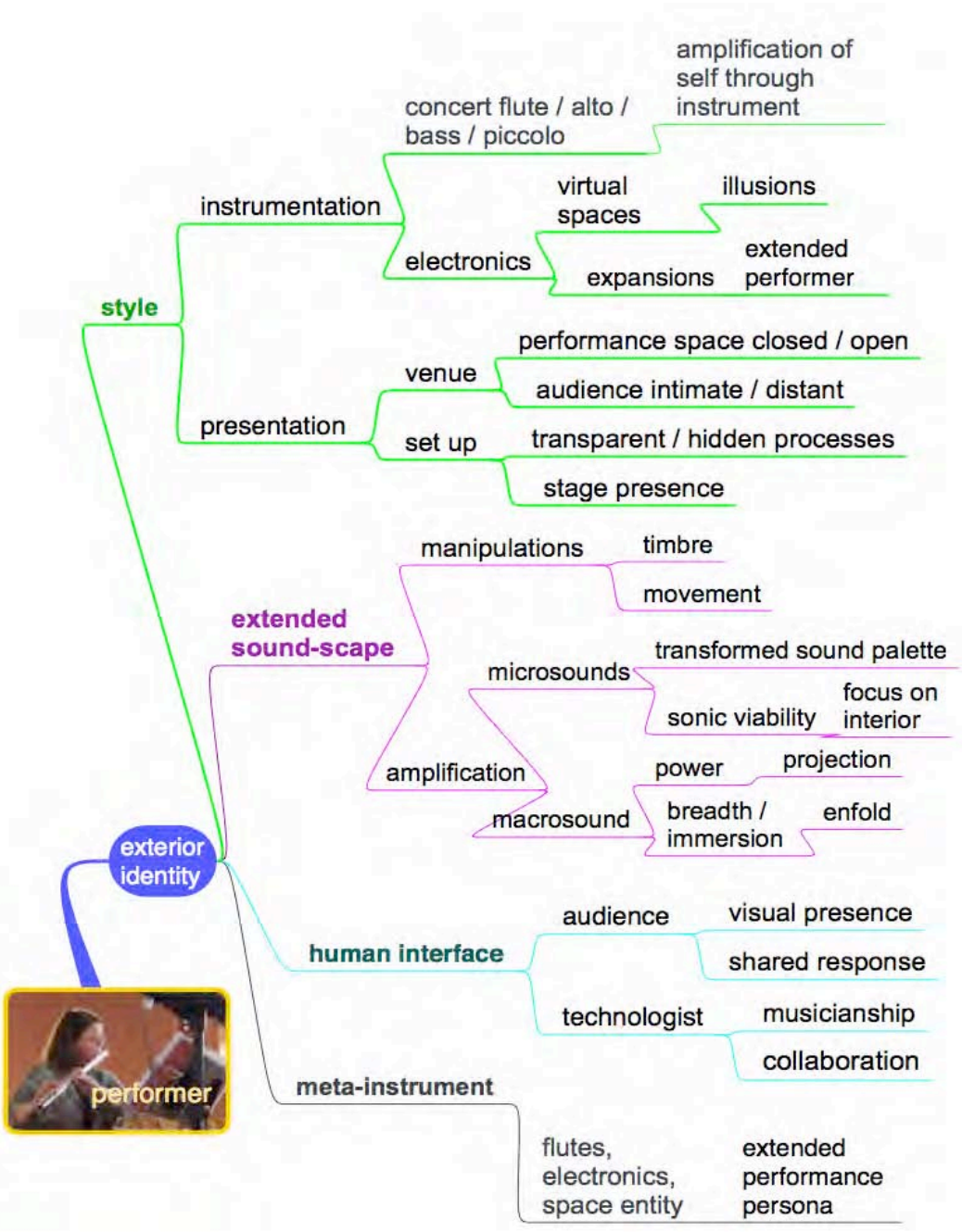
Mind mapping identity elements

Taking style, sound, interface and instrument as the major exterior elements I have followed each through to an externalised presentation outcome. The style of presentation includes specifications of instruments (giving visual presence, acoustic sound world identification, performer's core identity), electronics (set up, sound effect expectations), the composed or improvised components, the immersion or separations in sound projection, audience and venue set up. The culmination of these

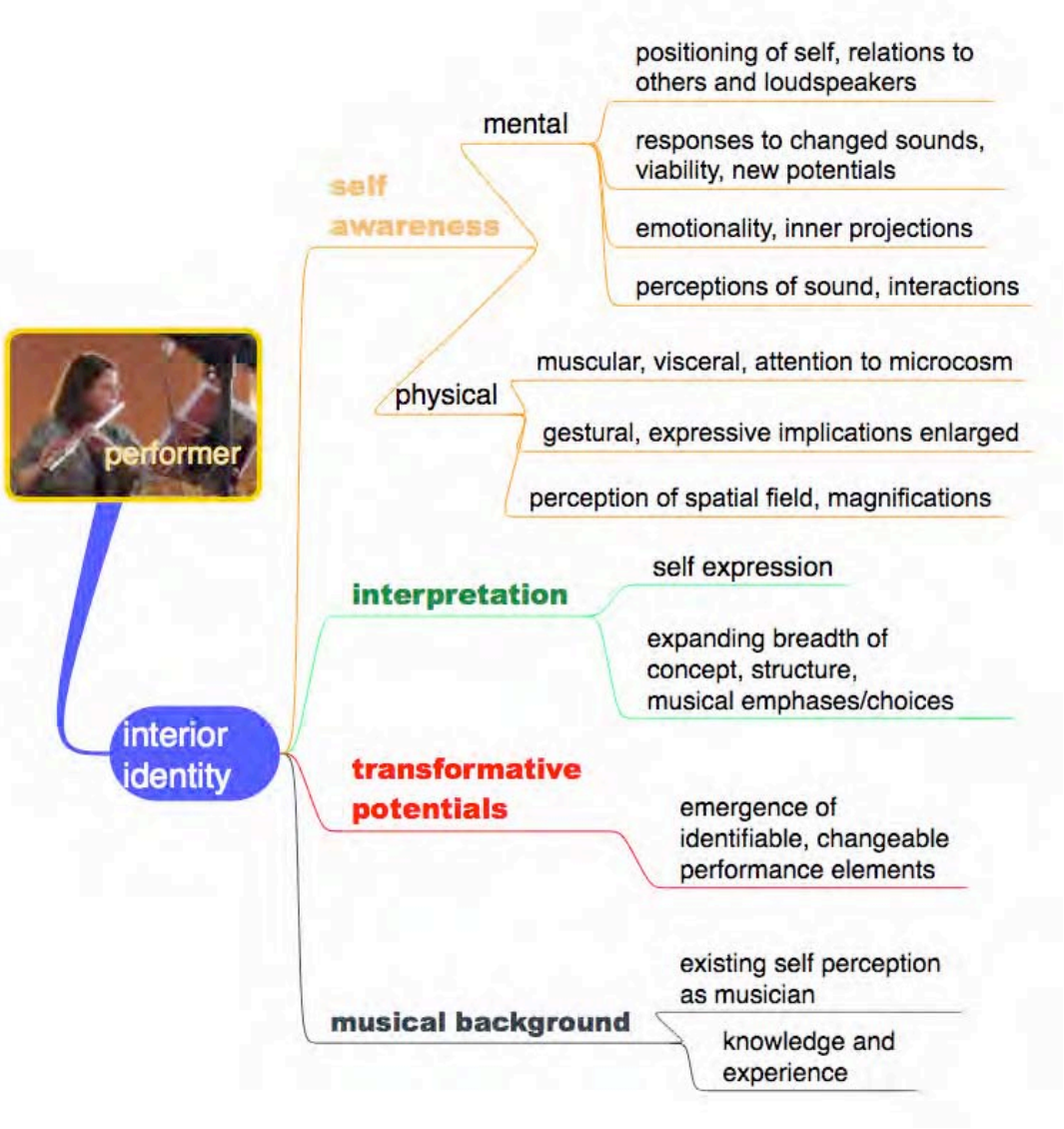
elements, the meta-instrument, mixing flutes, electronics and space, sees the movement towards an integrated projection of multiple selves, a construct to assimilate and extend the concept of 'flautist'. The interplay between these factors is a rich field of exploration, but, in general, the visible, physical presentation captures the audience's focus of a performance whether intimate or distant, or involving transparent or hidden processes and illusions.

My interior world is represented through self-awareness, interpretation, transformative potential and existing musical background, the central identity base from which new elements proceed, the sum of past performances and experience. Self-awareness of mental and physical responses highlight emotional responses, as well as a balancing of gesture and hardware negotiations, and is clarified by the spatial alteration, the magnifications and the power of projection. Interpretation ideas and development thrive on the inner source of energy and inspiration generated by the transformative potentials and creative negotiations of the music, all of which tumble together and slowly take shape as identifiable, confrontable and knowable elements.

The process of documenting these elements in this stream of consciousness manner clearly revealed the many influences. The maps formed instantly under my fingers, the lines of enquiry extending further and further, but necessarily cut to fit these pages. During this process I became aware of important areas, confirmed vague thoughts and sensations, and moved forward towards gaining a more complete understanding of myself as performer at this time. Writing up these experiences additionally lead me to question myself, and to allow a broader approach and response, a wider space for new evolutions and influences.



Mind Map 3: Exterior identity map



Mind Map 4: Interior identity map

Human interface: Listeners' response

As noted in the exterior identity map above, the development of a performing style is intricately connected to how a musician wishes to be perceived: the individual's outer presentation. A visual balance with the music is influential to the reception of a performance, even when denied or minimized by the performer, and the set up on stage creates a certain aura or expectation of style. The recital on 18th March, 2007 had the 'stamp' of a new music concert: the paraphernalia of technology defining the areas and a rough rehearsal room look. The venue itself is closed, being buried deep inside the Conservatorium, and the audience was by invitation only. The implication for me here was that this was considered a somewhat rarefied event, set apart from worldly existence.

An illusion of intimacy existed in the performance with the transparent spatial set up and proximity of the sound diffusion, but a sense of distance dominated my emotional engagement. The gestural stillness of my performing style was highly influenced by Stroppa's instruction to "keep a calm demeanour throughout" (personal communication, 12 July, 1998), and this expressive behaviour became a dominant feature. I was surprised how this seemed to translate into visual cues for the audience, providing a prompt for how to listen to the music. Some audience / examiner responses described my outer stage presence as strong and calm, drawing the listeners in to the 'difficult' music. Others felt that the stillness was a significant barrier in itself, and looked for greater physical movement to underline meaning and communication.

Response to the overall sonic scheme was overwhelmingly positive, but comments about the music seemed to reflect personal reactions to it, rather than the construction of the performance. Intense reactions were expressed: recognition of the beauty of the flute and the compelling strengths of the style; interest in the research argument; admiration for the accomplished rendition of difficult repertoire; mixed reporting of sensing closeness and distance; concern about the dates of the compositions presented. This interface evoked serious subjective questioning in myself with regard to my role as communicator and ways to further expand my work as performer and researcher. My impression was that the recognizable elements, the sensuous flute sound and the journey towards a different soundscape, were understood, but that the audience perception of the unfolding of the event, the expansion of the intrinsic and extrinsic, and the internal manoeuvrings in the performance remained largely hidden.

Spatialised flute: Reflective comments

The *Flute Passages* recital provided a platform for delving into the musical meanings and performative understandings of spatialisation, through investigating elements of expanded flute sound, discovering virtual and real auditory influences, changes in perception, relationships and identity. The personal journey of this project has identified significant questions and invited new perspectives towards my own work. Through preparation, performance and reflection, I have confirmed my enthusiasm for change, risk taking and engagement with musical practices that stretch my

performance and imagination; I have examined microscopic tonal and performance elements, expanded capacities and revealed essential truths about my own practice; I have renewed my intrigue with the interconnections of diffused sounds, musical ideas and firing imagination; and attempted to formulate these into a communicable format.

These processes have revealed much about my own approach to electroacoustic performance, and have developed from a stance determined by my search for musical outcomes: what can the technology do, rather than how does it work. Re-invention of interpretations, adjustments of technique, expansion of imaginative dreaming, and a new sense of artistic endeavour have accompanied this search. The importance of real space, the construction of the space through virtual and physical techniques, the construction of the music, the sounds, the movement in time and place, and the impact of these on performance have directed my search towards self examination, provoking reflection on performer identity and it's expression through this medium. Highlighting the multiple features of performance with technology has enabled new, often unusual, approaches to develop in my own thought processes, and given a new freedom and energy to my own playing.

In general, the technology released a catalogue of experiences and sound associations which gave permission for various playing techniques and created a sense of performative response and individuality. At times this was submerged and discrete, at others less predictable or familiar, and occasionally quite extrovert. My personal search for a wide range of sonic characteristics, inwardly reflexive self-awareness and projection of the musical interpretation combined with electronic interventions and interactions to clarify and define these potentials. The extended flute techniques created a sound palette with a myriad of shadings and meanings, magnified by the electronics. Each technique could be interpreted as an expanded perspective of the human energy source (the gestures, breath, musical interpretation) via the flute (acoustic tone).

The symbiosis of flute with electronics brought to the fore elements that overlap and enrich each other. Unusual sounds enable explorations of unusual ideas, and thus an extended sonic identity, and this recital provided many such opportunities. The amplified breath sounds, for instance, can be associated with a sense of

breathlessness, creating a tension and dissonance. Multiphonics are intrinsically unstable and, when played softly, frequently create an indirectness of expression and uncertainty in player and listener. Whistle tones seem to evoke a magical, ethereal, distant sense, which enters the mind as a character in a play. Percussive sounds spatialised throughout the space added another layer of altered meaning, but with these techniques the player must use strong, direct movements to articulate the sounds clearly.

In three of the four works presented, the electronics provoke the imagination of an invisible bodily presence. *Passages* presents a parade of characters with whom the flute converses and moves on. The recorded sound (representing the characters), directed through four speakers to the side of the stage area and audience with the live flute sound through the centre front speaker, is quite separate and identifiable. In performance, this relationship is clear and conventional, with the solo flute line and CD equal partners.

In *little i* there is much greater ambiguity, as flute sounds are disembodied and moved through the spatial field separately, blurring the conventional cause and effect expectations. These challenges are achieved through obscuring the source of the live and pre-recorded sounds, the dispersal of the canonic style dialogues, the disparate sound associations and the composed movement of the sounds through the six speakers. Stroppa uses spatialisation to set out the characters in the virtual space, to create this space as a dramatic scene and to imbue the flutes with uncertain, but enlarged, characteristics that merge with and emerge from the electronically produced material and effects. The movement of player and sound sources gives this illusory element a physical presence. There is a feeling of strong partnership, support and exchange with the technology persona in this work, resulting in a shared commitment to meet the numerous challenges which manifest regarding balance with the live flute, live scene changes, response of the CD player and the flute score itself. From the very first note, it feels like entering a special place, a totally absorbing sonic environment and theatre. The processed pre-recorded flute sounds present a wide spectrum of colours and pitches, sometimes merging with the live flute, or in dialogue, in a sense expanding the flute outwards into multi characterizations. The sense of the flute itself is spatialised in this way, and through live amplification. For example, different sounds from different ends of the flute, such as tongue rams from

the lower end of the flute and pizzicato tonguing from the top end, are sent to varied speakers to suggest distance and other presences.

Previous discussions of *Narcissus* have alluded to the reflected identity and layering of selves created by reverberation and delay techniques. The dramatic elements create a field from which the player is given a powerful position, through both amplification and reflective techniques. There is a sense of empowerment, flexibility and greater freedom to shape and colour the sounds, to use intimate and subtle playing techniques, and follow individual interpretative ideas, rather than set out to fulfil listeners' expectations. The capture and replay of my flute's resonant tone gave an illusion of powerful projection, and an increased feeling of control and potential. This sense of a reflective environment created a basic engagement with self-immersion, modified by the electronics to create dialogue, distortion and harmonization of the tone. The construction of texture through the single flute line provided an internalized discourse, again symbolizing the expansion of the flute and player. The instrument's characteristics and the sonic goals of performance were thus changed, and my position as performer was given strength and power.

Expanded sonic elements such as these impelled my search for self-examination of both playing techniques and communication style. I found that I focussed on the outward expression of the interior worlds in sound, body, mind, structures and emotions. Ideals of sound immersion, engulfing the audience with the sound, domination of the space were ideals less happily resolved on the day. My position as performer seemed as instigator or, at least, an equal partner with the technology. This relationship was, in reality, frequently blurred and questioned. The power of the non-human processes became an utterly essential element, even more than, for instance, an accompanist or other instrumentalist. The flute was but one dimension in the performance, the physical manifestation of the flautist's musical persona, but quite dependent on exterior factors such as the ability of the technology to enhance the flute, and thus the flautist, in the production of the sound effects required of the music. In a sense, the self also became a tool, with the sounds from the flute being placed around speakers out of the control of the player, and the notes sent out to be part of the construction. Occasional distortions from within the loud speakers during this recital illustrated the vulnerability of the instrumentalist, and the vagaries of unproven equipment.

My energy and inspiration came from a symbiosis of internal and external drives, the source of renewed capacities and amazing choices, responses to self-exploration and altered perceptions. The ideals of electronics used as magnifier of the inner and intimate opened up expressive potential, and gave transparency and form to my sound and thought processes. My mental positioning, particularly through my instrument as an amplifier of myself, adapted to this array of choice, the possibility of hidden and dominant presences, the attached emotionality of tonal qualities, shaping and manoeuvring, and perceiving my work with reviewed conceptual goals. As the new sounds and functions became recognized and usable artistic materials, they became instilled as an integral part of my own self-perception as a flautist. This is a manifestly shared ownership, however, as so much of the sonic control is remotely activated, from the sound technologist's desk.

Having established in these last two chapters some important reflections on the spatialised flute field, I now move on to exploring the intricacies of live interactive electronics and flute. Spatialisation forms an integral part in much of this performance practice also, creating a foundation from which to extend into other computer based technologies. As a link from this discourse to the next, I return to Italian flautist, Roberto Fabbriciano's account of his collaboration with Luigi Nono in *Walking with Gigi.* Nono's aim was "to produce a more conscious listening, a readiness to savour every little change loaded with significance" (Fabbriciano, 1999, p. 11).

> . . . the microphone was not used statically but became an extension of the instrument, and the performer, where the instrument and the microphone experienced a dynamic relationship nourished by mutual needs. The microphone made it possible to exalt the "shadow tones" with their resultant partials, it became possible to spatialise gradations of sound: *"sinusoidal"* or *"pure sounds"* derived from researching dynamics at the very limits of audibility and with total emission control. (Ibid)

Here is the crux of this research: Through explorations of the interconnections of flute performance and technology, renewed sonic imaginings and responses inspire significant artistic discourse and illumination. The instrumentalist, electronics and space become an entity, a meta-instrument, activated by the microphone to construct new sounds, new expression and new identities, demanding examination, reflection and deep understanding.

PART III: INTERACTIVE LIVE ELECTRONICS AND FLUTE

> With live electronics, when electronics are performed in realtime like instruments and combined with instruments (or, of course voices), two worlds are brought together in a theatre of transformations. No-one listening knows exactly what is instrumental and what is electronic any more. Legerdemain deceives the audience as in a magic show. When they lack their connection to the familiar instrumental world electronics can be inadmissably alien, other, inhuman, dismissable (like the notion of flying in a rational world). When electronics are seamlessly connected to the physical, solid instrumental world an expansion of the admissable takes place, and the 'mad' world is made to belong. (Harvey, 1999, p. 80)

Part III of this dissertation explores interactive live electronics with flute. Chapter 5 considers the historical context of the interactive milieu, the extension of the flautist's practice through electronic devices and processes, expanded flute techniques, physical demands, conceptual influences, new performance identity, relationships and performance spaces. Chapter 6 presents a detailed reflective critique of flute and interactive live electronics in performance, with specific reference to Recital 2. In this Chapter, the insider's voice is again heard as the experience of self through observation and reflection is presented.

5. INTERACTIVITY: BODIES, SOUNDS AND TECHNOLOGICAL CONNECTIONS

The interactivated milieu

In a continually evolving milieu, interactive live electronics[40] have expanded the realm of flute performance to include processes, interconnections and responses that have had a profound impact on the practice. The growth of activity in the wider field can be partially gauged by a glance at current internet forums, conference proceedings and computer based or assisted concert programs, indicating that work and ideas in this expanding area of musical encounter and performance is in a perpetual state of flux. A multitude of diverse works for flute and electronics[41] has been created since the first major work for flute with interactive technologies, Phillipe Manoury's *Jupiter* (1987), in which the 'extension' of the flautist began to become a reality, manifest in new physical, mechanical and conceptual influences. This altered performance situation provokes explorations into renewed approaches to presentation, interpretation, self-perception and interface.

Bruno Maderna's *Musica su due dimenzione* (1952, revised 1958), the first major work for instrument and electronics, is a semi-interactive work, based on the interchange of musical material between the soloist and taped flute music (pre-recorded by the soloist). It is a work that the performer constructs in collaboration with the sound technologist, involving free placement choice of composed motifs. Maderna states: "The whole performance of this composition ought to occur on a kind of bilateral interpretation by the soloist and the technician, an interpretation that can be "invented" each time" (Maderna, 1960). Other works for flute using pre-recorded material within a fixed timeframe and tempo, such as Davidovsky's *Synchronisms* 1 (1963), Jean-Claude Risset's *Passages* (1982) and Richard Karpen's *Exchange* (1987) explore the complexity of performance with fixed sound tracks, new sound effects, timbral manipulation and diffusion. Elizabeth McNutt refers to the fixed nature of this style of work as a "temporal prison" for the flautist (McNutt,

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[40] Human to computer musical interaction performed in real-time.

[41] As shown at http://www.subliminal.org/flute/ (Bassingthwaite, 2002)

2003, p. 299), similar to playing with an inflexible accompanist. Difficulties of performance include extremely fast tempo requirements (Karpen) and developing sufficient intimacy with the work to allow for timing prediction (Risset). Many flute works were composed in this format, and it was not until 1987 that flute and interactive live electronic music, a medium which increasingly gave freedom and control to the instrumentalist, was established as a functional medium.

In 1987 Phillipe Manoury wrote the first major work for flute and interactive electronics: *Jupiter* for flute and electronics (using 4X, a forerunner of Max[42]), realized at IRCAM in Paris. Manoury had been drawn towards the synchronization of instrumental and electronic forces since the 1970s, when electronics were only capable of "passive transformations of sounds" (Manoury, 2007, para 1.3). In the 1980s a more flexible format developed with the first models of synthesizers in real time, constructed by Guseppe di Giugo at IRCAM. Giugo and Boulez collaborated with Laurent (Larry) Beauregard in groundbreaking work that lead to computer identified flute, and the possibility to synchronize electronics and instrumental playing with greater freedoms (Ibid, para 1.4). In 1984, Beauregard had been experimenting with new devices[43], adding switches to the flute keys for the computer to detect the fingering, and hence pitches, and an acoustic pitch detector was also added to deduce the correct pitch (Winkler, 1998, p. 17). The score following[44] technology was developed further with Miller Puckette, and *Jupiter* became the first work to use these principles of interactivity (Manoury 2007, para 1.5). These developments resulted in sophisticated interaction, including pitch-based score following (Rowe, 2001, p. 215–221). Manoury describes the functionality of *Jupiter* thus:

> The idea was to give the flutist the liberty of changing tempo, as against playing with a tape . . . each time the flutist played a note, the processing would change in some

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[42] "Max was developed at the Institute de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris, beginning in 1986. The principal author was Miller Puckette . . . who originally designed Max to control IRCAM's powerful 4X synthesizer" (Winkler, 1998, p. 16).

[43] Barry Vercoe had also initiated research of 'score following' in the early 1980s, and worked with Beauregard on developing this technology (Risset, retr. 2007, para. 48). An example of this work can be seen at http://www.youtube.com/watch?v=vOYky8MmrEU

[44] 'Score following' saves partitions and recognizes these. It developed out of the use of graphics (Max) and virtual sliders that helped integrate gestural elements. Early versions were rather like a "set of windows that opened intermittently and closed immediately the task was done" (Manoury, 2007, para. 2.2).

> relation to the note played by the flute. The result was that the spectral evolutions of the electronic sounds were synchronised to the flute in pitch and timbral quality . . . we used frequency shifting, harmonizers and other kinds of transformations. (Cited in Chadabe, 1997, p. 183)[45]

Throughout the 1990s significant developments occurred, many generated or influenced by players in the field. As score following techniques became more common, and software developments such as Max/MSP became more advanced and inventive, the actuality of interactivity between performer and computer became more closely scrutinized. Dutch flautist and composer Jos Zwaanenburg's article *Composition and Performance with Live Electronics* (Zwaanenburg, 1998), investigates the performance of acoustic instrument with electronics. He suggests that the combination becomes a new instrument, and thus a new concept that allows flexibility and choice. The handling and operating of devices whilst playing, the choice to make a sound technologist a fellow performer and the necessity to review, expand and improve playing techniques in the light of new possibilities for modification are vitally important elements in the discussion.

Important works, such as Cort Lippe's *Music for Flute and ISPW* [46](1994), explore the combination of live electronics and acoustic instrument through real time interactive digital signal processing with the flute and Max/MSP. In this work, the major cues are adapted to be accessible to the technologist who can trigger the processes as they go. In Barry Moon's *Interact I* (1996) for flute and 'improvising' computer, the computer follows the flute and changes the output in response to music 'heard', creating a situation in which mistakes, spontaneity, improvisation and extended techniques are all allowable (McNutt, 2003). McNutt worked with Moon on this work, as well as with Andrew May on *Retake* (2001), which extends the techniques with the use of algorithmic 'performers' to respond to data from the analysis of the flute sound in a work which is essentially a joint improvisation (Ibid).

New techniques developing in the 2000s were often associated with real-time

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[45] In the same year (1987) Georg Hajdu composed his first version of *Sleeplessness* for flute and electronics. This work is discussed in great detail later in this dissertation, and it's use of MIDI pedal, new and subsequently updated software programs and sound manipulation techniques reflects the developments occurring in both the eighties and nineties.

[46] International Software Processing Workframe.

processing, such as timbre manipulation, spatialisation and other computer software based procedures such as plug-ins. A new performance sophistication arose through these means, which improved functionality and performer control. This, in turn, enabled and stimulated improvisatory processes, as independence and newly balanced collaborations developed, with performers and sound technologists working together to achieve sounds and constructs, sharing sounds and creative output. Hardware was increasingly minimized as some performers strove to create a more intimate and intuitive set up, often developing equipment themselves, or in collaboration with technologists or sound engineers. For example, La Berge uses:

> Clavia Nord Modular – for my filtering, sound manipulation of the flute because it is compact, easily edited and has a very good sound. Custom pedal system – developed by STEIM which, in combination with the program junXion can send MIDI to any device connected to the usb ports on the computer (and any program running on the computer) I use this STEIM board because it is light, flexible and very very handy. Headset microphone in combination with a stand microphone. The headset is to send the signal to the FX's and the other mic is for high quality flute amplification. (ALB, App. 1A, A-13)

New instrument based interfaces developed through the 1990s and early 2000s, some using modified traditional instruments, and others entirely new instruments. Modified instruments include the hyperflute, hypercello, metatrumpet, VPFI Flute and infra instruments, which use live processing to create expanded versions of acoustic instruments. The first well-known version was the hypercello, developed by Tod Machover with YoYo Ma in 1991, which used sensors and measurers attached to the wrist to generate sound processing (Electronic Music Foundation, 2006). In 1994 British trumpeter, Jonathan Impett, developed the metatrumpet[47] which generates physical and musical performance data and gives control over parameters such as loudness, speed, hand and breath pressure. The STEIM Sensorlab and Mac convert the data to MIDI. The centrality of the existing trumpet performance practice was uppermost in Impett's goal with this instrument: "Control parameters are implemented without compromising the richness of the instrument and its technique, or adding extraneous techniques for the performer - most of the actions already occur in conventional performing" (Impett, 2005, para. 3).

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[47] This instrument can be seen at http://www.uea.ac.uk/mus/research/metatrumpet?mode=print

Other interfaces include Michel Waisvisz's *The Hands* (1984 original version), designed for composing and performing,[48] and Joseph Rovan's studies of the expressive power of gesture and its application to interactive media performance. This includes a custom data glove developed at IRCAM, *The Glove Project* (1997), for use with clarinet and saxophone, which measures fingertip pressure, rotation of hand/arm, and full arm gestures (Rovan, 1997). Taking the concepts of these inventions further, and adding a little whimsy, John Bowers and Phil Archer presented Infra-instruments at the NIME05 conference: instruments based on making an instrument less, or including mistakes in design, or using non-instruments, or half developed instruments (Bowers and Archer, 2005).

Of particular interest to this study is the hyperflute. Cleo Palacio-Quintin has developed this flute from the standard Boehm flute, adding electronic sensors mounted on the flute and linked to the computer. The player has control of the digital sound processing parameters while performing, and through the tactile sensations of performance preserves the relationship between the instrument and sound. The computer becomes an extension of the acoustic instrument through an array of sensors: magnetic field sensors (detecting positions of G# and low C# keys), ultrasound transducers (measuring the distance of the flute to the computer), mercury tilt switches (measuring the tilt and rotation of the flute), light sensor (detecting ambient light on the flute), pressure sensors (under the left hand and both thumbs) and button switches (to set parameters). The sensors send information to a Microlab interface that converts to MIDI data and redirects it to the computer. Using Max/MSP, patches are developed and integrated into a complex software interface which processes the flute sound in real-time (Palacio-Quintin, 2003). This instrument has been used by Palacio-Quintin for improvisation, and is now becoming part of composed compositions as she works to extend its use into a broader performance community (Palacio-Quintin, 2008).

Embouchure measurement and mapping of flute performance elements are documented in two papers by da Silva, Wanderley & Scavone and Scavone & da Silva, presented at the NIME05 conference. *On the Use of Flute Air Jet as A*

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[48] Available on Youtube at http://www.youtube.com/STEIMTUBE

Musical Control Variable presents ideas on mapping embouchure gestures of flute players and their use as control variables by measurement of the velocity and direction of the air stream (da Silva and Wanderley, 2005b). This measurement presents obvious difficulties to a flautist, as air stream speed and direction are the sensitive and highly capricious elements that produce the sound. Through experiment, reasonably non-invasive sensors were developed. *Frequency Content of Breath pressure and Implications for Use in Control* (Scavone, 2005) investigates and tests breath pressure signals in an attempt to develop a usable control device in this area. Other research has been occurring simultaneously, such as the development of Simon Waters VPFI (Virtual/Physical Feedback Instrument) Flute. This instrument uses combinations of techniques, including Max/MSP treated signals from an amplified flute, replayed back into the body of the flute, together with systems allowing real-time dialogue with the player (Waters, 2007).

Japanese violinist Mari Kimura has a distinctive approach to performance with electronics. Kimura aims for absolute minimization of hardware and visible procedures, using no sound technologist, and no pedal, note or rest triggers.

> I like to consider my electronic instrument like a signal processor or synthesizer as part of my instrument that I master. And in order to do that, I believe in being very self-contained. If you have a helper, I feel as if somebody's doing my bow arm or doing a fingering. So in order to be self-contained, my computer is an extension of my brain, and my synthesizer's are extensions of my hands. I like to present my music and performance as a whole and not be assisted by someone else. I feel that will handicap me if I have to have somebody help me (Bundler, 1999)

This emphasis on the integrity of traditional instrumental performance appears as a common thread amongst performer's priorities in concert, and the gestures associated with interpretation and communication. For a considerable period, computer music appeared to lack the emotionality and connections of more visibly performed music. A culture of immersed listening has also developed in which the audience is given no visual references, through a purely aural, darkened presentation experience. This concert style demands adjustment from an audience, a willingness to forego expectations and an open approach to the style. The inclusion of live instrumentalists in such concerts can come as an immense relief, the return to a visible representation of music adding a certain familiarity and mnemonic assistance

to perception. The performer's input, as we have seen, can range from playing with tape to controlling every sound, both acoustic and electronic, and equipment can range from invisible sensors to electronic clothing. As an increase in interpretative flexibility has become available and a greater focus on more versatile functionality of technology brings the genre into a vibrant, humanist evolution, performers seem to be empowered to re-engage listeners with the music as a performance and interpretative art.

The human performer's contribution to computer music, and the computer's contribution to human performance is explored in Guy Garnett's *The Aesthetics of Interactive Computer Music* (1998). Technology as empowerment and an extension of the individual, new musical developments and the notion of music performance as a shared human endeavour, and the possibilities of developing a music more open to responsive artistic experience (for performer and listener) are discussed. Garnett promotes an aesthetic that brings "the true artistic experiences of richness, uniqueness, and intellectual depth and expression into closer contact with the social realities of our present cultural context" (Garnett, 2001, p. 30). Similarly, Christopher Dobrian's *Aesthetic Considerations in the Use of "Virtual" Music Instruments* (Dobrian, 2001), investigates issues and questions raised in performance with virtual instruments: the importance of performance, interpretation, displays of skill, previous knowledge of the instrument and the performer gestures associated with the sounds in traditional performance. The transference of these concepts to computer reveals the importance of an audience's understanding of the workings of virtual interface and mapping of gestures. John Bowers takes explorations a step further through research of his personal experience of performance in *Improvising Machines* (2003), a set of ethnographic studies of performance with electronics, exploring the influence of machines, gesture, musical materials, performer ecology, venue and variable sociability.

Gestural elements of performance have been a significant part of interactive music research, in physical and electronic forms. Physical adjustments for the performer range from whole body movements, to agile foot movements, to new arm and finger movements, to minute embouchure movements and internal mouth movements. These gestures become part of the new performance image of the musician, and contribute new elements to the projection of musical ideas and communication. A

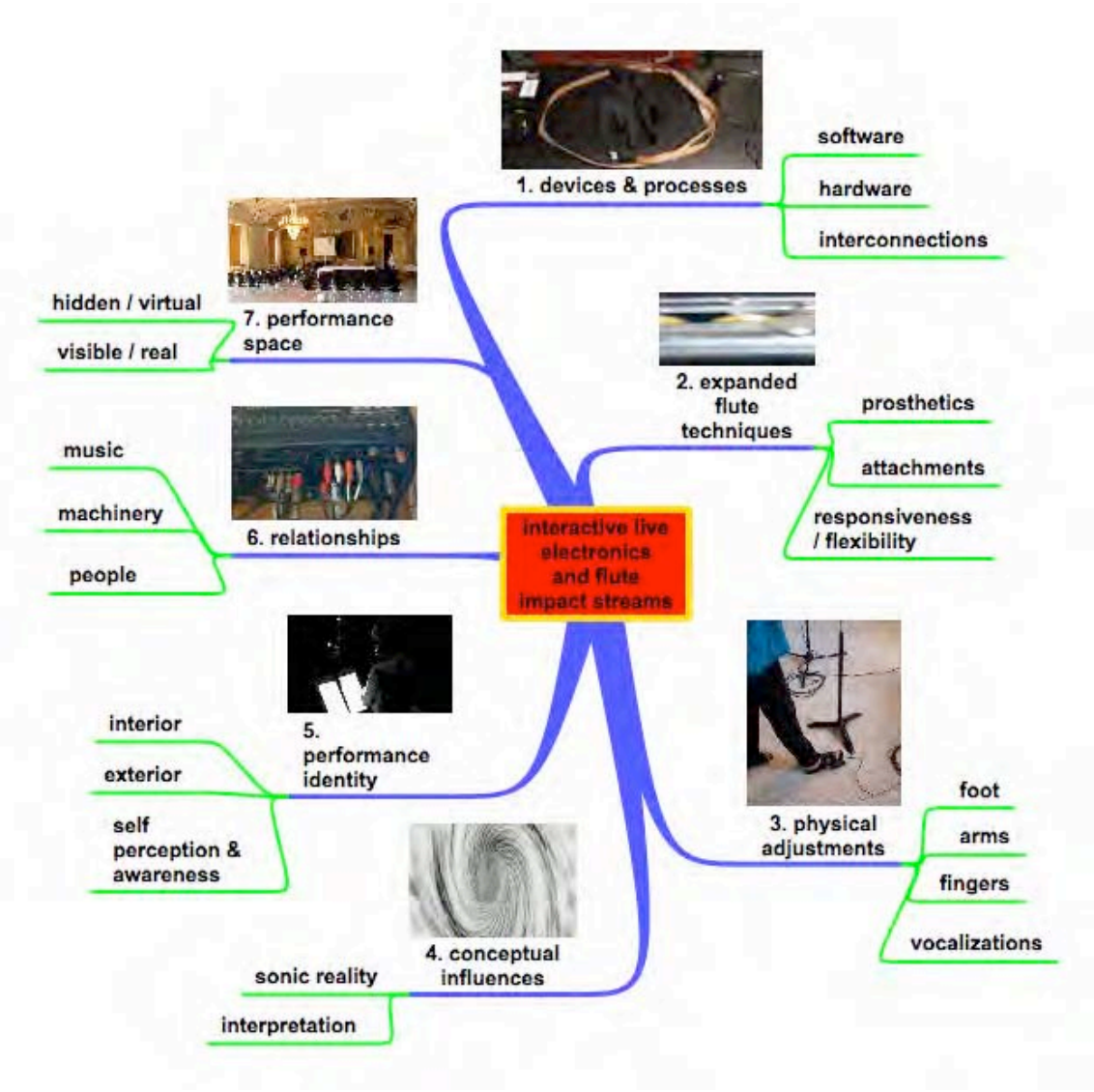
study by Jane Davidson and Jorge Salgado Correia has looked at the meaning of physical gesture and bodily experience, examining rehearsals and concept development, and the audience's perception of bodily experience as its own experience: ". . . the authentic performance is where 'becoming' occurs: that is, where the performers, exploring their metaphorical projections, end up reaching the bodily patterns of physical experience which, at a deep level, connect with or 'meet' the individual listeners" (2001, p. 80). Another significant text, the ebook *Trends in Gestural Control of Music* edited by Marcelo Wanderley and Marc Battier (2000), gives a comprehensive picture of gesture and technology at the end of the twentieth century. With contributions from forty researchers in the field, articles relate to gesture and the changes in understanding of the gestural dimension and electronic developments occurring at the time. An insightful comment on evolving performance practice by Yolande Harris concludes this selective background of interactive live electronic performance:

> With the increasing fragmentation, miniaturization and network communication of digital technologies, the instrument that uses these means is distributed, largely invisible and intangible and un-coupled from its apparent source of sound production: the body. Now the body inhabits and navigates through this instrument instead of holding it, the sound and tangibility of the sound comes from outside rather than generated from inside the body, and the audience spectator no longer has the focal point of body-instrument-sound, but explores as one of the players. It is like a turning inside-out of the intimacy of the musician-instrument into a space inhabited by multiple performers and instruments. (2006, p. 161)

The augmented flautist

The augmentation of the contemporary flute player's performance practice through interactive electronics creates a demand for intense adaptability. The diagram below (Mind Map 5) indicates areas of focus in investigating the impact on the flautist: electronic equipment (devices and processes), evolving flute techniques (extended flute and attachment techniques), physical responses generated (new foot, arm, finger and internal gestures), conceptual influences (sonic and interpretational), performer identity and awareness, human and inhuman relationship changes, and performance space issues. This discussion includes reference to performer responses in the

questionnaire distributed as part of this research. The discussion is developed in Chapter 6 with reference to the works presented in Recital 2.



Mind Map 5: Impact streams

Devices and processes

The technological processes explored in Chapter 6 include the use of software programs, in particular Max/MSP, in conjunction with various triggering mechanisms – MIDI pedal, pitch and threshold recognitions, as well as plug-in software from Cycling 74's *Hipno*[49] and *Plogue Bidule*[50] programs using *VMotion*

[49] "The Hipno collection [of audio plug-ins] designed by Electrotap, features an irresistible mix of granular, spectral, and filter/delay-based plug-ins that feature the unique Hipnoscope morphing interface . . . and plug-ins that can be controlled with motion tracking derived from a live webcam,

video movement sensor. Hardware includes computer, microphone, loud speakers, monitors, connectors, pedals, cables, buttons, and camera.

The understanding of computer functionality is an important aid to successful interactive performance. Many musicians may consider the time commitment demanded to study and absorb complex digital processes as alien to their practice, even though the level of understanding considered practical is not necessarily extreme. Several performers stress this aspect in the questionnaire distributed as part of this research: Elizabeth McNutt: "Also, understanding how these interfaces work - what they are supposed to do - helps me to give the computer what it wants. Practising with the tech is essential - many flutists don't" (EM, App. 1C, A-8). Some performers work firstly with acoustic flute, adding the electronics later in the rehearsal process. Sabine Vogel approaches from a broader viewpoint:

> I look at the electronic devices like an instrument and you have to practise them and to know them like your instrument . . . Sometimes you have to take care, that you not "play around" too much. You have to keep the focus on the music and not on the technique." (SV, App. 1E, A-10)

The flautist's relationship to the electronic device includes interconnections of physical activation, understanding of digital processes and illusory sensations. Through the intimacy of the microphone, the integration of new triggering mechanisms and a sense of expansion and sharing of sonic production with technology and technologist, an impression of powerful new controls, enhanced facilities and stunning new expression is given. This is balanced by an edgy uncertainty, an apparent lessening of direct bodily control of the sound, and a reliance on invisible inhuman procedures. The flautist may be driven to maximize the humanist qualities of the performance techniques, qualities highly prized and prioritized in traditional musicianship such as greater interpretational freedom and expression of the inner world of the performer, through a desire to tame, and completely understand, these visually obscure processes. The campaign for this

XML preset import/export, and references instantly available from within each plug-in" (Cycling 74 Hipno, 2009, para. 1–2).

[50] "Bidule is a realtime modular creation studio aimed mainly at artists seeking a new creative environment to experiment with. With Bidule, you create your own live music creation environment, inserting audio and midi devices, ReWire Devices, Au and VST instruments and plugins." http://www.macmusic.org/software/view.php/lang/en/id/693/

confluence and comfort with the technology is addressed in Chapter 6 through scrutinization of process and response.

The important element in this discussion is not so much the functionality of the technology, rather how the translation of digital data to sound intersects with the flautist and provokes adjustments in mental and bodily responses. The tensions that arise, the confrontations of dealing with imperfect machinery, the time commitment demands and the uncompromising nature of both human and inhuman behaviours all stretch the performer to new levels of experience, despair and resolve. Michel Waisvisz described similar frictions succinctly: "About my own experiences with gestural controllers I can only say that I fight with them most of the time. That's something that almost every instrumentalist will tell... We need instruments as obstacles, as challenges." (1999, para. 1.3)

Expanded flute techniques

The impact of interactive electronics on flute techniques significantly concerns an adjustment of the spatial parameters of performance and sound, the activation of electrical signals through the use of specific prosthetic devices (microphones, pedals, etc) and a focus on new physical and tonal balances and emphases. Techniques that are more flute-centric are generally concerning a heightened sense of tonal control and the use of extended techniques. Interactive processes that manipulate the flute sound provide a platform to develop a wide range of timbres, activated by electronics, but not exclusive to interactivity. A new focus, a new movement practice and an ensemble player's skills are some elements that gain close attention in this genre.

A number of flautists use devices that are attached to the flute, adding technical demands to the player simply by increasing available choices and combinations. For example, as described above, Cleo Palacio-Quintin's hyperflute connects directly to her computer through cables and sensors on her flute. Her emphasis on expanded tonal colours and textures creates a unique performance style, created through arm, whole body and finger techniques extended to activate the many levers and buttons she has built on her flute. The heaviness of a flute with attachments can require some adjustment and re-balancing of the instrument. Kingma quarter-tone flutes have also been adapted by some players through the attachment of triggering

mechanisms, creating a complex array of combinations and functions to negotiate in performance. Anne La Berge comments:

> Flutists have their hands occupied and would like to be able to switch from piccolo to flute to alto flute to whatever other flutes one has in one's collection. That means that a microphone unattached to the flutes is easier when handling the changing of instruments and that other body parts than fingers need to be used to send controlling information to the electronics. (Appendix 1A, A-13)

Extended techniques demand many new fingerings and a diverse set of breath, hand and tongue actions. Achieving microtones on a normal flute adds many fingering combinations, as do multiphonics and altered tone fingerings. Pierre-Yves Artaud mentions a staggering 140–150 different fingering options required for extended techniques (there are approximately 36 regular fingerings on a Boehm flute).

A renewed emphasis on tonal expansion and the repositioning of the goals of tonal expression are vital elements of changed flute techniques elicited by electronics. The effect of amplification has been discussed at length earlier in this dissertation. Within the live interactive field the focus and pitching of the flute tone can be of vital importance, to produce successful computer recognition and digital sound processing. Embouchure refinement, airstream control, breath flexibility, the ability to project the tone whilst dealing with unusual physical actions such as delicate pedalling or specific angle placement crucially expand techniques in this genre. Anne La Berge, again:

> Extended flute techniques are of no real importance in combining acoustic and electronic instruments but flute technique in terms of control of pitch, volume and sonority are essential simply because these are fundamental musical elements and because it gives the flutist more control over the signal being sent to the electronics. (ALB, App. 1A, A-8)

Physical adjustments

> In a musician's relationship with their instrument, the tactility of the interface is not purely manual; it comes through breath control, lungs, throat, tongue, lips, nose, reverberating in cheek bones and teeth, posture, pressure and all the fine gradations of musculature that loop from control of production of sound through to the hearing and

> the ear. The whole body is in reverberation in a process that reaches into the body on one side and out to another body through sound. These reverberations are felt, not just heard. The instrument is part of this sound-producing body; it is hard to draw a line where the instrument begins and the body ends, or where the instrument ends and the next body begins (Harris, 2006, p. 4).

Electronic processes have a robust impact on the learnt physical and kinaesthetic awareness of a player, especially in interactive pieces involving player activation of interface. In practice, the physical memory shifts, the different actions required to produce musical outcomes not learned as part of previous instrumental training, extend the practice into new musculature and mental dimensions.

Foot pedalling, for example, an action remote from flute playing techniques, brings a new element to performance, a physical response which becomes closely associated with electronic sound effects generated, contributing strongly to a new, expanded sense of sonic control and expression. In certain passages the sweep of the music is reflected in the lunging action of the pedalling, and at other times a timid nudging is called for. The action can be partially reflective of the mood in this way, although often the pedals themselves require a degree of firmness of touch. Assimilating these actions into playing, acquiring the physical and mental memory to develop a smooth technique is a significant performance concern. La Berge states:

> Because I use foot controllers, the techniques are: 1) remembering which pedal does what in each setup 2) developing an instinct for what each controller does and how that effects the sound . . . I just need to keep track of myself in relation to the controllers. That is, we dance together. My fingers move on the flute, my body moves to play the flute, my body moves to play the controllers. If I could have pedals built that felt as delicate and sensitive as the springs on my flute I would. (ALB, App. 1A, A-20)

Flute or arm movements used to trigger sonic events become embodied in musical concepts, refined in the search for cohesion and emotionally reflective movement. They become integral to interpretation, to the way the player responds to and thinks about a piece, to the intersection of inner and outer body and sound connections. These movements demand a rebalancing of the instrument and player with a new concentration on body use and stability in the space. Taina Rikkonen refers to the flautist as the audible body (2003). As this body engages with the extended vocal

and physical gestures of extended techniques and interactive processes, it seems itself to expand and merge with the accoutrements of performance, the space and the resonance created.

The impact of amplified vocalization techniques in the context of flute performance also creates a significant shift of physical emphasis and discernment. This issue is elaborated in Chapter 6, in relation to Saariaho's *NoaNoa*, where micro-musculature controls, changed throat and mouth shaping and new bodily connections are examined. The use of voice repositions the flautist, simultaneously imprinting a perception of human-ness and inviting a reappraisal of musical expression of the flute. This new positioning of the performer through exploiting the visible (physical) and invisible (virtual) dynamics between live performer and electronics has developed as an important expressive field, where the sonic universe of the performer is expanded into a multidimensional setting for performance. The invisibility of electronic functioning may be revealed through gesture, linking movement with altering sound textures and timbres, transferring the performance gesture into the technological gesture, with specific sonic results. The blurring of the connection of sound to gesture in some works brings transparent and hidden elements into play, creating the possibility for new artistic discourse, and renewed conceptual approaches.

Conceptual influences

The influence of interactive techniques on the development of performance expression was touched on above in the discussion on physical integration of new actions. Equally influential are the expanded sonorities, providing a rich field of exploration of performative approach. The field of resonance is highly flexible, opening up a huge range of possibilities for exploration, such as focus and shape of musical lines, blocks of timbre or texture, contrasts and dialogues, and merging and emerging sonorities. Sonorities are not, of course, left to the performer in many works, the manipulations proscribed by composers forming a major part of many compositions. These sonic changes intensely influence the playing mode of the flautist, as breath and projection are adjusted to enhance or transform the sound, to align with the aesthetic, meld or stand out.

As an improviser and performer of her own compositions, Palacio-Quintin speaks of a sonority of which she has strong control through physical actions that trigger effects (CQP, App. 1B). Improvisation in this setting allows so much choice, that structuring of sonic parameters becomes critical, with interpretational choices and emphases giving crucial shape to the work. A similar aesthetic can be seen throughout the score-based interactive field, although the freedoms with sounds are not so apparent. A brief comparison of, for example, Saariaho sounds and activation in *NoaNoa* compared to Burt sounds and activation in *Mantrae*, reveals differences of physical engagement and sonority which impact interpretational outcome significantly. Both sound treatments consist of complex textural and tonal elements, with entirely contrasted outcomes but similar translations: the calling forth of multiple characters, the evocation of place and aura, the centrality of the individual within provoking environments. The physical actions, discreet pedalling in the Saariaho, grand gestures in the Burt, in themselves induce a contrast in performance style and approach which transfers to the musical through a different sense of energy, and a different goal for flute colours and articulations.

Formulating interpretations, defining the performance imperatives of works that include ambiguous notions, disembodied sonorities or diverse characterisations encourages the study of the microcosm. Finding the essence of a sound or movement, developing ideas through repetition, skirting around the edges and constructing new paths to follow, establishing interconnections between sounds, motion and projection, or immersing oneself in the sound of one note ultimately leads to fruition in the search for cohesion and meaning. Maintaining the stamina and perseverance to elicit these meanings remains the challenge to the performer.[51]

Performance identity

My personal explorations of interior and exterior identity issues in the performance of live interactive flute music are undertaken in detail in Chapter 6. Whilst self awareness and integration of performance elements can be very highly developed parts of a performer's consciousness, few performers seem willing to explore performer perception ideas at length in the questionnaire included in this study.

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[51] See further discussions in Chapter 6, p. 122, Kineasonics section.

Perhaps many deliberately refrain from this delving into the psyche for fear of tripping up in performance. Guitarist Derek Bailey puts it very directly: "The worst thing you can do is thinking" (cited in Toop, 2004, p. 214).

Two examples of reappraisal and change are clear in the following excerpts from the questionnaire. The challenge of changed approaches to playing, such as exploring new tonal goals or developing new techniques is highlighted by Cleo Palacio-Quintin:

> Of course using a flute extended with electronic sensors is not an easy step to make. I spent years practising to get a good control on the acoustic flute playing, and had to put years again to get use to play with the hyper-flute involving other skills of control. After several years, it became quite fluent if I keep using the same live processing software. Each time I change parameters in my interface, or perform a new piece, I have to rehearse a lot to get use to the new electronics reactions linked to the gestural controllers. It's an instrument always evolving with the software development I keep doing. I keep learning to program computer interfaces to achieve better artistic results. It's a never ending story. There is always something new to learn. (CQP, App. 1B, A-8)

Sabine Vogel reveals a change in self-perception, of performer role and expectations:

> With electronics I don't feel so much as a flute player anymore – depending my own music. I feel more like a composer and musician in generally (sic). I do feel like a "flute player", when I work together with composer and play written music. (SV, App 1E, A-24)

Relationships

The live interactive electronic environment is a rich continuum of developing relationships between music, machinery and people. The creation of shared sounds and constructs, shared experience and expression, through pre-determined or impromptu responses, incites a fascination with the medium and the machines. Whilst many commentators locate humans and machines in opposition, the idea of tossing out this sense of confrontation, of re-aligning oneself in partnership, is at once liberating and compelling. La Berge presents this view:

> Computers are live organisms. They are beings. They are lovely. If I had been using the

> computer as an instrument as long as I've been using the flute, I would be as emotionally attached to them in the same way that relate to my flute. The problem is that computers have shorter lives, we can't blow on them or hold them when we perform. (ALB, App.1A, A-30)

Idealism reigns and collapses in an environment that seems infinite in capacity one day, and unresponsive the next. Support between individuals, co-conspirators in the performative search for enlightenment and inclusion, affirms a fragile, but vibrant relationship. These connections of performer to technologist may range from supervisory to fully responsive musical dialogue, where a new elevation of self occurs on both sides of the desk, and a new responsibility to explore musical ideas with clarity and directness. The heightened sense of the interactivity stimulates a refreshed feeling of anticipation and spontaneity, equal to the best in musical collaboration.

Performing space

Presentation of the visible and invisible elements inherent to electroacoustic music performance becomes a critical factor in the space. Within this networked arena the performer responds to sensory stimulus, through sound, emotion and perceived response, as well as the physical and psychological impact of the space itself. An encounter occurs, with digital and mechanical elements, illuminating an otherness in both the digital and the body, neither of which can be fully known nor foreseen. This encounter impels emotional and physical shifts, and creates responses to and distortions of the self, uncertainties and estimations.

Concerns of performers frequently focus on the visual aspect of presentation and the practicalities of the set up. Physicality gives a stage presence, an opportunity to express in gesture the meaning of the music, a sense of validity to the performer and a visual focus for the audience. Part of the tension in this situation can be a manifestation of concern over mis-understanding, or rejection by an audience expecting familiarity (consciously or not) and the aim to bring people into the sphere of new musical expression through discourse, drama and a sense of normality. This, we may hope, will give acceptance, reflect current experience, extend shared musical experience, and express the music in meaningful ways. Achieving this can send performers into a swirl of presentation preparations: how to make the space

accessible, presentable, acceptable, or more easily understood. Transforming the audience through a concert stage space can be a challenge, we may prefer to emphasize the aural, the sonic connections, and evade the visual.

Some further comments from fellow flautists follow, extracted from the questionnaire responses, illustrate approaches and concerns addressed by performers in concert:

Anne Laberge on presentation:

> Using an electronic setup has allowed me to develop a more informal presentation style where I allow the audience to see me interact with the equipment. I stop playing, I push buttons, pedals, talk about what I'm doing, pick up game controllers, change flutes – with an ease that is more pedestrian than a typical classical music concert presentation protocol. (ALB, App. 1A, A-27)

Jane Rigler on equipment:

> Usually I don't find it distracting b/c it's part of the show. BUT, if I'm playing and the equipment is large and bulky, and the possibility of tripping over wires becomes a hindrance, I find that putting the equipment as far away as possible, or stacking the equipment on top of each other can help. I bring nice towels or table clothes to cover things, and I cover and collect the wires or tape them down as much as possible. In general, this why I built my trigger system: to avoid the ugly visuals and awkwardness of all the equipment. (JR, App. 1D, A-23)

Elizabeth McNutt on set-up:

> I try to minimize my set-up (fewer stands, reduced score, mic away from face, no monitor, etc). I try not to worry about it - and be as present as I can be for the audience's sake. (EM, App. 1C, A-23)

Summation

This chapter has presented an overview of music performance involving flute with live interactive electronics, with reference to the wider field of musical interactivity.

The sequential development of more intuitive procedures, modelled on the history and expressiveness of instrumental performance, has been noted as a highly influential element on how the genre has evolved. Electronic device activation, technique, physicality, self perception and performance space dynamics have been shown to have an immense impact on the performer, stimulating a vigorous response to new capacities and performance understanding. These issues are expanded through personal encounter in the recital *The Extended Flautist*, discussed in the next chapter.

6. RECITAL 2 REFLECTIONS

The recital

THE EXTENDED FLAUTIST

Music for flute and live interactive electronics

Jean Penny, flutes
Andrew Blackburn, electronics

Sunday 26th August, 2007,
Ian Hangar Recital Hall, Queensland Conservatorium

PROGRAM

Kaija Saariaho NoaNoa for flute and electronics (1992)

(Sveinsson: Sounds of Snow)

Russell Pinkston Lizamander for flute and Max/MSP (2003) (Australian Premier Performance)

(Sveinsson: Sounds of Heaven)

Warren Burt Mantrae for flute and live electronics (2007) (World Premier Performance)

(Sveinsson: Sounds of Birds)

Improvisation veiled emergence (August, 2007) for flute and computer

(Sveinsson: Sounds of Sounds)

Georg Hadju Sleeplessness for piccolo, alto and bass flutes (1988 /1997 /2007) (Australian Premier Performance)

This chapter comprises documentation of the processes and responses of the recital, *The Extended Flautist*, presented on August 26th, 2007 in the Ian Hangar Recital Hall, Queensland Conservatorium, Griffith University. It is an account of the performance journey, from original concept to concert presentation, including repertoire choices and rationale, flute and technological techniques encountered, transformations activated in sonic, spatial and performer perception and reality, and reflective reviews. It is a personal story, aimed at discovery of new understandings, expanded capacities and relationships, new awareness and insight of the flautist engaged with a specific interactive live electronics performance. The move from the general observations and material of Chapter 5 is thus transformed to specific reporting of processes, an aspirational emergence of understanding and solutions in this multifaceted search. Through examination of performative issues encountered in preparation, performance and review I have endeavoured to construct a picture of my personal experience of this journey through auto-ethnographic research. This picture is elaborated with reflective discourse, which seeks to provide deeper understanding of performance in this field. My position as primary participant and subject in the research implies a narrative approach to self-observation and experience, through the processes of explorations, learning approaches, interconnections, production and response.

> The notion of interactive live electronic music performance conjures up images of musicians and gadgets, computers and machines, microphones and the colour black: a theatre of prospective sound devices in which performers can be veiled, emergent, magnified or dislocated in a transformative environment. The contemporary sonic world of the solo instrument is explored in this concert, in a program of music for flute and a variety of interactive technologies and styles. Acoustic resonance and technology meld to create new spaces and sonorities. The inaudible becomes audible, the gesture visible and invisible, sounds reverberated and mirrored, and dramatic intensity amplified. A potent theatrical dimension is established with Saariaho's *NoaNoa* (fragrant), which explores the introverted sonorities of the flute and extended techniques as it seeks to evoke the spirit of Gauguin's Tahitian journal and paintings, *NoaNoa*, of 1891-93. Russell Pinkston's *Lizamander* is an exuberant and flutistic work, utilizing pitch and threshold tracking to generate flute-computer interactivity. This invisible processing creates a virtual chamber music arena in which the performers (flautist, technologist and computer) respond. Georg Hajdu's *Sleeplessness*

> explores the unsettling nature of psychological anxiety. Bass flute, alto flute and piccolo create a sense of disturbance through a succession of contrasting episodes and activation of sound modifications and effects. Interspersed between the electroacoustic works are three acoustic interludes taken from *Twentyone minutes* for solo flute (1981) by Icelandic composer, Atli Heimir Sveinsson. A highlight of this concert is the premier of Warren Burt's new work, *Mantrae*. In this work the flautist's gesture and movement trigger radical sonic modifications to the distilled yet powerful contour of the flute line, signifying non-predictable change and capturing the intensity of the Hindu chant, and the essence of the individual in a continually changing world. (Author, from Program notes, August 2007)

Repertoire choices and rationale

My principle aim with *The Extended Flautist* recital was to present a musically integrated program that included relevant interactive live electronic and flute techniques for research and development: a program representing a snapshot of the genre, engaging with sound transformations and methods, and providing a forum for discussion and exploration of the performer's perspective. Activating the space through diverse tonal colour focussed on the interactive theme and balanced with acoustic flute as distilled source material, exploring the notion of an invisible partner (the electronics), testing the functionality of performance methods such as microphone, pedal techniques and sound projection, and developing a sense of confluence and intensity in performance were major goals. Identifying and evaluating the musical styles, the distinctive sound worlds and dramaturgy, the technical elements that extend flute playing and the potential works held for exploring self perception and identity informed the search for appropriate repertoire choices. Additionally, I aimed to create a flow from piece to piece which gave a sense of an unfolding of new perspectives and sound structures.

The main repertoire selection criterion consisted of the following:

- Demonstration of live interactive techniques: gesture, pedal, pitch and threshold triggers, flautist – technologist;
- Varied musical styles, new music, recent music and a major repertoire work;
- Electronic and acoustic sound transformations: Max driven, plug-ins, and

extended flute techniques.

Whilst the full range of styles within the genre cannot be represented in a single, short concert, the characteristics outlined do constitute core processes of interactive flute and electronics music in the extant literature. Availability and functionality of both music and equipment were integral elements in the progression towards music choices, and a long period of searching, testing, contemplating, choosing, changing and finally deciding on program content stretched over many months, and up to the weeks before the recital.

Equipment suitability was a major hurdle to overcome in the exploratory stages. An example of these challenges included investigation of performer-specific devices developed for and by flautists for individual use. These include procedures developed by several of the questionnaire participants: Canadian flautist, Cleo Palacio-Quintin, uses unique triggering sensors on her flute (keys and buttons) for performances of her own music; Anne La Berge has collaborated with institutions such as STEIM in Amsterdam to build interactive devices for her own improvised and collaborative performances; American flutist, Jane Rigler, has composed and performed music such as *Traces/Huellas*, using specifically designed hardware. This last is an expansive interactive work I was very interested to include in this program and research, but although Rigler was keen to send me the equipment, she was unable to reproduce it at the time and the project fell through. Commercially available equipment was ultimately appropriate for the final choices, allowing smooth transitions in concert and flexible functioning of effects. I required a relatively short list of equipment: four flutes, two microphones, computer, mixing desk, MIDI interface, pedal, sound diffusion system, software (Max/MSP, *Hipno* plug-ins and *Plogue Bidule),* cables, connectors, webcam, and an extra computer screen. The physical set up remained the same throughout the concert, although electronically, each work required an individual set up.

The music scores presented similar difficulties. It was impossible, at the time, to purchase a performance copy of the Saariaho with electronic files, and my solution was to contact the composer and her technologist, Jean-Baptiste Barrière, who quickly sent me these files. I was able to purchase *Lizamander* directly from Russell Pinkston, a busy academic in Texas, USA. Georg Hajdu's publisher advised

contacting Hajdu directly to acquire an updated version, which he readily supplied and integrated with my own recording of the narrative. The commissioning of a new work by Warren Burt was made possible by my successful application to the Australia Council Music Board. I purchased software for myself and the composer, webcam, cables and connectors, and provided a composition fee with this grant. With unknown musical content until six weeks before the concert, and an electronic component still subject to change up to the hour before, this unique flute work was the wild card element of the recital.

The following Table details the final music choices, their principal features and my aims for each.

work	technology	research aims
Saariaho *NoaNoa*	Max/MSP MIDI pedal sound files	major repertoire work sound transformations use of voice as mask / shadow / new identity pedal triggering
Pinkston *Lizamander*	Max/MSP Pitch and threshold tracking	invisible triggering
Burt *Mantrae*	Hipno Plogue Bidule Video movement tracking	new commission gestural triggering new physicality
Improvisation *veiled emergence*	Hipno	flautist - technologist interaction manipulated microsound exploration
Hajdu *Sleeplessness*	Max/MSP MIDI pedal	dramaturgy extension of virtual space pedal triggering
Sveinsson *Twenty one minutes* (4 movements)	Acoustic	acoustic sound source

Table 1: Technology and research aims for works

Recordings of these works can be found at Appendix 5:
Saariaho NoaNoa [audio] – Track 5; Pinkston Lizamander [audio] – Track 7;
Burt Mantrae [video] – Track 9; Improvisation [video] – track 11;
Hajdu Sleeplessness [video] – Track 13; Sveinsson [audio] – Tracks 6, 8, 10 and 12.

Dancing the labyrinth: Techniques, interactivity, kinaesonics

The performative impacts of technological interventions are primarily grounded in the techniques demanded of the genre, the repositioning of the soloist in the performance space, expansion of musical potential and the new relationships that emerge. In this section I focus on the techniques, interactivity and physicality of live interactive electronic performance to articulate my personal responses to these elements as they occurred in *The Extended Flautist* recital.

My focus was on sound creation, highlighting sonic aspects of the works through a performance style aimed at creating a deliberate intensity. I would be physically anchored to the pedal in two works (and thus greatly restricted in movement), and engaged in full body movement alternating with stillness in another. I additionally aimed to emphasize the part of the intermediary, in a genre where the procedures are not necessary visible. These elements formed the basis for performative exploration in which acoustic resonance and technology melded and separated to create contrasting sonorities, visible and invisible gesture, triggered sonic effects, virtual and real space, amplified soundscape and dramatic intensity.

In general, my approach consisted of a plan encompassing the following:

- Ascertaining functionality of performance venue, and repertoire possibilities;
- Repertoire choice;
- Flute score note learning, developing techniques, colours, articulations, gestures, flow and meld of voices, juxtapositions of ideas and procedures, shaping of whole both sonically and physically;
- Technology: putting together the hardware and the software; developing the technologist - flautist relationship as ensemble partnership; reflections and discovery of new angles instigated through electronics;
- Working together for confluence and functionality; investing energy and time into the significant demands of the mechanics of interactivity;
- Revising functionality;
- Projection; revision of interpretational ideas; reflection on meaning of electronics;
- Establishment of mechanics and acoustic balance in the hall.

This plan was necessarily adjusted to allow for issues such as arrival of software, collaboration with composers on technology functioning and completion of newly written work. The musical styles themselves impacted considerably on methodology. The traditional linearity of the solo flute develops implied structural complexity through the electronics, through expansion of the flute sound and contextualization within sonic effect production, and the rehearsals with the electronics were essential to inform musical priorities and projection. Additionally, the re-interpretation of composed music implies a search for the composer's ideal, a pursuit of perfection: the ideals of performance. This performance consisted of composed and improvised music, and many of the works on the program were premier performances, implying experimentation, an exploration of presentation ideas and a step towards this state of perfection. The methodology hence essentially allowed for a progressive approach, which continually revisits the work both before and after performance.

Techniques and approaches

The basis of the sound world consisted of extended flute techniques, normal resonant tone, and electronic manipulations created through Max/MSP and plug-in effects. Extended flute techniques included vocalisation, glissandi, microtones, multiphonics, varied vibrato, breath tones, varied articulations, double trills, whistle tones and combinations of these. These individual techniques are well established within contemporary flute performance, the sounds having become recognizable elements and the considerable technical demands an expectation. Electronics changed the scope and demands of these techniques, at times creating greater freedom (for example, through amplification), at others requiring finer detail and nuanced embouchure control (for example, with whistle tones). Physical adjustments to the techniques included body movement such as pedalling, whole body movement to trigger movement sensors, and the minute breath, embouchure and throat/mouth manipulations enabled or enhanced by amplification. Mental adjustments were stimulated by the expansion of sonic material, an enlarged sense of expression and projection, and a sense of re-positioning myself as performer in the space.

Working with the invisible partner, the electronics, encouraged a sense of mystery and uncertainty. The performance worked with this ambiguity, and the changing

perspectives and observations that occurred within the evolution of the recital. The imperceptible nature of much of the interactivity meant that the audience may not have been aware of activity occurring on stage (such as triggering and screen responses), and sound events may have lost their definition, and source. I aimed to emphasize this veiled or implied aspect of the performance, and the ambiguous transduction of the elements of each piece into the sounds and emotions of expressive music performance.

Success with the techniques came from a sense of openness in approach, a willingness to take risks, and a sense of conviction. Throwing away any pre-conceived ideas of right and wrong in this context was important in the search for what worked in the moment, and conveyed expressive ideas. It was a slow but luxurious process, that included critical periods of contemplation and reverie, developing a vivid picture of the desired sounds, dreaming about ways to attain them, experimenting with varied methods and finally finding what worked. The following example of rehearsal methodology emphasizes these cyclic patterns in relation to the use of voice and flute techniques in the Saariaho.

> First attempts to project my voice through a low C created an extremely unstable environment: the tone of the flute disappeared, and my voice seemed to me to completely miss the sonic characteristics I would look for. Nevertheless, I persevered with just getting my voice to sound in conjunction with the flute sound, without any judgement of quality, or reference to the ideals of the piece. Gradually this narrowed down to more specific vowels, consonants and then a choice of pitches. Whispers alternating with vocalization, through the flute, beside the flute, and especially above the air gave me a sensation of progress, of encouragement. Brief moments of control created an anticipation of success, and artistic merit. The experience was more organic, as I learnt to anticipate the physical actions and sound goals of voice production through a spacing of movement and time, adjustments of thoughts, and by applying a steady drive to the movement of the piece as well as to myself. (Author, journal notes, July 2007)

The connecting roles of the computational and personal induced a process of demystification, of discovering the links and transformative potentials of the meta-instrument, the extension of thinking, moving, and playing demands. The balance,

the working methodology and the construction of the functional zone to activate and recreate the habitat for each piece, were central elements of performance production. Within this arena sits the vital relationship of instrumentalist and technologist, a relationship built on trust, acceptance and a willingness to tread risky paths together. The demands made on the technologist were many, including problem solving of electronic processes, such as functionality of equipment and software, artistic advisor, sound balancer, and technical liaison with composers and venue staff.

The following section outlines the functionality, actuality and matching of interactivity goals which occurred in performance.

Interactivity

Interactive live electronic techniques consisted of both flautist and technologist triggering of sonic material created either from pre-recorded and pre-set files or plug-in effects. The rehearsal processes unfolded an intriguing journey to unravel the language and procedures used in each work, as, even when composers use the same platform, there appears to be little uniformity of idiom. For example, Max/MSP provided significant variances in functionality. Hajdu, for instance, sent a locked run-time version of his software, which required several adaptations by him before it worked in our technological environment; Pinkston, on the other hand, sent an open system which could be configured to suit our technology.

Pitch triggering in Pinkston's *Lizamander* is achieved by the computer recognizing specific pitches played by the flute; threshold triggering in this work occurs when the computer recognizes pitches above a certain threshold. Both of these functions allow the piece to progress to the next section, and are indicated in the score by sequential numbers (see Figure 10, below). In performance the computer screen shows the word "Matched" when these are successfully picked up. These signals are like throwing goals, and add greatly to the fun of the piece – but this was fun that belonged to the performers, invisible and imperceptible to the audience. Difficulties with the pitch matching can occur when the acoustic in the hall is either too live or dry – and on one occasion in this performance this happened, requiring a manual progression by the technologist.

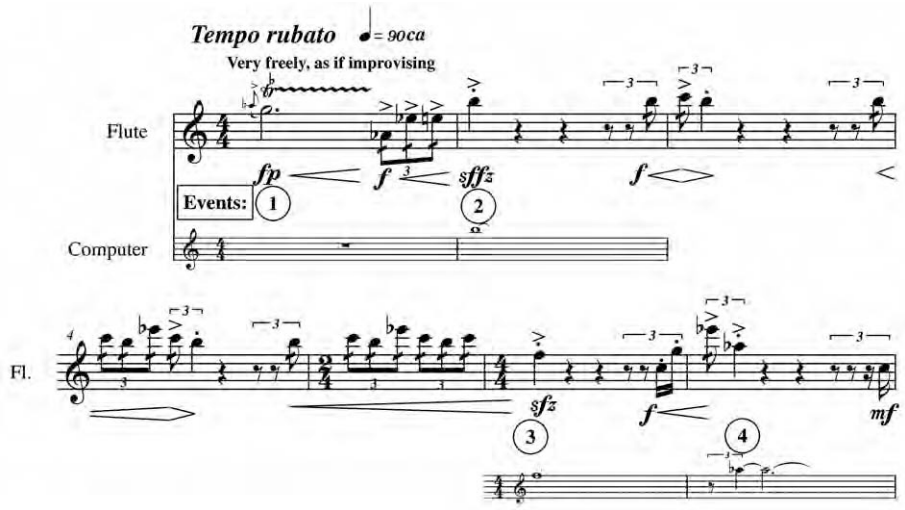

Figure 10: Pinkston Lizamander, opening bars[52], indicating computer recognition events (circled numbers).

Body movement triggering in Burt's *Mantrae*: In this work the flautist is instructed to intensely focus on each *mantra* and to also move randomly from one to another, and hence stand to stand. The flute begins solo, with the electronics appearing after the first thirty seconds. Then the flute sound is processed through the plug-in effects, which are programmed to change through *Modulator / V Motion* as the flautist sets off the camera / motion sensor by moving from stand to stand. The conceptual layers of meaning are revealed through the technological processes in this work, the intense chanter (the flautist) being surrounded by the sonic material of plug-in effects. The sound effects show up on the screen in this work also, but in this case I ignored them, being physically entrained by the actions of the piece. Examples of the *Plogue Bidule* patch and *Hipno* plug-in settings can be seen in Appendix 3, which includes Burt's set-up and performance instructions for this piece.

Pedal triggering in Saariaho's *NoaNoa* and Hadju's *Sleeplessness*: These two works used pedalling throughout to trigger sound effects such as reverberation of varying speeds, pre-recorded material, and harmonization of the flute tone. A great sense of control emanated from this pedalling once it became part of the physical ecology: pivotal and critical moments in the score became associated with this specific movement, and resulted in a strong physical involvement with the music. This was especially noticeable in the Saariaho (see example in Figure 11). In an earlier performance of this work the patches were activated through the desk, considered an

[52] Cited with the kind permission of the composer.

update of the technique; in the Brisbane recital I took this on myself through the pedal and it became my preferred option.

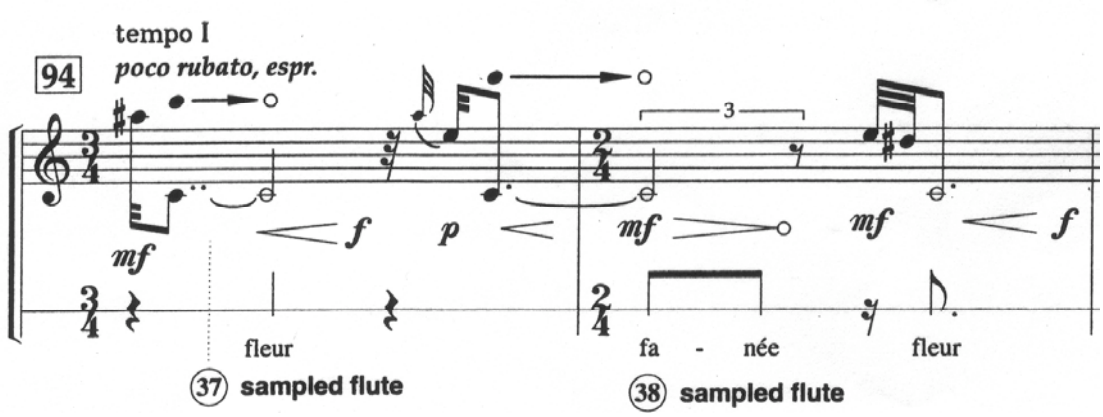

Figure 11: Saariaho NoaNoa[53], pedal use notated with circled numbers, bars 94 to 95

The improvisation, *veiled emergence....,* allowed for flautist and technologist exploration of plug-in effects and responses. A pre-planned overall structural scheme was devised to secure a sense of predictability in this performance. The visuality of the interactivity was rather traditional, the eye contact with co-performer and computer screen cues serving to actuate communication and progression. The musical goal was to achieve an introspective mood, accented by manipulated micro-sounds. Extended flute techniques such as breath tones, whistle tones, multiphonics, jet whistles, percussive key clicks and articulations, and occasional glides into resonant tone were here transformed via *Hipno* sound effects (see screen shot example Figure 12), which captured, looped and expanded the sounds. In practice on this occasion, the flute was largely leading the progression of the work, but developing responsive ideas with the effects as they were established. In performance the *Hipno* effects appeared on the screen, allowing a visual confirmation and recognition.

The move from interpretation to improvisation established a new environment, with new procedures and responses. The goals changed from the pursuit of perfection to a mobile continuum, a state of alertness to stimuli and an awakening of response sensitivity. As a performer with a long history of working with composed works, this improvised performance was a moment that has become etched in my memory,

[53] NoaNoa Music by Kaija Saariaho © Copyright 2000 Chester Music Limited. All Rights Reserved. International Copyright Secured. Reprinted by Permission.

of sharp contrast to the rest of the program. The freedom to give attention to my own inner thoughts and musical spontaneity, to articulate these in a stimulating and reactive environment became a regenerating and compelling process.

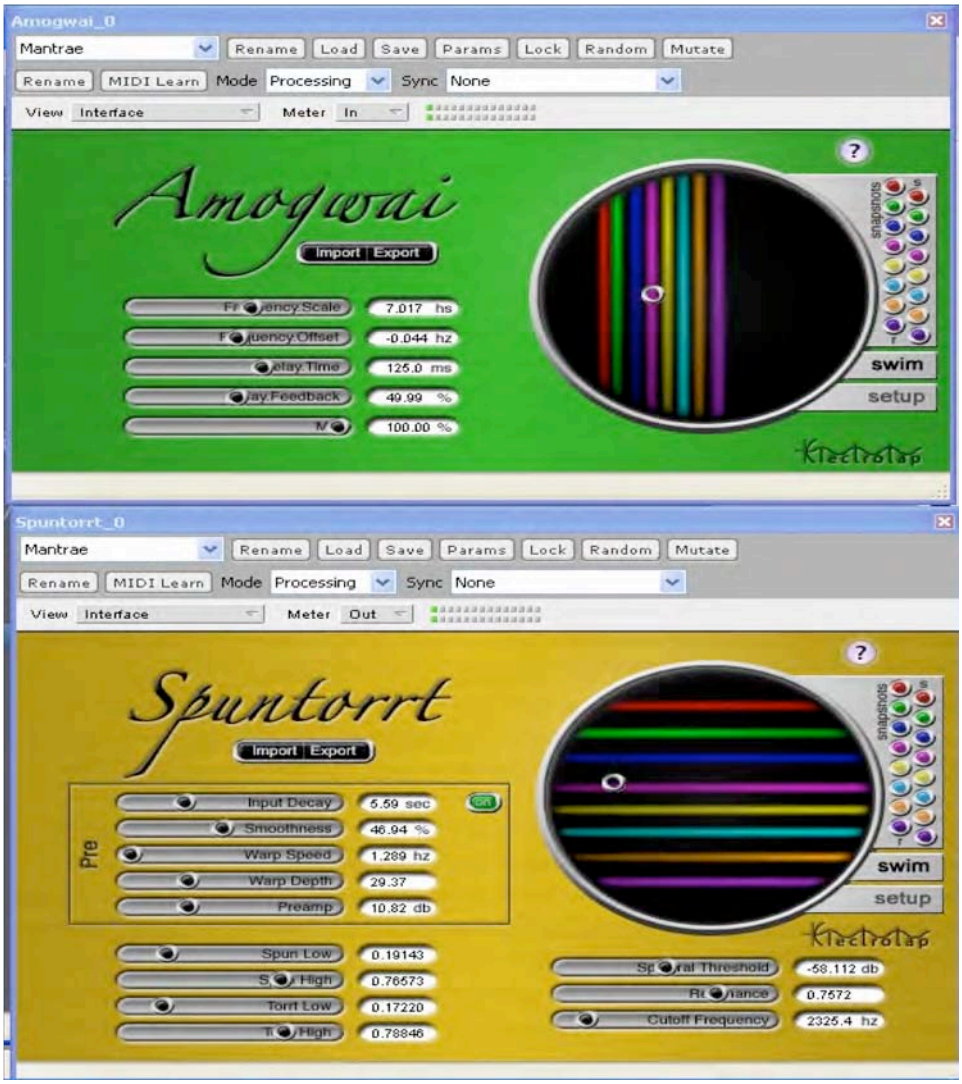

Figure 12: Hipno screen shot example

Kinaesonics[54]

The physical elements of *The Extended Flautist* recital served to illuminate functionality and musicality, performance style and expressive experience. The metaphorical projections that link physical experience and expressive meaning have been examined by Jane Davidson and Jorge Correia (2001), in the search for an understanding of the place of movement in musical concept development. Using

[54] Kineasonics – " physicalization of sound or the mapping of sound to bodily movements" (Wilson-Bokowiec & Bokowiec, 2006, p. 47).

contrasting flute works as a base, their research utilized rehearsal and performance as a means to study the role of physicality for player and audience.

> Jorge could only really formulate a meaningful interpretation by finding out how the music felt within his body and how he related to it. He understood the nature of the musical language better for having felt the piece within his moving body. (2001, p. 74)

Additionally, they state, the response of an audience involves metaphorical inner movement, which engages the experience of listening through connection with physical memories (Ibid).

These elements came to the fore in this investigation, as new processes stimulated and demanded new body movements, and goals of interpretational projection and integration were sought. Engagement of the whole body occurred through the use of voice and language, breath and embouchure, tongue and articulations, new arm, hand, leg and foot movements, engagement of abdomen and back muscles, new listening focus and the connections of all of these to sonic control. Connecting each sound to the body was developed through finding the placement of every note, phrase and technique, so that each became embodied in physical responses and automatic. These physical actions, memorized as part of the performance preparation, demanded the acquisition of numerous new skills and connections.

The biggest physical adjustment required was the pedal triggering, as used in the Saariaho and Hadju works. Learning to integrate this physical anchoring and balancing weight on one leg, whilst maintaining optimal flute playing posture, was a challenge, with virtually constant pedal changing through these two pieces. In *NoaNoa*, the impression was that the pedals created a sense of dancing to the pivotal points of the music. The changes to reverberation or activation of sound files were so critical to the soundscape, that a feeling of anticipation and drive, both when changes occurred in quick succession and when well spaced out, belonged so much to the flow of the music that the physical effort was virtually choreographic. This gave a strong integration to the physicality and interpretation, which complemented the inner body flute playing motion very significantly. The sense of the movement seemed to add sense to the music. In this work the vocalization and use of the French language, breath tones, juxtaposition of vocal and flute articulations and

multiphonics all created physical challenges. The example below (Figure 13) illustrates combinations of breath tone and consonants.

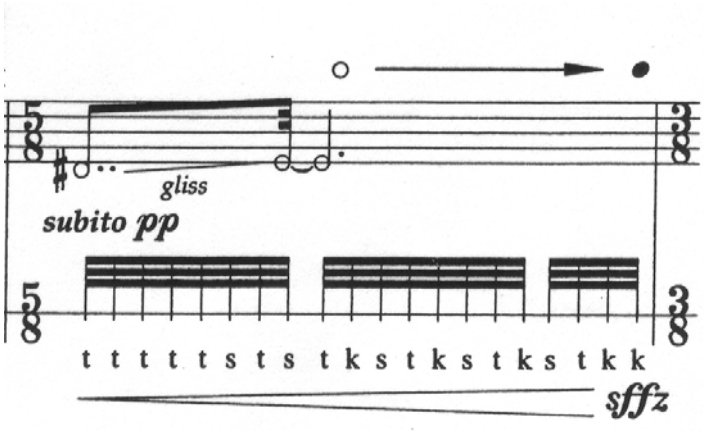

Figure 13: Saariaho NoaNoa[55], bar 47

In *Sleeplessness* the pedal progresses the work to the next section, adds voices through harmonization or narrative, and activates reverberation and sound effects (see Figure 14, below). Hajdu requested that the pedal changes be made in a very subtle, barely perceptible manner (personal communication, July, 2007). This instruction was consequently uppermost in my mind in performance. Further physical demands came from the use of bass flute and breath tones, the piccolo which at times is screaming and at other times whispering, and the repose of the untreated alto flute line which signifies acceptance and resolve in the final section.

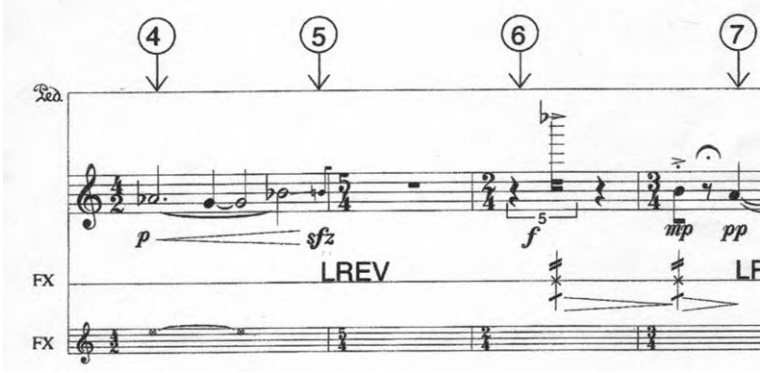

Figure 14: Hajdu, Sleeplessness, bars 5-8; Pedal activation notation numbers[56]

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The physicality of Warren Burt's *Mantrae* activates a whole sonic world. The movements felt somewhat awkward at first, and combined with the jumping around from stand to stand as well as phrase to phrase in the music, created a challenging visual situation. My ideal was to intensely focus on each changed position to give a strong sense of the chanting persona of this flute part. The sonic effects of this work were not embedded in my mind before the recital (they were altered right up to the minutes before the recital began) but wild changes were certainly anticipated.[57]

Pinkston's *Lizamander*, on the other hand, was quite free of new physicality. The pitch and threshold matching was quite easy to achieve, although dependent on accurate tuning and certain ambient acoustic properties. The improvisation *veiled emergence...* was also less physically demanding, although the ample use of extended techniques provided flute playing challenges, and the freeing up of attachment to a score was a contrast. This last was actually quite hard to achieve, as I found myself exploring the music stand for visual cues most of the way through.

Transformations: Sonic identity and space

Sonic transformations

The sonic aims of the recital were met through the varied levels of expansion and tonal alteration achieved, through the contrasts of musical styles and technological processes. The diversity of sound manipulations, from subtle reverberation or widening and narrowing of vibrato, to breath sounds mixed with whispering, to harmonizations, to the wildness of plug-in territory created a chameleonic effect. Each work provided a contrasting soundscape, moving from elaborate manipulations to pure acoustic tone. The inclusion of totally acoustic works in which the sounds were seemingly laid bare was intended to illustrate a stark disparity, a reminder of the source material upon which the whole program was based.

The diagram below (Figure 15) indicates sound and technology progression, the flow of sounds and techniques, through the recital. The alternating media and scope were accentuated by including the Sveinsson miniatures: pieces which in themselves have

[57] See Chapter 7 for further discussion.

a very light sonic resonance, depicting snow flakes, celestial mysteries, and soft birdsong, with only the last one, *Sounds of Sounds*, resolving to more normal levels of resonant tone.

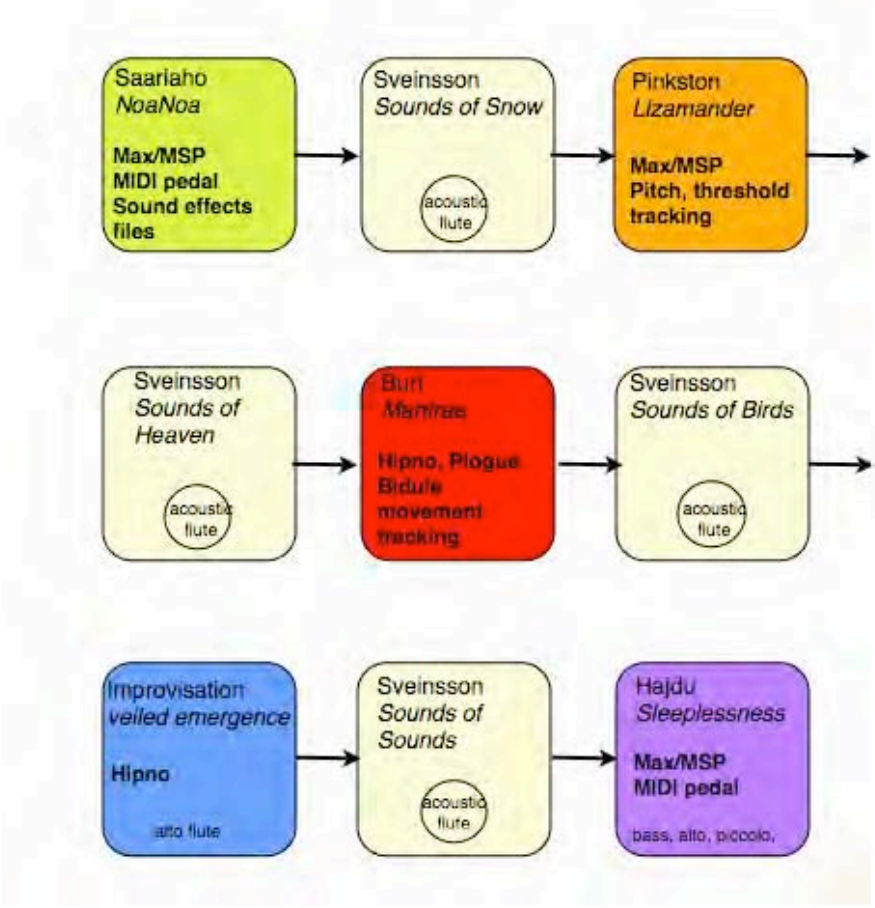


Figure 15: Recital 2, Sound and technology sequence

The use of voice, as narrative and melded sonic material, became a significant element in the sonority of the recital. The diagram below (Mind Map 6) shows pathways of meaning and illumination from the use of the voice, and the impact on projection of self in the works. The voice symbolizes and creates a human presence, in this case the presence of the flautist. It is an unexpected side of the flautist that appears, at times disembodied or smudged with flute sounds, creating a new sensation, a new location, a new sense of self. Vocalizations meld with flute, breath or synthesized material; they emanate from whispers, pitches or speech; they suggest location, other presences and diverse manifestations of self. Disembodiment of diffused voice creates a sensation of external commentary of inner thoughts, of looking in from outside. In performance these sensations appear to extend the personal space of the performer, to unveil aspects of self normally hidden, and to

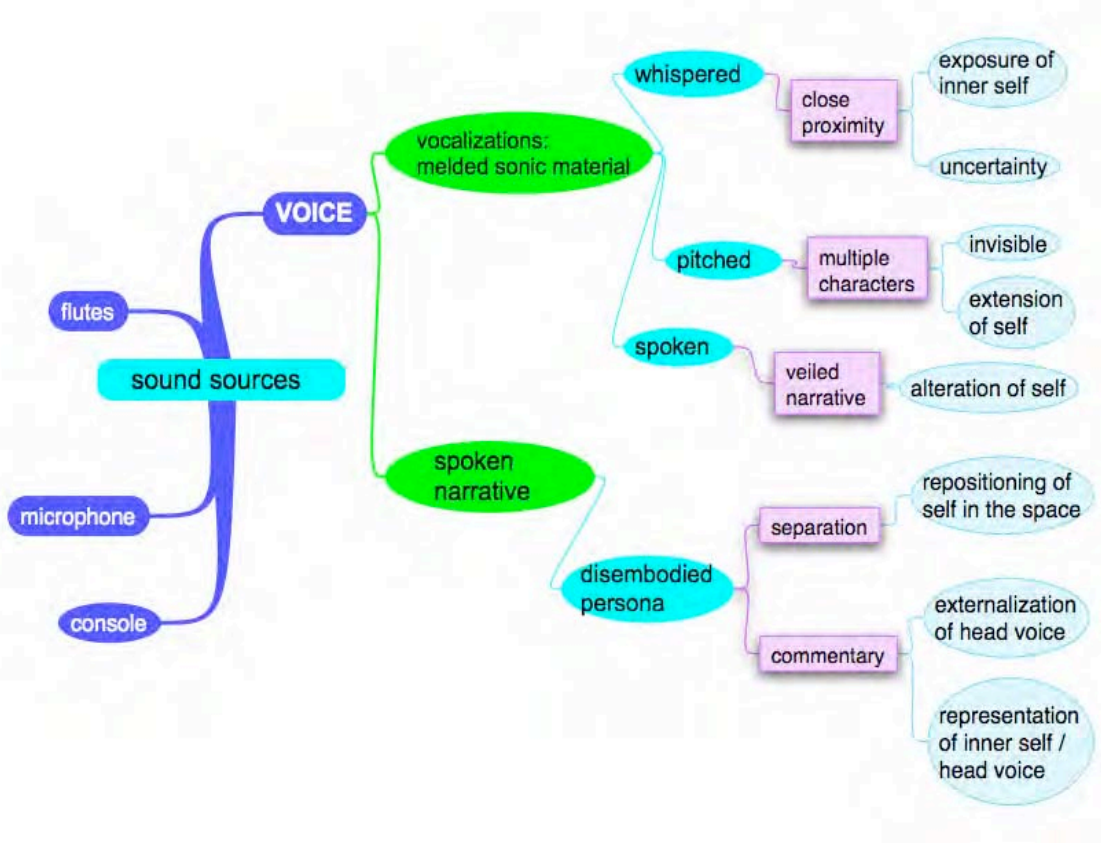
allow a feeling of psychodrama to emerge.

The spoken narrative in *Sleeplessness*[58] establishes the significance of the visible and invisible aspects of the performer. At the start of the work, the disembodied recorded voice of the performer is heard through the loud speakers, setting up an anticipation of dialogue with the flautist as musician, and suddenly propelling the audience into other-world, time and space. A sense of uneasiness is created with the opening words that express apprehension, discomfort, and an unsettled disposition. The start of the flute's commentary brings attention back to the stage and flautist, but the character of the flute appears as an accompaniment, part of a duo with an invisible partner. The musical language is motivic, episodic, and disjointed, with unfocussed tone colours, angular lines, and disjunct accents creating a sense of insistence and anxiety. The electronics add undercurrents, especially through the reverberations, capturing feelings of shakiness and nervous twitches. They also conjure up shadows and confusion through the harmonization effects, introducing new characters and voices. The separateness of the recorded voice, presented as a strong persona in the hall, gives it an almost overbearing presence, which builds up to a frenzy, and then quietly slips away at the end. This is the central character of the drama of the piece. The soloist is therefore separated out into this commentary, the hidden electronic sound transformations and the musical responses happening visibly on the stage.

The vocalizations melded with flute in *NoaNoa* create a very distinct sense of multiple persona. Whispered and spoken French words, as well as pitched voice are used. The meaning of the words of the text (see Appendix 3) suggests the colours, scents and sensations of Gauguin's Tahiti. A literal translation is superfluous, however, as the principle effect of the voice is the tonal colour and physical sensations it creates. The voice (the language) and the sound of the voice (sound) are presented in a context where the words are sonic items, without the normal sense of prose. The meaning is obscured as phonemes become acoustic material, out of the normal context of words, melded or contrasted with flute sound (See example in Figure 16, below). The tangles of the flute and the voice at times make the two sounds indistinguishable, giving a sense of ambiguity, of other presences and

[58] See text in Appendix 3.

shadows, and also a veil and uncertain definition to the performer (Hear example at Appendix 5, track 19). This effect was quite startling for some listeners, reflected in an audience comment: "when you began to whisper into your flute it took my breath away". This unexpected sense of proximity and the physicality invoked by the vocal reverberations gives this work its unique sonority and power. In performance, the sensations of these vocalisations with flute emphasize and articulate a dramatic introspection, a 'turning inside-out' of the self as well as a shifting of performance mode in the presentation of the exotic character of the piece.



Mind Map 6: Voice and Meaning map

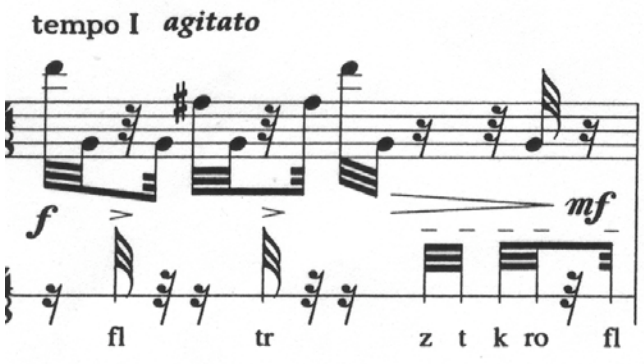


Figure 16: Saariaho, NoaNoa[59], bar 160

[59] NoaNoa Music by Kaija Saariaho © Copyright 2000 Chester Music Limited.

Identity transformations

Altered self perception was identifiable in ways that sometimes astonished, were sometimes rewarding and always significant. Reflecting on the performance in the months following the presentation revealed many facets of my work and thought processes, as well as illuminating many of the influences of technology in general. These influences directly and indirectly impacted interior and exterior identity perception.

The meta-instrument, the extended exterior performance identity, not only gave a new sensation of expanded presentation, but also engendered an enlarged and evolving self-awareness. If the instrument is accepted as an amplifier of the self, as suggested by Emmerson (2000), then the amplified instrument expands this threshold even further. This is most clear in the new level of transparency in tonal and physical awareness, in the detail exposed in tonal fluctuations and bodily movements. The difference between normal acoustic playing and electronically enhanced playing in this respect is the degree to which these elements seem to manifest. The expansion of the sound in the room mirrored this sense of magnification of body and presence, as the space became a player in the music as well.

The changed acts of performance drove this extension through a stepping process towards an engagement commensurate with the performer – instrument relationship (See Figure 17, below). The basis of flute playing is already accomplished and incorporated as part of my identity. Acquaintance with the new interior and exterior physical gestures began with a struggle of assimilation and familiarity. Immersion led to the gradual materialization of ease and enfold, as the flute took on these extensions and they became part of my performing self. Although this amalgamation was revealed as imperfect, with the extensions essentially remaining part of the digital other, this seeming aloofness was frequently minimized and an impression of oneness was discerned. This sensation occurred notably where recognizable trigger points become points of physical engagement, and these connections became part of

me – the performer – and part of the expression of the music.

The exterior image of this performance concealed much of the activity. As mentioned earlier, the pedalling was discrete and not necessarily noticed, and the invisible triggering was reliant on program notes to decipher. This partnership with invisible elements imbued the performance with unpredictability from the audience's point of view. The changing of relationships between player and technologist, player and audience, and player and devices were an important part of the drama, and part of the appeal. The challenges to listener expectations offered underlined my aim to express layers of identity imbued with ambiguity, multiplicity and changeability. Drawing the audience into this space, communicating the concepts and changing expectations, sharing the response and musical impact was a major goal. Challenges in this regard included the lack of transparency of body gesture, and at times a physical rigidity demanded by the works, as well as the relative impossibility of facial expression: physical gestures which normally assist in the effort to convey musical meaning.

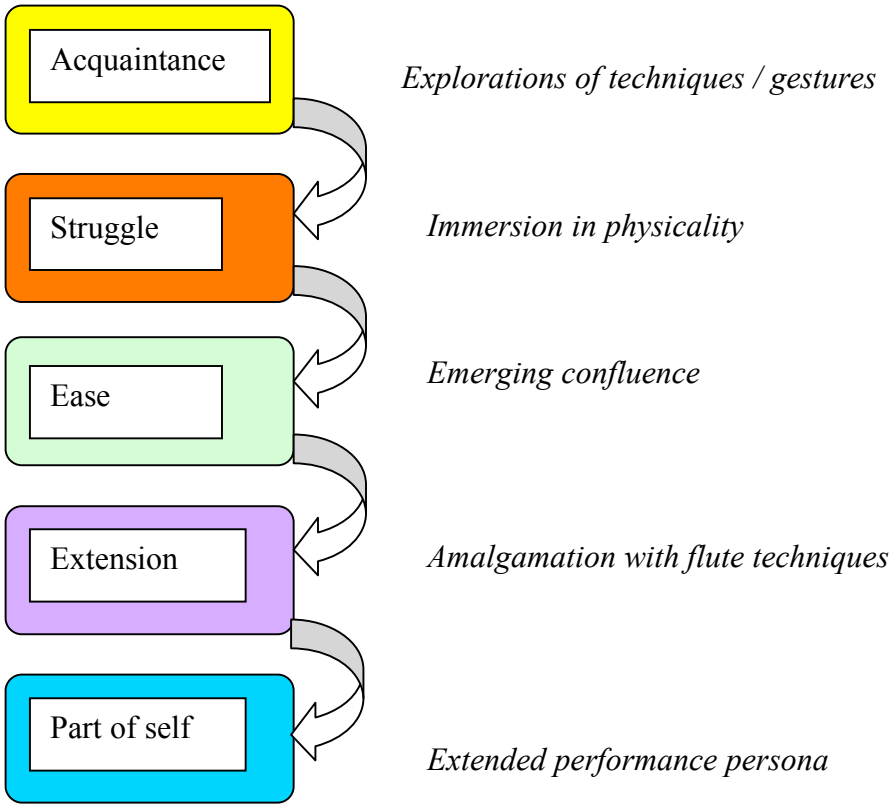


Figure 17: Steps towards integrated performance persona

Space transformations

The transformation of space occurred with the physical set up and visible dynamics, the real space, and the virtual space of sonic illusion and invisible interconnections and processes. Spatial transformations important in this recital were the performance arena (including flautist and technologist spaces), the diffusion and illusions of perceived location of drama and the sonic source and spectra alterations. The meta-instrument containing these strands was an evolving organism, merging performers, instruments, equipment and space within the Ian Hangar Recital Hall.

This recital was a formal presentation. The hall and stage set up was based on historical context, with the stage and audience facing each other, and physical practicalities allowing for visual and physical performing functions. The set up consisted of the flute table, music stands, microphone, camera, MIDI pedal board and the computer screen which was connected to the mixing desk and computer situated in the middle of the raked seating of the hall. This created a round performance area, with clear parameters and restrictions. Two speaker arrays were suspended high above the audience, facing out from both sides of the stage, through which the amplified flute sounds and effects were blended and defined (see Figure 18, below).

Musical connections to the body of the hall included the electronic and visual connections to the technologist and mixing desk, and also to the minute timer: a percussionist who kept time in the Sveinsson pieces to keep them to the minute[60]. These slaps, indeed, added a surprise element to the performance: the sudden explosive sounds chopping off the flute in each acoustic work. On this occasion this drew reactions from audience members: one loud shout of surprise, and one attempt to lower the level. From my point of view this element added precious moments of connection, a pleasant sharing of responsibility, and I loved the drama of the loud interruptions and shift of focus.

[60] Each movement of this piece must be one minute long. A live percussionist / time-keeper (Louise Blackburn) fulfilled this role on this occasion, using a large 'slap' instrument obtained from the percussion department at the Queensland Conservatorium.

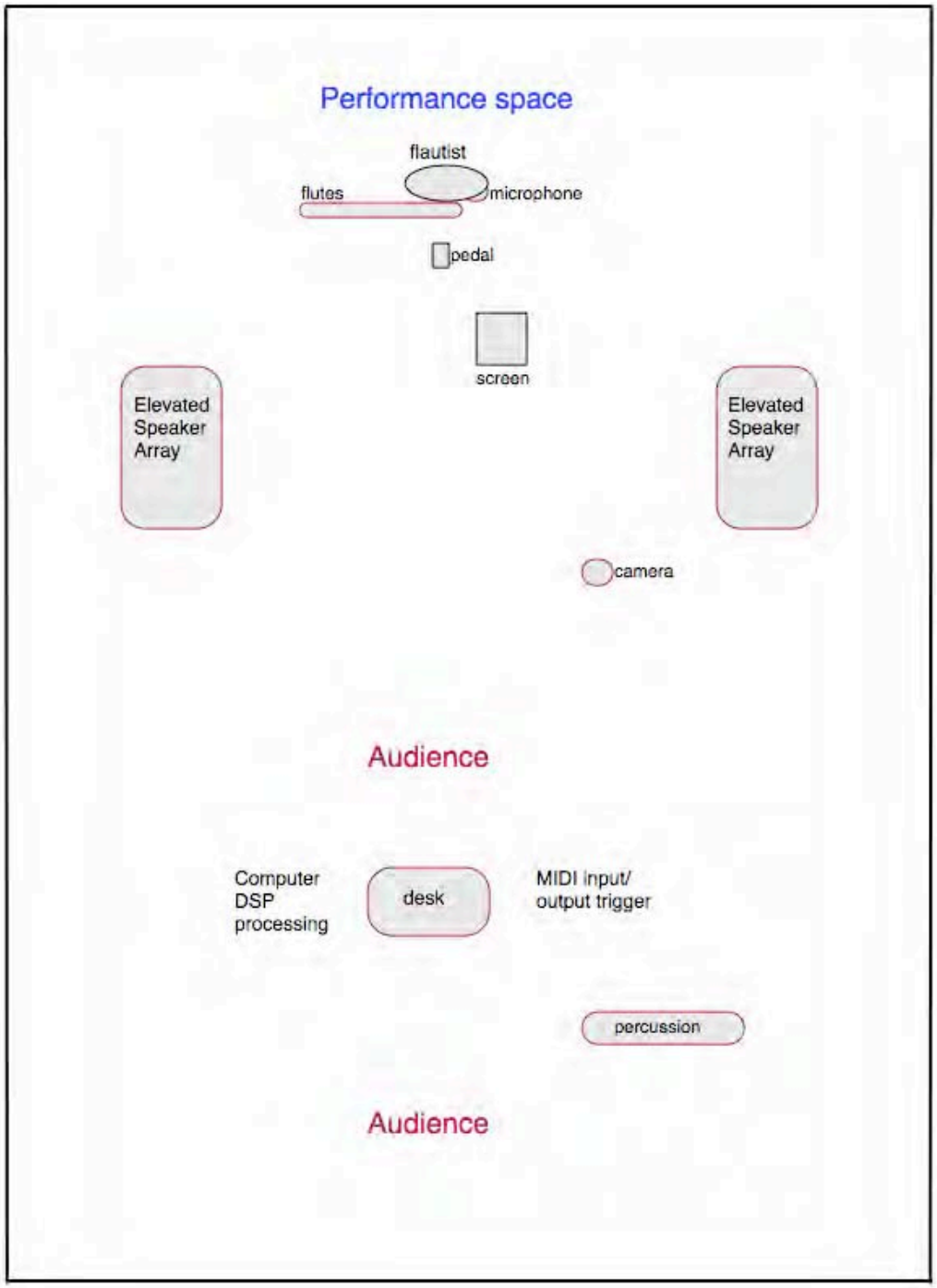


Figure 18: Recital 2 set up

The virtual space, as a vital element of expression, influenced the perception of sound sources, proximity and drama. There was surprise at times, reported by audience members, by the use of voice, the immersion and disconnections of player and sound, and the hyper-magnification of sonic units. Through the course of the recital the position of the performer was variously magnified, obscured, empowered and reduced, and spatial representations of rooms or psychological spaces (for example, in the Hajdu) or enclosure or self containment (for example, in the Burt) were played out.

The virtual space also strongly influenced my own sense of the performance. At times there seemed to be an immersion in the sounds, at others I felt that a trajectory of micro-sounds and accompanying voices were corroborating in the recital from above. The surrounding sounds and pitches provided a sense of context, response and ensemble, activated by the technologist and sonic procedures. The expansion of internal bodily actions, such as breath and tongue sounds, out into the room also had a significant impact. At times there was a sense of exposure of self, an open sharing of the internal in pursuit of sonic and communicative pathways.

Representations of spatial dimensions were primarily created by reverberation effects. In the Saariaho work reverberation is used throughout to create sustained tones, introduce multiple voices and to add structural richness. A sense of the music existing as your whole world occurs in the performance of this work, through an immersive sound environment and the fully entrained attitude demanded of the techniques and interpretation. One's whole body is participating here: chest, abdomen, vocal cords, arms, hands, legs, feet, throat, mouth, ears, eyes and mind. The surrounding virtual spaces appear to confirm the sense of involvement.

Reverberation in Hajdu's *Sleeplessness*[61] creates the sense of anxiety, as well as aloneness and the dimensions of the rooms of the house. The creation of the theatrical space occurs through textual reference, suggestive allusions, and electronic effects. The listener becomes situated within the house, the drama unfolding first in the living room, then bedroom and bathroom. This spatial metaphor for the psyche of the self, moving agitatedly through states (or rooms) of unease, is created through a repertoire of sound effects melded with the flute line. The reverberated staccatos and the harmonizations imply spaces through echoes and shadowed musical lines. These echoes confirm and surround the sound in the space, indicating dimensions of the place as well as emotional responses. The low, indistinct pitches imply intimacy. Unfocussed flute sounds, or rustle sounds, blur the edges of these spaces, and the rushed sequences represent an agitated, restlessness within this confined area. The sense of the space is enhanced through the performer's physical and musical gestures, which seek to draw the listener across the divide into the interior world of these emotions.

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[61] This work is further explored in Chapter 7.

The two components of interest here are the real space: the area of activity, focus of attention, and the visual positioning of the musician, and the virtual space engendered through the sound diffusion and illusions of the rooms of the house and the head of the narrator. The inner performance area creates a circle of concentration, broadened through diffusion to include the disembodied voice, and connected to the sound technician through the pedal, cables, and visual cues. The outer circle encompasses the audience, reached through sound synthesis and diffusion. This circle remains separated, observing but distant.

At the start, the disembodied voice of the performer sets up an anticipation of dialogue with the flautist as musician. A sense of uneasiness is created with the opening words that express apprehension, discomfort, and an unsettled disposition. The start of the flute's commentary brings attention back to the stage and flautist, but the character of the flute appears as an accompaniment, part of a duo with an invisible partner. The musical language is motivic, episodic, and disjointed, with unfocussed tone colours, angular lines, and disjunct accents creating a sense of insistence and anxiety. The electronics add undercurrents, especially through the reverberations, capturing feelings of shakiness and nervous twitches. They also conjure up shadows and confusion through the harmonization effects, introducing new characters and voices.

The centrality of the drama in *Sleeplessness* emerges through the use of the flutes, the narration, the musical style, the effects and spatialisation. From these elements come the facilitators: the instrument choices, sound effects and musical language. This use of spatio-dramatic effects confirms the importance of dramatic representation in and by the space, the transformations created by electronic processing of sound, and the re-positioning of the performer within this space.

The interactive flautist: Reflective comments

The Extended Flautist recital became an elucidating forum for discovering the components of performance with live interactive electronics and flute, and my personal intersections with this genre. The freedoms gained from new performance methods engender a freedom of approach to solutions: there seem to be no right or wrong modus operandi, as an emphasis on finding spontaneous solutions, and

running with fresh ideas that spring from the re-evaluation, can be developed. Many such examples were revealed in this recital project. For example, various sound effects, especially the extended flute techniques, are now established and best practice is sometimes to follow advice from books and practitioners. Often, however, it is more interesting and informative to trial new approaches, and to develop sounds which more truly match an individual ideal interpretation. This can engender a sense of discovery, of emerging latencies and personal achievement in the performer, as well as a greater sense of ownership of sound. In combination with electronics, these sounds expand the parameters of self-perception and self-projection as the transformed sonic palette is highlighted, and the identity of the performer is consequently given new expression. Significant sonic elements revealed in this recital included the vocalization occurring in two works, which stimulated explorations of the voice as liberator, locator, and an influence on new self-perception, explorations that informed others in sonority, projection and placement of the soloist in the performance space.

A significant part of this research was devoted to testing performance methods in rehearsal, and developing procedures conducive to coherent musical performance through effective microphone, pedal, and sound production techniques and balance, both flute and electronic. These processes demanded high levels of attention to the moment, a suspension of the performance action and close examination of the different components of a single action. This is a familiar process to most musicians, in the search for solutions to performative issues: with interactive electronics the "rhythms of exchange" (Kozel, 2008, p. 192) and the actualisation of the virtual, add challenge and richness to this pursuit. The performer, indeed, needs to strip back all reserve, to respond wholly to stimuli, and capture and transform these new elements into part of themselves.

Challenges arose in creating a continuum of sounds, whilst sliding seamlessly from one to another, and integrating techniques into interpretative ideas. Again, the vocalization in the Saariaho work, vividly illustrates the point. It is a most dramatic effect, providing the scope for deep explorations of timbre projection and balance. Experimentation with various methods, for example, whispers and voice, provided insight into the strength of these techniques as modes of expression and the physical and mental preparations required. The reverberation in this work, and the continuity

of sound this allowed, minimized air stream breaks during word articulation, and created a means of success unattainable without amplification.

Physical challenges encountered in *NoaNoa*, *Mantrae, veiled emergence* and *Sleeplessness*, the minute movements, the whole body movements and the pedal actions, strongly influenced interpretation and projection of the music and style. The triggering of sound effects became entwined with the physical actions required to achieve these, and the flow of the pieces became melded with physical activity. The surge of energy from the potency of the pedal transcended the sense of physicality that might be expected from such an action, as the impact of the electronics created such powerful transformations. This generated a sense of a more compelling performance as the projection out into the room lost acoustic reality. In later performances of these works I have found an increased comfort with this power, a relaxation with the concept, and an ability to work effectively with shades and nuances, timing and balance.

Changes in expectations and performing persona seemed enhanced and enlarged by the interactive technologies. The proximity of the player in the Saariaho induced by magnification of whispering, the invisible processes of the Pinkston, the sonic complexities and re-positioning of the player in the Burt, the move to micro-sound and intense but indefinite processes in the improvisation, and the shift in location of both voice and flute use in the Hajdu all impacted on self perception and expression of identity. My sense of characterization in performance was based on ideals of dramatic presentation which on this occasion were partly veiled. Later performances of the program would gather strength in this respect: a re-doubling of emphasis on these contrasts and characters, and greater projection of inner ideals.

A new sense of oneness in the sonic world seems to occur through interactive electronic processes. These include the melding of techniques to give enhanced freedom of expression, sonic empowerment and flexibility: one feels in control of a much wider sonic field. There is an expanded sense of the energy source: the gestures, breath, interpretations; and increased sense of sonic choice. There is a new sense of the ensemble, and at times a spatialisation of solo playing into layers and illusions of other presences. There is a magnification of the micro, intimate elements of playing, and the possibility to mask and confuse, to emphasize ambiguity. The

electronic device as the facilitator, a hidden enhancer, activates an edgy relationship in which there is never complete certainty, and there is reliance on elements outside personal control. There is an impression of immersion through the intimacy of the microphone, the use of triggering mechanisms as they are integrated into performance style, the feelings of support and expansion given to the player, the sharing of sonic control. Initially, this oneness seems to be an illusion, as the removal of direct bodily control and delegation to electrical signals creates, in fact, a separation. The affinity a performer has with their instrument, the means to personal expression, the everyday tool so integral to our identity, is a much closer, haptic relationship that becomes intertwined with the self. The device seems more distant: rewarding to work with, but belonging somehow to the other, a world of intangibles.

An insightful description of this situation appears in *Closer*, where Susan Kozel[62] describes this relation of the self to the digital other as ' an extension but profoundly different' (Kozel, 2008, p. 214) "Where does one end and the other begin?' she asks. 'The other is not outside me; nor is the self dissolved." And later: "Through technologies our relations with ourselves (our movement, our perceptions, our thought processes) and inevitably our relations with other shifts too" (Ibid, p. 215).

Performing with the flute and interactive live electronics in this recital revealed this dichotomy: the sense of greater sonic control created by such devices as the pedal or the amplification, is often accompanied by a sense of not having any control at all over the functioning of the electronics, of handing all over to the technologist. This partnership between flautist and technologist is integral to successful performance, and thrives when a commonality of artistic and aesthetic goals exist, when the myriad shades of balance, tonal softening or distortion, response and imagination create together a truly interactive gestural environment and ensemble. On this occasion these elements were well in place, a commonality of purpose was established, with the experimental elements remaining somewhat mechanical: the uncertain sound pick up and newness of some settings providing material for performative freshness and excitement through unpredictability.

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[62] Susan Kozel's book *Closer* (2008) reveals much about dance and interactivity through a phenomenological study, equally relevant to music performance. The correlations with music performance are many.

Expectations of audiences can be challenged not only by diffusion techniques, and location and components of sounds, but also in the physicality of the performance, the stillness or movement and the visible and invisible interactions. The inner and outer reality can be challenged here, with the performer setting up situations that may enhance the musical ideas and ideals of interpretation, but the audience's lack of awareness of procedures may make these misunderstood. Program notes were produced in this instance to assist with understanding intentions.

Audience response to this recital indicated, in general, an understanding of the purpose of the research and where the recital sat within it. Some listeners expected a greater expansion of flute tone in the Sveinsson miniatures, but appreciated the contrast these works were designed to convey. It was my impression that the musical ideas were successfully communicated, that the processes were satisfactorily accomplished and that the recital as a whole demonstrated the aims of the research.

An assessor's response:

> Within the context of the stated aims of the programme, i.e., music for flute utilizing extended-techniques with live interactive electronics, the choice of works presented was extremely well planned and the end result demonstrated a superior understanding of the current state of extended flute music and the resources, particularly computer and electronic inspired works, available. Not only was there an excellent mixture of styles-from the episodic, disjointed work of Georg Hadju to the post-minimalist-inspired work of Warren Burt (a premiere)-but the electronic manipulations and computer programming aspects employed varied greatly . . . The performer seemed completely 'at home' with this style of music. lt was performed with a level of beauty and grace that I have seldom experienced in music of such conceptual and technical difficulty. . . The performance had 'something to say' in a language often considered difficult, if not obtuse. . . In terms of beauty of sound, I thought the Saariaho and Pinkston works stood out. While technical demands of the Burt and Hajdu demonstrated the performer's skill at controlling multiple tasks, both musical and logistical. Connecting it all were the more delicate Sveinsson Interludes, a clever way of cleansing the palate between the 'electronic' courses.
>
> Dr. William Duckworth, Professor of Music,
> Bucknell University, Lewisburg, PA USA [63]

[63] Griffith University Assessment Report on Doctor of Musical Arts performance presentation, 26th August, 2007.

Defining the connective experience

To conclude this chapter I return to Susan Kozel. The computer, she states, "is not just an instrument . . . or the interval between clicking and getting somewhere else" (2008, p. 186). This comment provokes investigation of the meaning and realization of interactive technologies and instrumental performance. There is more than a duality here – the meta-instrument is a force greater than its individual components, with transformative potentials worthy of deep attention. These encounters through technology, the interconnections of machine and body, of machine and sound have the potential to profoundly inform us by questioning the nature of performance activities and relationships, through exploring human senses and thus extended lived experience.

The Extended Flautist recital presented a diverse set of musical works from which to develop insights into performative practice. The group of pieces, including a new composition, an established repertoire piece, an improvisation, and demonstrations of varied interactive processes, came together as a satisfying entity, the works progressing from and contrasting to each other. A progressive transformation of flute sound was demonstrated through acoustic and electronic means, activated through the interactive procedures, which, in themselves, provided material for significant exploration. Physical and practical elements were addressed, along with interpretative and perception influences. In this way, an analysis of the experience of the recital, the experience of the performer, was constructed through auto-ethnographic analysis of this journey: a unique opportunity to research performer responses in a live interactive electronic environment. The following chapter represents a culmination, a further drawing together of participation and self-observation, a definition of these encounters as experienced in three works.

PART IV: PERFORMANCE ANALYSES

Performing involves the development of intelligence in the body and tactility in the mind. Steven Schick (2006, p. 92)

Presenting a performance seems to be a rare opportunity for performers to share with others who and what they are precisely at that moment. (Jane Davidson, cited in Rink, 2002, p. 150)

In Part IV I present three examples of the journey to performance, the exploration of the insider's experience in preparation and performance of music for flute and electronics, the spaces between the player and the music. Through these analyses, I chart three significant journeys of personal experience, through in-depth explorations of the impact of the electronics on the evolution of interpretational ideas, a renewed awareness of self, location and performance relationships, shifts in emphasis and expanded sonic expression.

The analyses are presented as individual papers, each taking a particular angle or interpretation of the idea of a performance analysis. The transitional journey from score to performance is thus presented in both formal and informal contexts: a notated score analysis with internal observations of encounter; a journal tracing the processes of preparation; and a more formal analysis of music and performance approach. The discussion is focused on selected works from the recitals that demonstrate a variety of flute and electronics performance styles. Whilst these works have all been discussed to some degree in previous chapters, the major aim of this chapter is to present a clearly defined variety of approaches of value as self contained entities. Through the period of this research I have become aware of a distinct growth in clarity of expression and methodology. I am seeking in this chapter to reflect that development, with a defined response: a window into my own performance practice. In dissecting my responses to performing these works, separate parts of performance – the learning, interpretation and execution of the music (Schick, 2006, p. 92) – are examined in a context of evolution, and are in that sense a snapshot of these processes in time.

The works each have distinct musical characteristics and functionality, ranging from

gentle spatialisation of amplified flute sound to complex triggering mechanisms such as body movement with plug-in software or MIDI pedal. All of the music is composed, implying a search for the composer's intent, and the perfection of performance presentation. The works themselves have suggested the formats in which I present these analyses: the luminosity and enveloping mood of Lavista's *Canto del alba* creates the environment for a meditation on details of the work as it passes in time; Warren Burt's *Mantrae* provokes layering and cross referencing in an analysis that is focused on the central figure set within an environment of change, represented as a personal journey of performer process in the environment of a new work; the drama and construction of Hajdu's *Sleeplessness* is mirrored in a mix of commentary and response, within the shape of a four sectioned circle. Performances of the complete works are accessible at Appendix 5, Tracks 2 [audio], 9 [video] and 13 [video].

7. THREE PERFORMANCE ENCOUNTERS

MARIO LAVISTA: CANTA DEL ALBA PARA FLAUTA AMPLIFICADA (1979)

Canto del alba, editada por Ediciones Mexicanas de Musica A. C. Impreso por Arturo Sandoval Hernandez. Icazbalceta 74, Mexico D.F. El 21 de Abril de 2003. La edicion consta de 150 ejemplares al cuidado de la profesora Isolda Acevedo Jimenez

a Marielena Arizpe

Composer connections

Mario Lavista was born in Mexico in 1943. His compositions include works for orchestra, piano, voice, chamber groups, organ, choir, tape, the theatre and film. His solo flute music includes works for alto flute, bass flute, piccolo and concert flute. Two of these flute works include amplification: *Canto del alba* (1979) and *Lamento a la muerte de Raúl Lavista*, for bass flute (1981) (Living Composers Project, 2004). Lavista's exploration of extended techniques of traditional instruments was undertaken in collaboration with performers[64]. *Canto del alba (Dawn Song)* explores these flute techniques and timbres to create a work of startling sonic beauty. Amplification of micro-sounds magnifies fragile flute techniques, creating a sense of immersion and interconnection with the inner self, and an evocative sense of place and tranquility.

> The music arrived from the composer on 3rd October 2006, with 15 stamps, pears mostly, and jars . . . all the way from Mexico. What will this music express of this?
> The package contains three scores and a CD with *Canto del alba* plus *Nocturno* (for alto) and *Lament* (for bass). All pieces very beautiful and atmospheric, evoking such stillness.
> Playing *Canto del alba* reveals an excellent score with great clarity in print and explanations of notation, with fingerings given for multiphonics and glissandi. This helps enormously, and everything works. This will be most enjoyable to

[64] Marielena Arizpe (flutist), Bertram Turetzky (bassist), Leonora Saavedra (oboist) and El Cuarteto Latinoamericano (strings) (Peermusic, 2009).

> play – difficult to control but wonderful. Looking forward to more work on it. Amplification is set ('excellent' amplification required) and remains the same throughout. This would be good contrast to other moving spatialisations in recital. (Author, journal notes, October, 2006)

Listening

> *Seated alone, amongst the bamboo, I play the ch'in, and whistle, whistle, whistle. Nobody hears me in the immense forest, but the white moon illuminates me.* (Wing Wei, Tang dynasty)[65]

This poem, quoted at the start of the work, immediately evokes a vivid sense of place through visual and aural allusions. A solitary remoteness imbued with muted light paints a picture of dreams, of beauty, of quiet meditation. A thread of sound is imagined floating through the landscape as if an offering or expressive communion with the surroundings. The instructions at the beginning of the music also add to this aura: '. . . grey light before dawn . . .' The mood is thus clearly suggested to the performer before sounding a note, to be revealed in a striking way with the first run through.

Here in the liminal world between first impressions, imagination, anticipation and reality the sounds begin to imprint themselves on the psyche. Strands of sounds spring from suspended tones, floating, implying pitches and anticipating resolutions; a sense of a melisma, a gathering of multi layers, overtones and slides through an allusive microtonal expression. The introspective mood is intense, enveloping, amazing. The sensations are mirrored in the technical demands: smooth and steady physical control, extreme mental calm, intense active listening, sustainability of breath, tone and focus, and a zen-like spatiality. The flautist is compelled to re-appraise tone production and intensity, defining ambivalent micro-sounds, micro-tones, multiphonics, altered fingerings and the ethereal whistle tone passages, all of which require extreme precision and control. The listener is coerced into engagement from the physical act of listening to quiet; perhaps watching from afar, perhaps immersed in the sound.

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[65] Translation from Spanish text in score, J. Penny.

Learning

The score is presented here in full, with underlain comments, pinpointing major learning aspects and reflections. The notation is divided into phrases, creating the discussions through observations designed to reveal a process of elucidation, the unfolding and materialization of the piece. The major imperative here is the transformative impact of the electronics, the amplification, which offers the opportunity to re-evaluate the precepts of flute performance, and the ideals of sound production.

The initial exploratory rehearsal sessions of *Canto del alba* generate revelations of form and structure, notation and fingerings, technical challenges to confront, stamina demands to develop, and sonic potentials. This sets the scene for dreaming, and the establishment of process. Immersion in individual techniques emphasizes the goal of accuracy perfection, and the search for solutions. A gradual emergence of interpretational clarity as direction evolves; muscular control and sonic choices of resonance, texture, emphases and balances are made. Each step back to observe and reflect generates a new perspective, and further trials of structural and microelements become possible.

Searching for the meaning of the work, and for how the sense of place is created, leads to close examination of the elements that are crucial to expressing this:

- *Rhythm* – fluidity through precision;
- *Gesture* – physical movement from stasis – to fluid encounter with techniques; the power of the movements to accentuate the music – by absence and presence;
- *Tone* – the role of the extended techniques and the impact of the technology;
- *Amplification* – the connections of flute with microphone, the perception of location, the impact on sound and movement; what changes this incurs in learning, interpretation and execution.

A methodology is generated: the cyclic processes, the confrontations with the aural, physical and psychological demands needed to succeed with each technique and phrase.

This analysis can be heard and read simultaneously via Appendix 5, Track 2.

PHRASE 1[66]

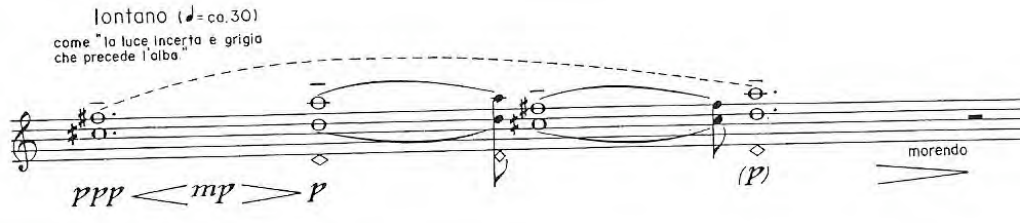

Figure 19: Phrase 1

This first phrase (Figure 19) instantly creates the mood, the aesthetic, the performance style and the sound world of this work; it evokes place and it demands attention through an immediate plunge into extended techniques. The words in the score – *lontano, come "la luce incerta e grigia che precede l'alba"* [67] – inspire a transformation of verbal descriptions into sounds in the room, through timbre, balance and nuance. An intensity of purpose wells up in the body, as the anticipation of raw feelings, of aural, physical and psychological confrontations form. The delicacy, the uncertain projection, is revealed in the initial multiphonic (C quarter # and F#), which emerges from silence via a carefully directed airstream, relaxed embouchure focus and breath stability – leading to a further D harmonic-based multiphonic more difficult to secure. Placing the A, the top note, becomes a priority; working with the instability, practising alternative note projection, discovering timbres, striving for maximum focus and accuracy.

With the addition of amplification, the first example of revelation occurs: the discovery of micro components, the impacts of slight shifts in breath or muscles, the degree or levels of flexibility available, the muscular control required for fragile techniques, the potentials of expression and projection. The intent of the amplification here seems to articulate and emphasize the sonic aura, to facilitate the projection of sounds that tilt towards fragmentation.

Physical gestures develop expressive connections: embouchure, throat, mouth, fingers, and arms work in tandem with tongue positions, breath lightness or intensity,

[66] All citations of the score with kind permission of the publishers:
Canto del Alba, by Mario Lavista, copyright Sonic Art Editions (BMI). Used by permission
of Smith Publications, Baltimore, Maryland 21207, USA.

[67] *Distant, like the grey uncertain light before dawn* (trans. J. Penny)

and rhythmic energy. The tempo is extremely slow: this phrase is 41 seconds long. The challenge of sustained breath, of stamina, of entrainment is already present in the first phrase.

PHRASE 2

Figure 20: Phrase 2

Within this phrase, I feel a new world opening up, as the polyphony develops, and the microtonal slides of the multiphonics evolve into separate parts, with sustained tones hovering above moving pitches. The rhythm picks up a slightly undulating drive. I find this phrase exceptionally difficult initially; the angle of airstream, shape and tenseness of embouchure demand a fine focus, and the note changes require adjusted finger positioning. Finger sliding between the first two multiphonics is difficult until new solutions arise, allowing easy negotiation of the lumpy trill keys and sideways movement. Mental anticipation of the pitches proves to be vital: I can will them into place if I 'hear' them distinctly ahead of time. The polyphonic movement creates strands of sound, extremely difficult to control but powerfully expressive of inner connections.

PHRASE 3

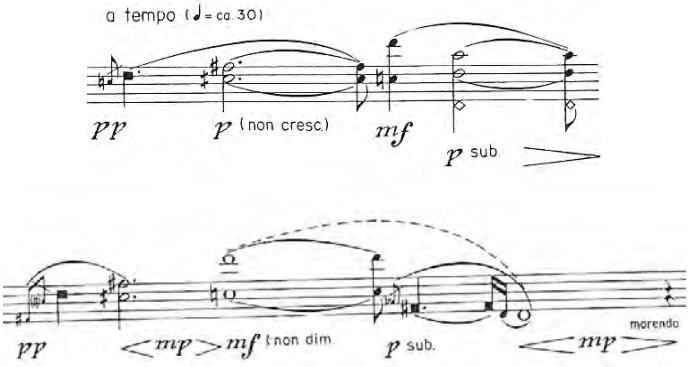

Figure 21: Phrase 3

The first appearance of altered fingering (the square D, creating a veiled tone colour)

and melodic appoggiaturas; the tone quality is a silvery grey. A seemingly extreme mezzo forte (the loudest notes so far) falls to the harmonic D multiphonic – the D shadowing the A in this instance. This phrase ends with the first straight resonant notes (F# and D): this feels so different, so amazingly comfortable, there is an urge to overdo the dynamic in the extreme, but it's p – mp, and a repositioning and release occurs as a new sound quality emerges.

PHRASE 4

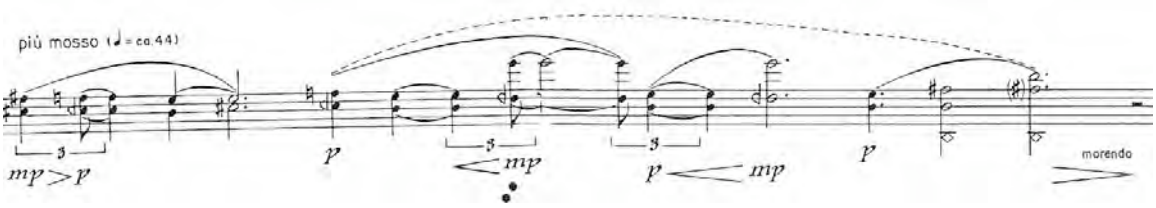

Figure 22: Phrase 4

An extended, more mobile sequence of multiphonics gives the phrase a melismatic effect. After a repeat of the opening of Phrase 2, an ascending 'motif' appears, one that returns in varied forms throughout the piece. Recognizing this structural element adds a sense of ease, and familiarity as the work progresses. Coherence and divergence claim important equal time here in rehearsal; exploring the tone colours, enjoying and exploiting the first attempts, but working and building on these to underline the emergent pitch changes, accentuated fragility, and to develop a sense of presence and shape.

PHRASE 5

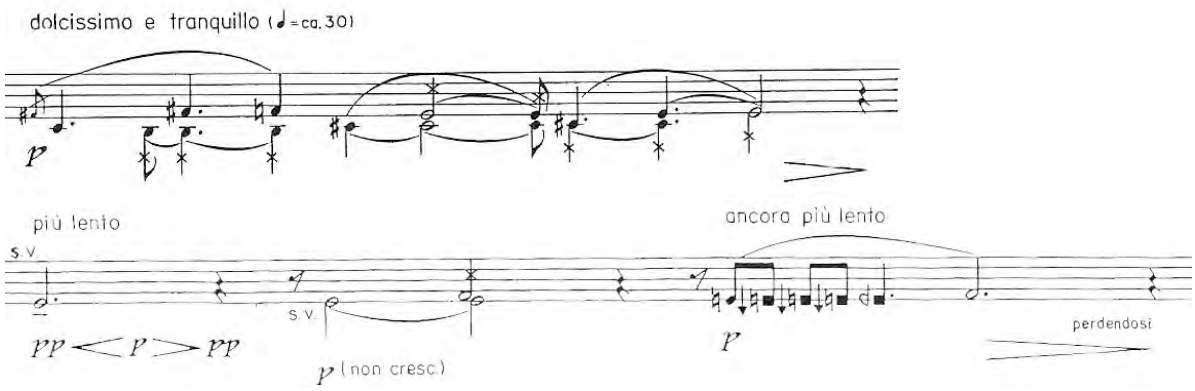

Figure 23: Phrase 5

Here the polyphony is created by a new element – my voice (the crossed note stems). This technique has an extraordinary impact: the presence of the human body is now imprinted on the soundscape. This new sound, this new dimension accentuates an intimacy that becomes derived from the sensation and vibration of the sounds and the physical shift of pitching and projection of voice that occurs. Sonic pauses appear as transitions; the vibrato-free flute tone melds with voice at a semitone – a feeling as much as a sound; a sigh-like *bisbigliando* (altered fingering) phrase circles the pitch centre (*ancora piu lento*).

PHRASE 6

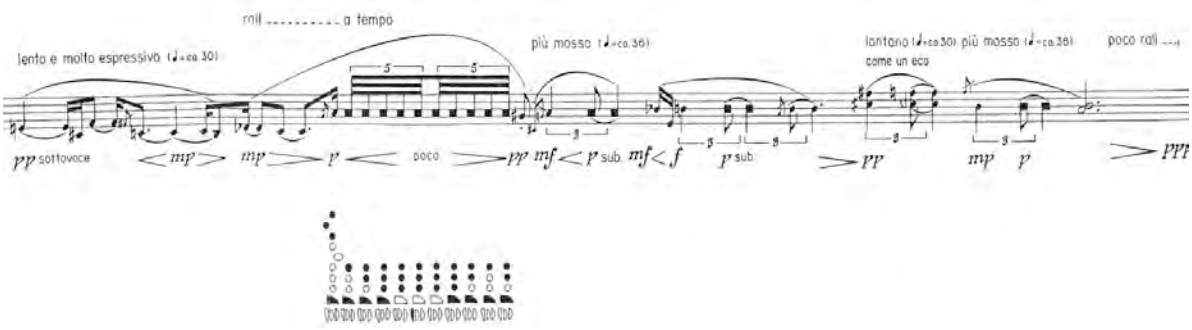

Figure 24: Phrase 6

Resonant flute, but *sotto voce* – this notated restraint is hyper-magnified by the context. The temptation is to burst into (flute) song, but this *molto espressivo* is quiet, I must again look for a new sound. The bisbigliando fingerings are notated in the score (see Figure 24, above) – creating a quick and fleeting timbre change – effective with speed and crescendo – decrescendo. The phrase then introduces the first fleeting forte, the sublimated energy mirrored by an increased tempo, a more incisive rhythm . . . but only momentarily, this glimpse of intensity dissipates into an echo, and a challengingly close multiphonic.

PHRASE 7

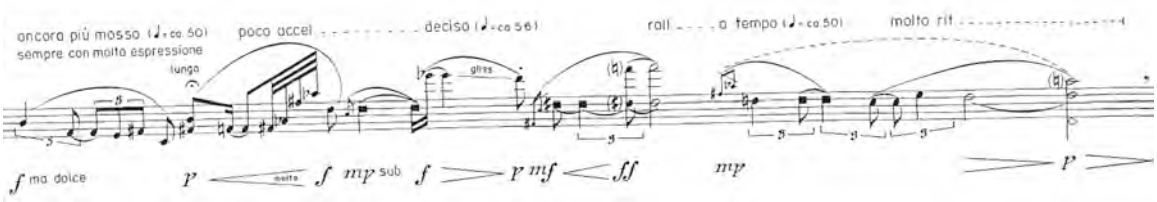

Figure 25: Phrase 7

The mood is allowed to fluctuate more widely with a mix of timbres: normal resonance, multiphonics, altered fingerings, glissando, and short motifs. Rhythmic impetus signals an approach, a hint of accumulated emotion.

PHRASE 8

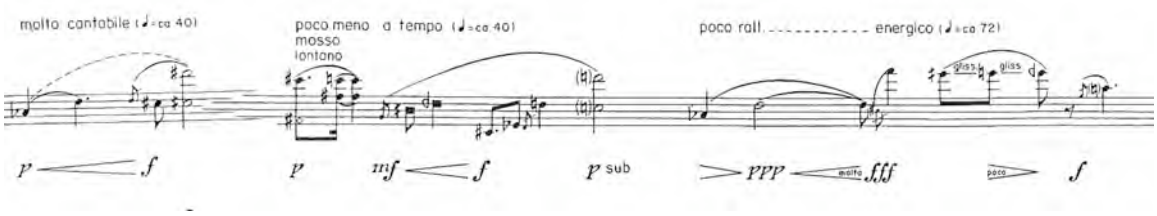

Figure 26: Phrase 8

The ascending motif, cantabile and warm moves towards the distant, microtonal, multiphonic; swinging dynamics lead to a pivotal glissando that imprints a flash of light, climactic but quickly fading. Emphasizing these shapes, sculpturing the ascent, swinging through hesitant and undulating sequences impels the music towards the suspended A. This A stands like a pillar, a culmination.

PHRASE 9

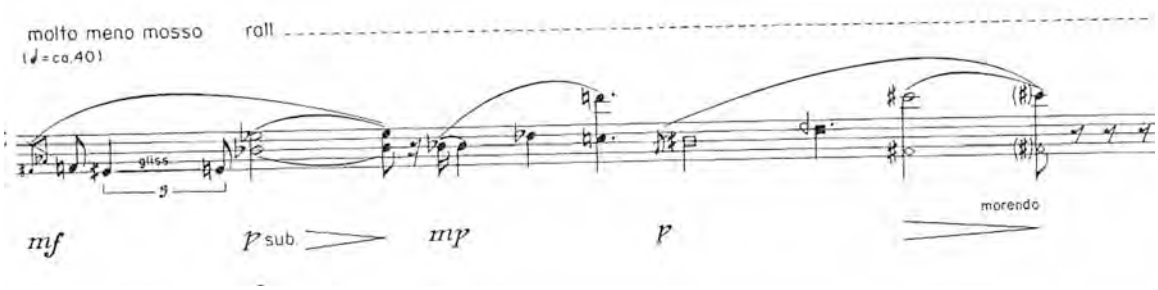

Figure 27: Phrase 9

A return to quiet reflection, but maintaining the momentum is vital within the stasis of this phrase, as the energy seems to seep away. Subtle movement and sculptured phrases with clear defined colours and intensity give the sounds a location, a purpose. Playing with reflected, purposeful gestures assists me find the connections and expression.

PHRASE 10

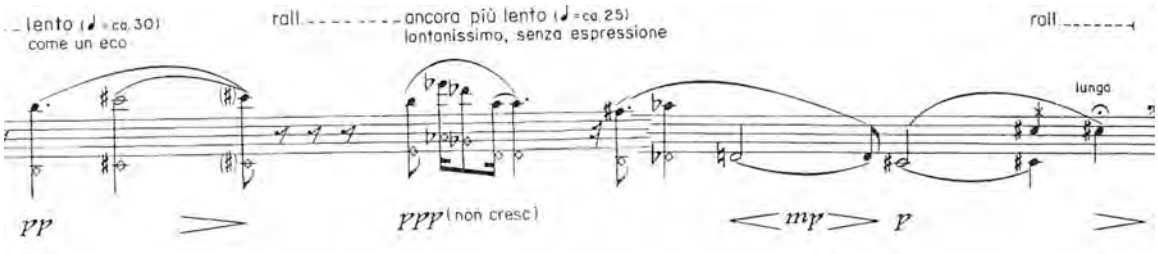

Figure 28: Phrase 10

Double octave echoes and twelfths; distant, expressionless, zen-like lines, accompanied and shadowed by the low pitches. The challenge of the octave voice pitch, which morphs into flute, forces a reassessment of the approach to vocalization, and meaning. Experimentation with the physical, the muscular mapping of the gesture, and psychology, the mind set and anticipation needed to bring this small effect off, renews this approach. That octave is so awkward.

PHRASE 11

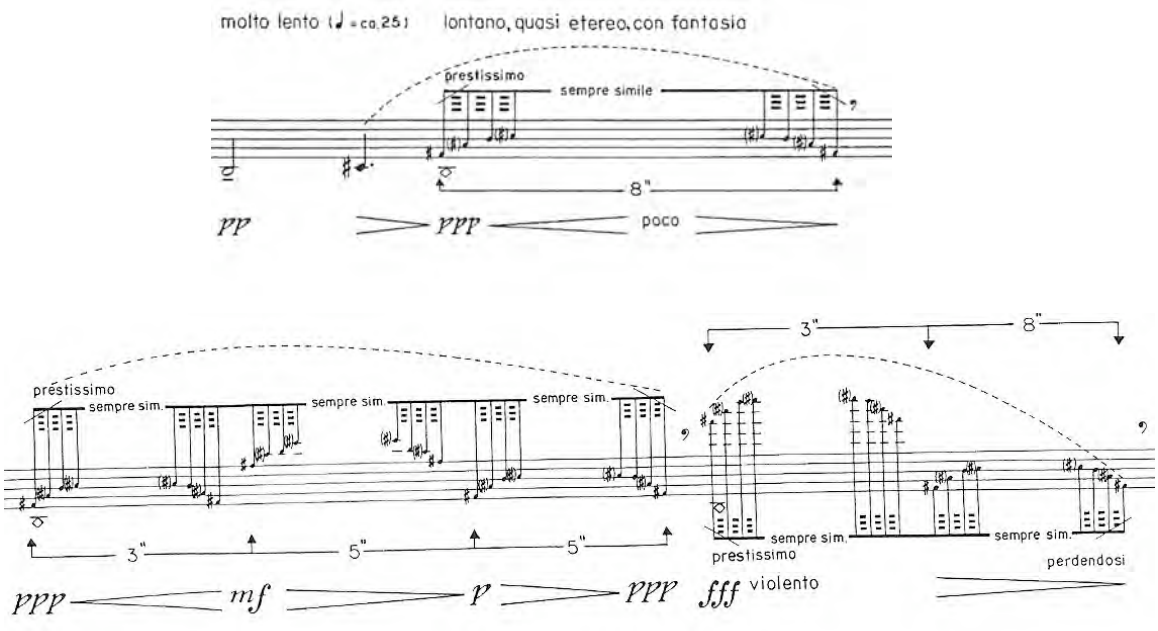

Figure 29: Phrase 11

The 'distant, ethereal fantasy' of the finger glissandi[68]; approximate pitches are permitted! This effect is startling, and builds up to *fff violento* before dying away. Anchored to low B, the focus is on creating a whirling, whooshing effect, not the detail of notation – an easier, more relaxed approach works far more effectively; the texture of the clacking of the keys – an unexpected, but not unwelcome, by-product.

PHRASE 12

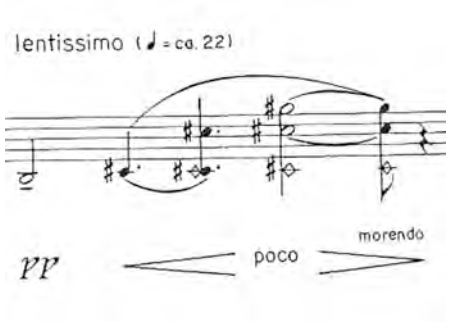

Figure 30: Phrase 12

Short build multiphonic returns mood: an easy harmonic progression, but difficult to sustain the sounds together.

PHRASE 13

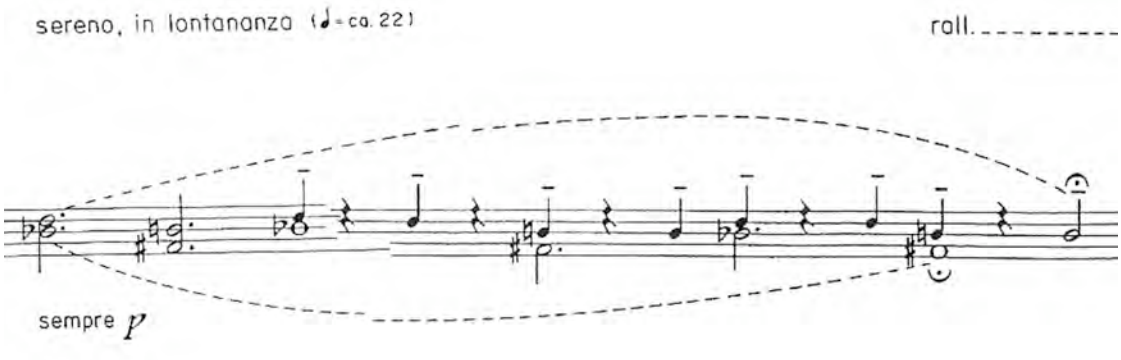

Figure 31: Phrase 13

New elongated multiphonic structures and technique are introduced, with the sustained notes underneath, and shorter *tenuto* shadowed notes detached above. The

[68] With B3 fingering, very quickly cover and uncover the keys of c, d, e, f, g, a and b, alternating them *ad libitum* so that the pitches indicated can be approximately obtained in the lower, middle, or high registers (score notes).

serenity of mood created by the suspensions and even crotchet movement conceals the performer's challenge to pitch and hold these notes whilst staying in the moment. A firm physical balance is needed, extreme control of gesture and breath, in this penultimate line.

PHRASE 14

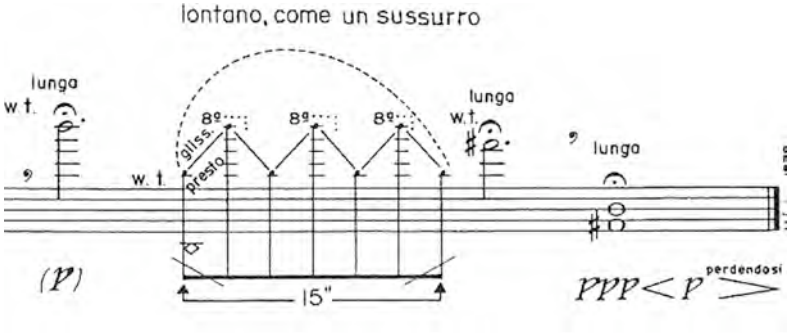

Figure 32: Phrase 15

The whistle tone sequence, beginning with a high B, very difficult to pitch, is followed by whispering whistle glissandi, extremely soft; sustained multiphonic to end, fading away to nothing. This extreme quiet evokes the peace of the surroundings, and the calmness of the meditation. The technique itself creates a physical approach that invokes intensity and focus, a setting of stillness and active listening requiring concentration, discernment and stamina. The amplification injects life into this fragile gesture, as it brings the work to its closing notes.

WARREN BURT: MANTRAE FOR FLUTE AND LIVE ELECTRONICS (2007)

Composed for Jean Penny with funds from the Australia Council for the Arts, New Work Category (2006).

Mantrae[69] is an interactive work that explores the connections between the individual and the world. Stillness and movement, inner calm and chaotic change are juxtaposed in a setting that transforms physical movement into sonic forms. The shifting relations of the self to a digital other, the responses and controls, are activated through motion capture and sound modification, using *Plogue Bidule* as the host program for the processing and Cycling 74's *Hipno* sound processing modules.

Movement and mapping: From gesture to digital processing

The most dominant performative imperative of *Mantrae* is physicality, as full body gesture activates a whole sonic world, converting gesture into digital sound. From the outside, the body becomes the visual prompt, the revealer of process, the audience informer. The meaning of the piece, the trajectory of flute chanting, the (dis)connections to the outer world become focused through the image of performer. Intensity of purpose, sensed through musculature and postures of concentration, discloses the conceptual basis of the work, the centrality of the individual within the disarray of life. The invisible presence of the transformative technologies, the motion tracking and effect triggering, are representations of perceived connection, a linking fabric between gestures of exchange.

The flute sounds are traditional at the source, resonant, articulate, and impelled. The altered sounds emanating from the flute bear little relationship to this focused flautist; they are nebulous connections, the sounds of otherness. The technology creates the communication, and the dichotomy. The overlap, the linking performance gesture is changed into the technological gesture, the sonic changes incurred by the computer plug-in software, connect movement with sound texture and timbre, the 'extended flautist' here becomes a representation of individual and

[69] Video and audio of *Mantrae* can be found at Appendix 5, Track 9.

global relationships.

The experience of performing *Mantrae* is an unfolding focus on motion and location. New balances and sensations evolve, challenging acquired performance knowledge, and merging with the desire to be completely free within this circle, to attempt to move with abandon, swiftness and grace, to dissolve into the music, to become the meditation through a semi-immersion. The movements are sharp and fast, turning with seeming unpredictability from one stand to another. There is some awkwardness, some difficulty sustaining vision of the scores, moving without unraveling basic flute playing techniques and postures. Modulating this potential for instability begins a search for greater fluidity and cohesion, a shaping of the matrix of patterns. There is a blurring of connections here, a powerful sense of separation that provokes a sense of disregard for a distracting environment and a search for control of those diversions. The performer is enclosed within a circular space (see Figure 33), introspective, self-contained, entrained within the meditation; the surrounding diversity of manipulated sounds are shifted and altered through physical gestures far removed from that world.

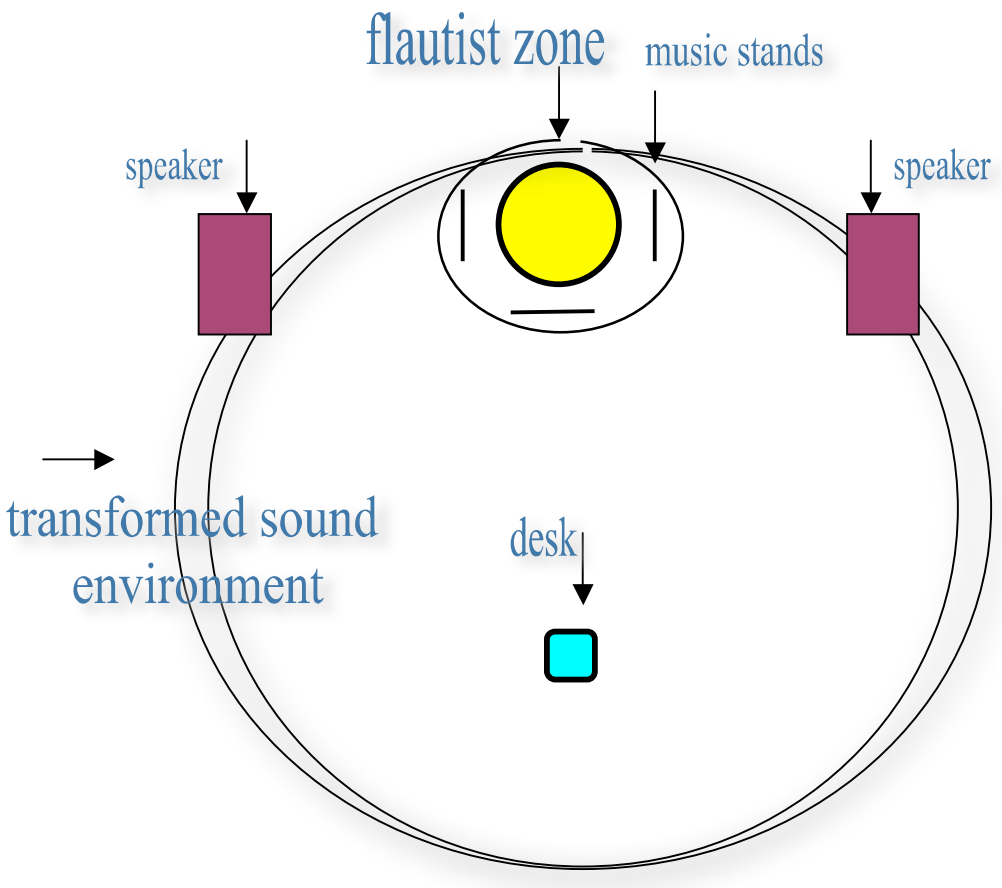

Figure 33: Mantrae performance space

An intensified experience evolves, as the desire for control transforms into a response, as the individual turns away from outside events, embracing the vortex created by the technology. The following section traces my encounter with this music, from first meeting to post performance reflections.

Pathway to performance – A personal journey with *Mantrae*

November 2006: Commissioning the work from Warren Burt is met with astounding enthusiasm from the composer, and a basic premise for the work is set by email: flute with live interactive electronics, using gestural triggering. Warren writes a page of intended ideas for the grant application needed[70]. No other word arrives regarding the content of the work, or any stylistic clues – just preferred technology, software needs and a suggested methodology for collaboration. I had played some of his pieces before, most recently the world premier of *The Wistful Armadillo* (2004) for alto flute and piano, and, of course, knew his work in general: I expected to be in for an interesting time.

Months pass, and eventually the word comes through from the Australia Council: we have the go ahead!! Software is purchased and explored, enthusiastic notes come from Warren in Wollongong, and a meeting is set up for June to work on the piece.

June 2007 in Kallista: On this day Warren comes to my house in the Dandenong Ranges, and hands me three sheets of paper – "here's the piece". . . I quickly scan

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[70] "Proposed work for Live Acoustic Flute and Real Time Electronics. For Flautist Jean Penny and electronics, by Warren Burt.

For this work, we propose to process the flute live through the computer using the Cycling 74 package of sound processors called "Hipno." These processors, which work on both Mac and PC platforms, have some of the most interesting and extreme forms of sound processing available today. Additionally, Hipno has a module called the "VTheremin", which allows video (webcam) control of any of the parameters of the sound modification. I have worked with video control of sound sources since 1987, and it's a field that greatly excites me, and that I have a fair degree of confidence with. The idea would be to set up a system where the movement of the flautist would provide controls for some of the major parameters of the sound modifications. The visual presence of the performer and the sound result would thus be inextricably linked. Additionally, the acoustic flute part would be constructed in such a way as to reflect the nature of the sound modifications occurring. Spectral analyses of some of the modifications would be used to extract pitch material the flute would play during the piece. The work would be between 12 and 15 minutes long, and would use flute, microphone, input into computer, computer, webcam, and 2 channel sound system. It would be designed in such a way that it could be set up and be ready for performance with about 20 minutes set up time. It is thus hoped that the work would be portable enough to be used in multiple performances in a variety of venues. (Burt, 2006)

through – wow, I think, this is really straight. The score looks blank, expressionless, blunt – a visual impression hard to ignore. Warren, later on after lunch, begins to chant in a loud, sharp manner: "this is how it goes …. would you like to try it?" Dadada, da, da, dadi – da … it must sound like Hindu chanting speech rhythms.

We set up the computer, sound system and the video camera that is to capture my movements as effects triggers, turning my flute sounds into amazing others. I play through, hoping to pick up some ideas – immediate issues here are tonal projection, articulation clarity, rhythmic sharpness and getting a sense of the mantra. Mmmm, that last is not happening, I will have to spend time with this….. Playing around with the sound effects (which are wild and wonderful) increases my unease – I'm sure this is meaningful, but I'm just not there yet. I dream of long days of entrainment with this piece, focusing on the aesthetic and concept – THIS will bring it to me.

The following weeks: With the sound of Warren's voice in my head, I begin concentrated explorations of *Mantrae*. At first I ignore the switching (the performer jumps randomly from one page to another throughout the performance), to concentrate on connecting with each one as an individual – to get to know it, achieve an easy confluence and discover the rhythms and pitches of each. This proves to be an engaging process, as elements surface or submerge, demand attention or drop into the background. I find myself playing them over and over, just enjoying the flow when it starts to happen, the continuity, the endlessness…. [That's it! – just let it take over, start the unfolding, the revelations, the POINT.]

The days roll by. I study the notation; I focus intensely on this. Some enlightenment comes from the accompanying composer notes[71]. We[72] add the electronics – plug-in sounds and video capturing. The electronics are still in embryonic form, to be worked up further in August just prior to the premier performance, but already give a good indication of the scope of the piece. The flute begins solo, after a static, frozen 15 seconds, starting as if already playing, with the electronics appearing after the first thirty seconds of music. Then the flute sound is processed through the plug-in effects, which are programmed to change through *Modulator / V Motion* as the flautist sets off the camera / motion sensor by moving from stand to stand. The piece ends with a return to flute solo, and a sudden jolted stop and freeze.

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[71] See Appendix 3.

[72] Sound technologist musician, Andrew Blackburn, and author.

The sounds are like none I have ever made before with my flute: they are outrageous, startling, diverse and stimulating. Where does the flute stand in this? How can I get control of the events? How do I approach a broad interpretative development? I just keep on playing and playing. Stamina and focus continue to provide the energy as the layers of meaning begin to unravel. Technological processes are becoming more apparent, and the sonic material is establishing a sense of the space, the surrounds to the chanter / flautist. Speech rhythms and articulations are beginning to adopt the character of the Indian chant. I listen to some Indian chanting on *YouTube* that doesn't seem to relate to this! Further explorations occur, but the main sound in my head is still Warren's voice and the aura he projected.

The movements, the organic impetus: focusing on the physicality of this work, I begin to draw what I can from the meaning and functionality of the gestures, to incorporate these into my playing practice and see if there will be a change in my sense of identity, a loosening of previous perceptions or an emergence of new ideas.

With explorations of body gesture based triggering of sound effects comes the imperative of movement cohesion and fluidity. A new perspective arrives, as the visual demands of twisting from stand to stand, and page to page of the music creates a different and unexpected difficulty: vision. A new sense of physical awareness develops simultaneously, as postural ideals of keeping an upright equilibrium, and optimum breathing state, are balanced with a leaning towards each page, a creation of space, motion, swirling music lines.

Repetition - repetition - repetition. Thinking of the flute in the circle of chaos. Exploring transformations of sounds as separate material / sphere. Refine, explore, evolving concept, the shaping of the musical life, responding to new perspectives. What is happening with the electronics? What is the sound technologist doing? Where are the freedoms and restrictions?

Rehearsals with full sound (August, 2007): We are in the Ian Hangar Recital Hall rehearsing the full program. The stage is blank, but spacious, the speaker arrays are far above my head. The sonorities are re-balancing in my head, the flute seems to be a silver thread, shooting through the prism, the vagaries of the sound effects seem unsettled and disconnected – but strangely enveloping and becoming closer. I explore the breadth of the performance gestures and my sense of presence in the performance space, the links to the outer field.

A week later: Warren is in Brisbane for our 'dress rehearsal'. Adjustments to movements occur – more leaning, more twirling, more freezing. Adjustments to the computer occur. An intensification of entrainment evolves from the influence of the freezes. These occur at the start, and at the end, and form an entrance to and exit from the site of the piece. This enhanced sense of place, the sharpened connection to the spaces of the movements, the rhythms, the connections to computer and sound world revitalize my thoughts and performance energy.

The next day, first performance: It's smack- bang in the middle of the recital at QCGU. The music stands are re-arranged, the camera is checked, the computer is re-set, the sense of anticipation rises: here in the presence of the composer (and various other eminent people) we are about to perform the world premier of a work that has just come off the presses, indeed some of the presses are yet to be set! We are taking a gargantuan plunge, a magnificent risk, full of excitement, and head voices saying – it doesn't *matter*. The freeze at the start is a most wonderful moment – enforced stillness, focus, the slide into the world of these *mantrae*. It goes, it plays, it happens, it twirls, it jiggles, it slides, it jumps. The cloud of effects create an envelope of otherness, the flute bears downs on the stage, chanting away in its own world. The final freeze . . . and it's done. Was I there? Did I do it?

January 2008: Warren comes again to my house in Kallista. Another great lunch, followed by a session with *Mantrae*. The software is adjusted, leaving us with a great sense of anticipation about a second performance – but when would this be?

July 2008: Second performance: Sydney Conservatorium, Australian Computer Music Conference. This time it seems that the scrutiny is on the composer – many miles away in America. The performance comes after my twenty minute talk: *Amplified breath: (Dis)embodied habitat*. This venue, the Western Recital Hall, is so easy, so comfortable, so obliging. It was very easy to feel rejuvenated here. Tempo adjustment was natural, giving a far more lively energy, the re-mastered sound effects clearer, movements easier. I feel changes occurring in interpretation, and a more fully entrained performance experience that clearly demonstrates that the act of reflection itself informs subsequent performance: "the process of thinking that informs the doing" (Kozel, 2008, p. 9). The influence of easy functionality creates a sense of completion, but even as I write this now, my thoughts of performing *Mantrae* seem to have changed radically again, so dramatically, to be on an evolving continuum: I feel impelled to perform it again and again, to re-create the scene with ever changing revelation.

GEORG HAJDU: SLEEPLESSNESS FOR PICCOLO, BASS AND ALTO FLUTES, ELECTRONICS AND NARRATOR (1987)

Duration: 10 minutes
Premier: Cologne, Germany, June 9, 1988, Carin Levine (flute)
Publisher: Peermusic, Hamburg, Germany

This analysis explores performative ideas and processes encountered within Georg Hadju's *Sleeplessness*[73]. It focuses on the inherent dramaturgy of the work, the creation of habitat for performer and audience, representations of personas and identity, and seeks insights into the meaning of the technological input in this work. The impact of the electronics on interpretation, sonority goals, performance space, physicality and identity are examined in four main sections, or wedges, that are further divided into descriptive observations and approaches to learning and performance. Hajdu's descriptive use of the term 'wedge' pertains to the four main sections of the work. The term is transposed here to represent four areas of performative investigation. This framework loosely mirrors the structure of the piece, following aspects of the 'self-similarity' ideas influencing the composition. The voiced narrative and interpolating musical episodes, and the use of dramaturgy and technology generate commentaries on learning processes and practical applications, inserted as responses through the document.

Wedge 1: The Work

Georg Hajdu (born 1960) lives in Hamburg, Germany and is professor of multimedia composition at the Hamburg School of Music and Theatre. His work emphasizes multimedia, microtonality, and algorithmic, interactive and networked composition (georghajdu, 2008). *Sleeplessness* was written in 1987, and revised in 1997, when the composer's own text was added. The software was updated in 2007.

Sleeplessness is episodic in structure, moving through sections for three flute types: low flute (alto / bass / contrabass flute), high flute (piccolo / concert flute) and middle range flute (alto / concert flute). The flautist uses a MIDI pedal to trigger 71

[73] Video and Audio of *Sleeplessness* can be found at Appendix 5, Track 13.

patches, activating the voice recording and manipulations of the flute sound. For the original version, Opcode MAX controlled the interaction between performer and computer, requiring Opcode's OMS and Apple Macintosh or PowerMacintosh to create the MIDI activated effects. The later version uses Max/MSP patches.[74]

Compositionally the piece uses the *Formelkompositionsmethode* of Karlheinz Stockhausen.[75] This, in turn, is based on Goethe's Urpflanze[76], applied to the music through structural uniformity. A wedge, with four possibilities (centre, up, down; centre, down, up; up, down, centre; or down, up, centre), is initially apparent through the use of the different flutes, and is also applied to pitch, duration and tonality (octatonic, chromatic and diatonic scales). There are 13 characters in the title, grouped into 8 (related to *less* and *ness*, similar) and 5 (*sleep*, dissimilar); the 3 syllables group into 1 and 2, and thus the Fibonacci-series (1,2,3,5,8,13) emerges (personal communication from composer, July 2007). Hadju also used this series to determine durations of pitches, bars and parts. He was strongly influenced by the self-similarity ideas of the 1980's, particularly those of Ligeti.[77] This link manifests in the S parts, which are variations of each other, and the E parts,[78] which follow the idea of a gradual transformation or metamorphosis. These parts expand through the piece to create the illusion of exhaustion due to the sleepless night. Hadju states: "The piece is very 1980s, extreme in its consideration of the material, but (aware of the semantic charge) also attempting to break away from this, longing for a more direct expression and communication with the audience" (personal communication, August, 2007).

The music was originally composed with added electronic manipulations, but without the text inclusion in performance. In the later version the text is integrated through recording. Hadju states:

> Postmodernism . . allow[s] the artwork to have a narrative facade through ornamentation. I was wondering at the time whether I could create this narrative out of

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[74] Futher technical information can be found in Appendix 3.

[75] Composition methods based on formulae; in this instance based on the name of the work.

[76] The perfect plant, a generative paradigm which governs the structure of all plants.

[77] Fractal patterns, in particular, used to generate musical structures.

[78] For further explanations of these parts and structures see Appendix 3.

> the manipulations of the material itself. I added live electronics, and the poem (which I had created independently around the same time of the composition, but had added to the piece itself about 9 years later) to facilitate this process. (Ibid)

Although the music was originally performed without the narration, the two media have been integral to the work since inception. The music, indeed, forms a commentary to the spoken text, reflecting the mood of the narrator and responding to, and elaborating on, the unsettled mood of anxiety expressed. A discourse is established following the opening narrative. The electronically induced environment draws the flute sounds out into the building, colouring the often dry playing with colour, space and innuendo. This world of electronics gives the life to the work, transforming all the elements into a dynamic dramatic work.

Performer's response: Learning approaches

At first, I am confronted with visually disjunct material. Diverse elements appear on the pages: fragments, chunks of dense notation, numbers and instructions are placed amongst portions of text. This text gives the intent of the piece away, capturing a commonality of anxious experience, setting up an arena for theatrical engagement. Visual cues draw me in, create a strong sense of anticipation, and declare the parameters of the piece.

The initial sonic impression of the work emerges as a compelling, and at times startling, array of tonal colour. The contrast of flutes (from bass to piccolo), the extended techniques and diversity of timbres indicate to me a broad range of expression: air sounds, dryness, whisper-tones, an edgy dynamic, explorations of resonance and kinaesonic energy, as well as dialogue, immersion and characterisation. I can chose which flutes to play, provided that a gradation of low to high to mid-range is used, and I discover that the software is adjustable in pitch for use of the alto or bass, contra bass or sub-contra bass pitches. The act of assembling this range of flutes creates in itself a sense of excitement and anticipation.

Working with the technology further unveils the imperatives and difficulties of *Sleeplessness*. The electronic interactivity underlines the relations of text and flute, electronics and flute, physical, mental and dramatic interchange and opportunities for challenged positioning and location. The technology drives the rehearsals towards

the discovery of changed playing methods, prioritising the articulation of transformed sounds and new balances, exploring extremes and refining nuance, physical gestures and confluence.

The extended techniques in *Sleeplessness* reveal some unusual emphases. The techniques themselves are quite mainstream in contemporary styles, but this dramatic discourse demands a distinctive focus, a continuum of anxiety. The opening section of the piece utilizes whispy staccatos, glissandi and flutter tonguing on bass flute to create spikes and twitches (see Figure 34, below), picking up rhythmic drive in an episode for air tone (see Figure 35, below). This unfocussed bass sound is somewhat wobbly and unwieldy, and the writing is scattered with disjunct accentuations and interruptions. Harmonics and multiphonics add to the uncertainty and gathering unease, and harmonisations create shadows and invisible companions. The screeching reverberated piccolo signifies the onset of panic, (see later, Figure 39) but is juxtaposed against the whispering piccolo, an unusual micro-sound that gives an impression of rustling disturbance. In practice, the sense of the music darting around the text creates a challenge to keep up the momentum, to achieve flow and balance, sharp juxtapositions, vivid images and a projection of the dramatic mood. A cohesive thread of invisible theatrical characterisation is called for, as the episodes glide (or spill) from one to another.

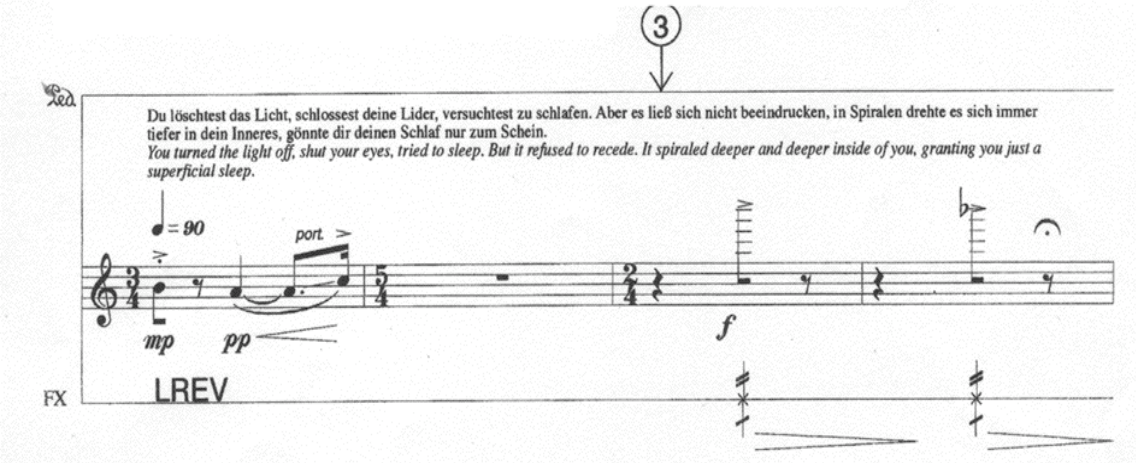


Figure 34: Opening bars, Sleeplessness[79] (App. 5, Track 20)

A dominant performative element is the function of the pedal, as it triggers sound effects throughout. This apparently simple action of pedalling, the switching and

[79] Cited with the kind permission of the composer.

triggering, conceals a powerful influence, and highlights the importance of extensive rehearsal within the technological environment. Only there can the true sense of the music be discovered and refined, the impact of physical and mental changes be felt and dealt with, the difficulties confronted, and the control and understanding achieved. Exploring, for example, Figure 35 below, one can see the juxtaposition of sharply focussed accented notes – but splayed and stuttered, achieved with variations of KTK/or TKT/or KTT tonguing – against rhythmic breath tone sequences. The movement between these two techniques requires adjustments of embouchure, throat and tongue shapes, difficult to achieve quickly. The addition of reverberation to this, however, takes this effect into a more powerful range, the player gains greater flexibility, and can relax, almost allowing the sound to self-project, depending on the level of intensity desired.

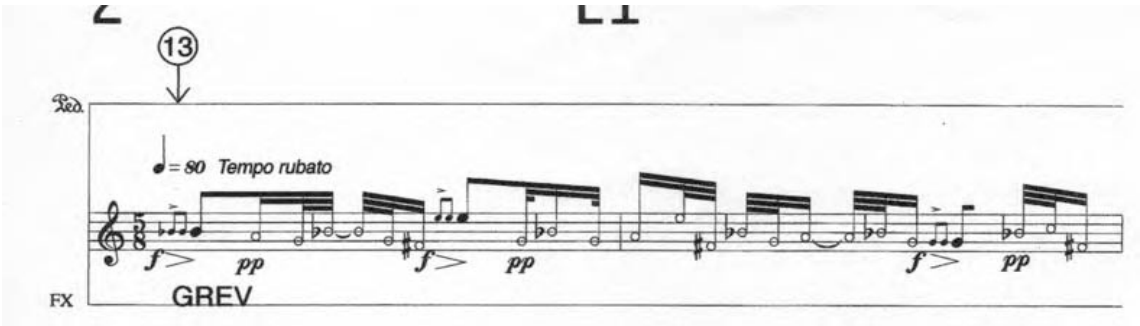


Figure 35: Bass flute air tone episode, Sleeplessness, p.2[80] (App. 5, Track 21)

These discoveries of changed physicality propel the rehearsals towards further physical goals. Achieving pedal fluency is critical to the flow of the work, the connections of the player to the drama, and the physical reality / virtual dialogue concern. The frequency of this action can be seen in Figure 36 below, where harmonization and reverberation effects are triggered in succession. Pedalling is grounded in known associated actions, such as foot stamping, but modified here into subtle, almost invisible gestures. These physical responses become embodied in musical concepts, a pressing forward, an adjunct to the rising sensations and propulsions of the drama. Aligned with the pedalling is also the significant impact on the flautist of manipulating and controlling very large flutes, or very light flutes,

[80] Cited with the kind permission of the composer.

at the same time. Getting used to it, through muscle build up and posture is fundamental, and crucial.

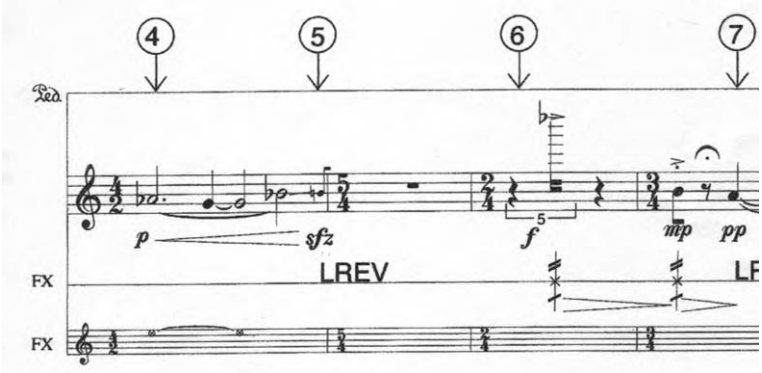


Figure 36: Pedalling notation (large circled numbers), Sleeplessness[81]

The balance of flute to electronic effects additionally challenges this goal of balance within oneself as performer. Playing techniques begin to merge with the transformations, as each phrase, each echo, matching, layering, melding and positioning of the sounds inspires innovative solutions to projection and tonal colouring. For example, pizzicato effects abound in this work, singly or in groups. In many passages they are treated with reverberation, giving them an entirely new effect: a shaking, stuttering sense is portrayed; the reflections of the notes represent sharply recurring thoughts, the agitation of the narrative. This is particularly clear in the piccolo episode shown in Figure 37, below. The physical mapping of these sounds to the body begins to feel like the sounds themselves, the twitching, spiking and shuddering.

Time in rehearsal is a valuable resource here, allowing play with techniques such as embouchure shapes and tongue striking, breath pressure to sustain varying timbres, tones and suspended motifs; time to experiment with shaping patterns of notes – the *sea of yellow and green dots* – embedding micro chunks and searching to reveal the meta structure of the work as it evolves. A luxurious immersion is the most valuable time: a whole week thinking about and trying alternative approaches to a single sound, adding electronics and discovering new nuances and meaning; taking it away again to distil the tone and search about its source; adding it back to explore the changes that have occurred. These are learning processes to treasure in this work.

[81] Cited with the kind permission of the composer.

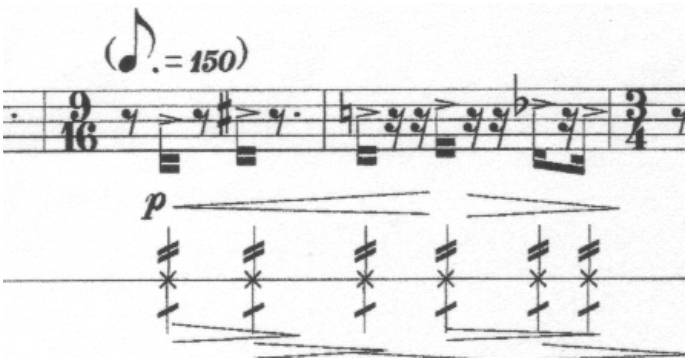


Figure 37: Sleeplessness, piccolo reverberation, p. 8, system 4[82] (App. 5, Track 22)

Wedge 2: Drama

From the first moment of *Sleeplessness*, the dramatic atmosphere is apparent. An unexpected realm comes into play through the disembodied voice (of the performer) setting up an anticipation of dialogue with the flautist as musician. The voice represents an invisible participant in this drama, without physical presence and in a seemingly separate spatial field from the performer. Anticipation of an unfolding drama about to take place, and the illusion of the theatrical space, is established through the textual reference, suggestive allusions in the musical effects and the diffused sound.

The text describes a head-voice commentary; a sense of uneasiness is immediately created with the opening words – *You'd been restless the entire day* – expressing apprehension, discomfort, and an unsettled mood: an emotional state one can immediately identify and identify with. The listener becomes situated within the house, the drama unfolding first in the living room, then bedroom and bathroom. This spatial metaphor for the psyche of the self, moving agitatedly through states (or rooms) of unease, is created through the repertoire of sound effects melded with the flute line. Anxiety is expressed through motivic, fragmented and disjointed phrases, unfocussed tone colours, angular lines, and disjunct accents creating a sense of insistence and interruption.

Instrumentation is a crucial element in the expression of these varying levels of unease. The bass flute (used in the opening episodes) creates a close, intimate,

[82] Cited with the kind permission of the composer.

feeling: you are right there with the sound, the low range implying bodily proximity. The bass is also deliberately indistinct, uncertain, disconcerting: one is left with a feeling of inner disquiet. The cellular and scattered style of the opening leads to an episode of air sound, then rapid semiquaver movement, displaced by the awkward, jerky accents. The change to piccolo could result in a greater sense of distance, but this does not occur: the music becomes the pounding heart, screaming with dread, causing visceral reactions to player and listener. The piccolo subsides into a micro instrument with whistle tones, glissandi and pizzicato. The move to alto flute towards the end signals a transition to calmer resolute acceptance. This is represented by a progression to normal resonant tone in the middle range flute. A melodic sequence appears to act as a comforter, but the work ultimately makes no resolution, the music retains remnants of questioning, and the narrative ends with an incomplete question, the issues unsolved, deferred to another day.

Performer's response: Dramaturgy in practice

Sleeplessness juxtaposes voice, flute, electronics, psychology, musical structures and literary text to evoke unsettled and uncomfortable emotions in a dramatic scene. A major performance goal is to develop an understanding of these interconnections and to give vivid expression to the dramaturgy evoked through the various media.

The episodic structure of *Sleeplessness* is very clear to see; the challenge to the performer lies in achieving cohesion with the disjunct material. Part of the aesthetic is, indeed, an awkwardness of approach, and the compositional aspects as well as the flute writing underline this. Observing the episodes sequentially, one can determine the mood progression from a state of slight disturbance, through extreme agitation, to repose and acceptance. This highly recognizable structure of psychological disruption is rather approachable, setting a familiar scene in the familiar home setting. The musical treatment of the theme is also unambiguous, with atmospheric flute tones and twitchy, shadowy undercurrents created through the electronic effects. Theatrical elements, such as the use of narrative and spatialisation of voice and flute, emphasize the mood creation, introducing multi layered music and invisible identities.

Projecting the dramatic style as a cohesive interpretation draws together the transformative effects of real and virtual elements. The virtual space is immediately established with the narration, the mood is sensed through the text and the flautist captures it through musical and physical gestures, propelling the narrative and the emotions into the scene. The power of anxiety to engulf is emulated through technological illusions in this enclosure, the sensation of emotions encircling the space, of shadows and multiplied voices, immersing and separating through the shifting patterns of the work. The flautist exploits the magnified resonances of flutes and voice, the stuttering echoes, the agitated swirls, the drawing back and forth from intimacy to observation. Incisive distinctions are demanded, as dense passages give way to fragmented passages, as the mood shifts from unease to panic and resolution. The pedalling and intensity drive the player on, accelerating and slowing, aligning physical response to the emotional.

Visceral sensations arise from every corner of this work: the intensity of the piccolo pandemonium; the jagged rhythms and disjoint accents (see Figure 38, below); disruptive breathing and diaphragmatic impulses; unstable sonorities of whistle tones and breath tones. Integrating body, voice, instrument and electronics becomes defined by the constructs and interplay, the sonic contexts in the evolution of this drama.

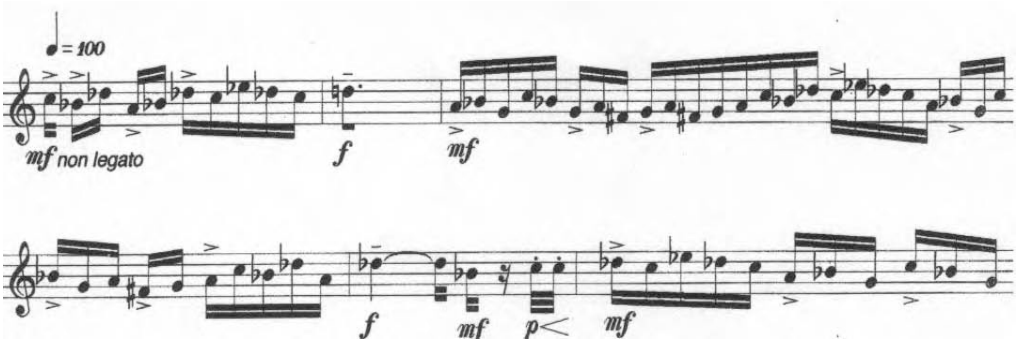


Figure 38: Disjunct accents, Sleeplessness, p.3, system 1[83] (App. 5, Track 23)

The instrumentation itself reflects the dramatic meaning of this work. The bass flute seems to envelope the performer, both physically and aurally. The fields of sound move from isolated flickering to a soundscape that is all of a sudden saturated with a dense and highly active bass line. The instrument itself is heavy, it needs space, it

[83] Cited with the kind permission of the composer.

requires an inner calm of the performer, plenty of air, but relaxed breath. The gestures of bass playing become entwined with the rhythm, the space. The sharp change to piccolo accelerates the mood to sheer panic, easily recognized and produced through the high tessitura and overlapping effect (see Figure 39, below) With the move to this micro instrument is an intensification of dissonance and inner stress.

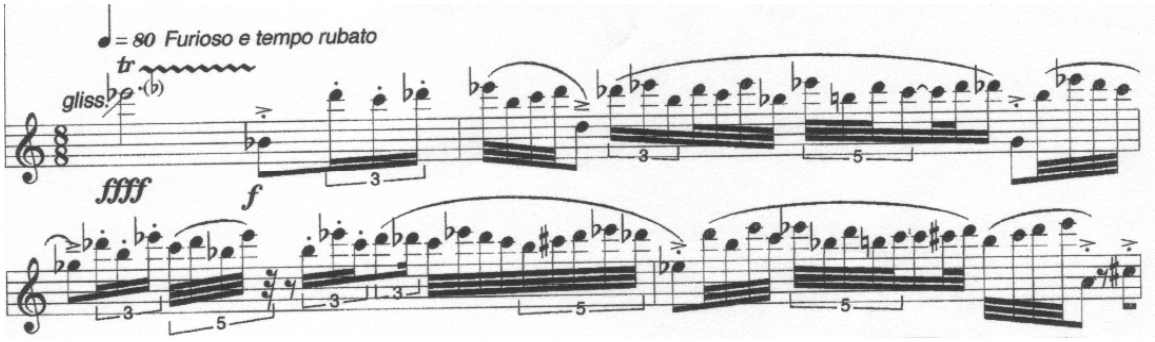


Figure 39: piccolo agitation, p.5[84] (App. 5, Track 24)

Playing the piccolo is equally intense for player and listener: the high pitches, forceful air pressure, ear tension and resultant jangling nerves creating a very clear metaphor for the panic described in the text: *My god!! You're dying! Your heart is beating like mad, your head is inside a suction cup . . .* The line dissipates, becomes shaken and jittery. The emergence of the alto flute gradually steers towards a sense of calm, of control over inner doubts and anxiety, as smoother, more melodic lines unfold (Figure 40, below). The therapy of the seamless phrase returns the focus to a beautiful sound, a pathway to resolution.

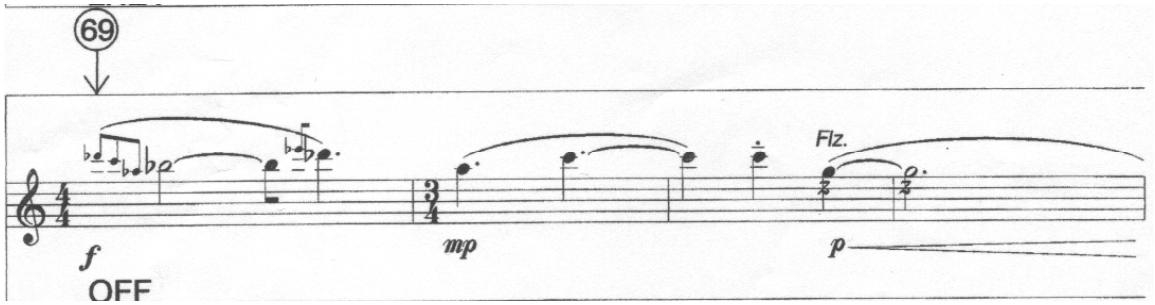
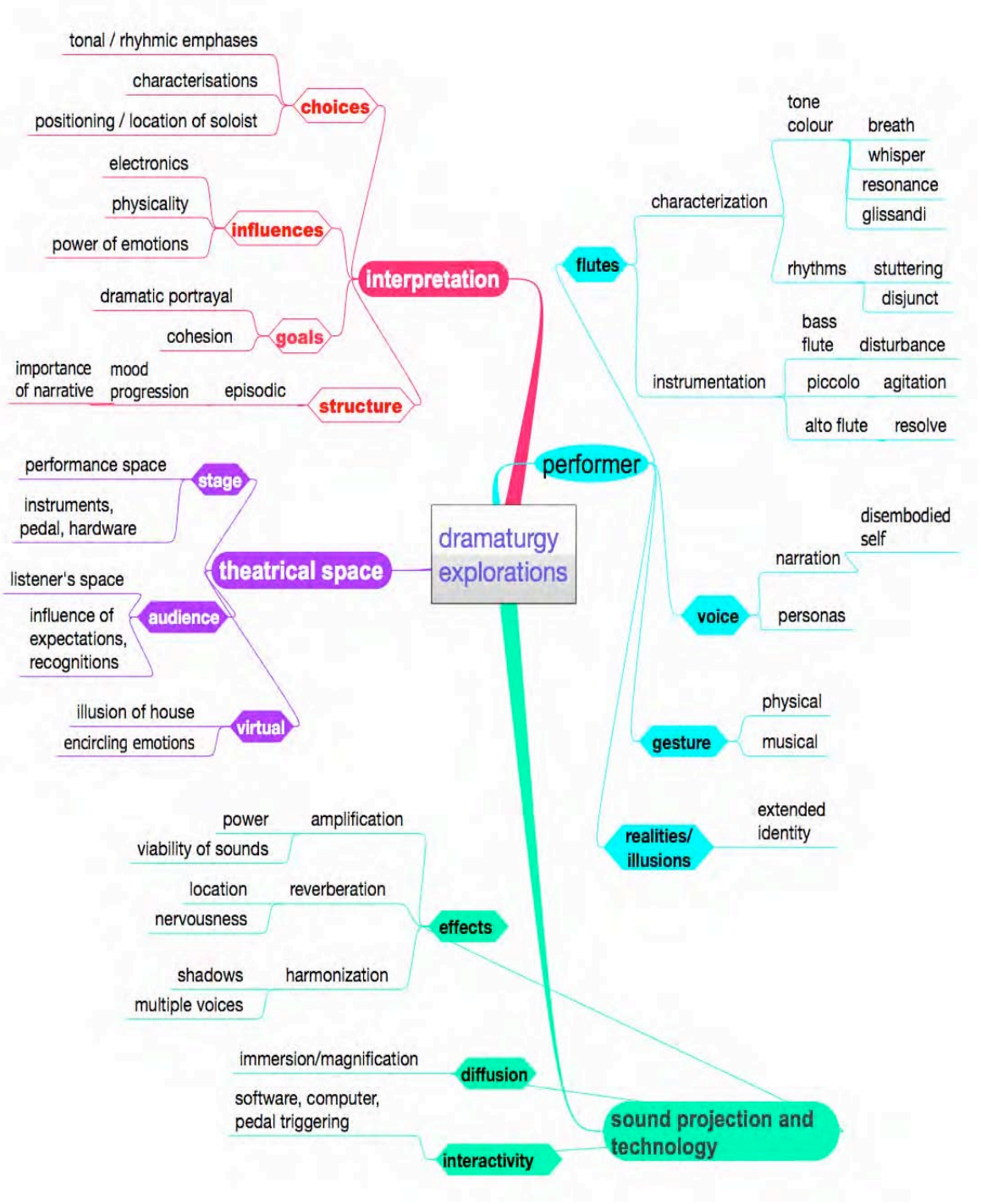


Figure 40: alto flute calm, p. 12, system 3[85] (App. 5, Track 25)

[84] Cited with the kind permission of the composer.
[85] Cited again with the kind permission of the composer.

The diagram below (Mind Map 7) shows exploratory paths of dramaturgy elements in *Sleeplessness*.



Mind Map 7: Sleeplessness dramaturgy explorations

This stream of consciousness flows from ideas discussed above, articulated here through linear representation of rehearsal elements and reflections. The process of drawing this map was revealed as a meaningful and helpful trail towards formation of musical and performative imperatives of this work. Illustrative pathways of the

expressive dimensions and goals of the work spring from the four main elements explored: performer, technology, space and interpretation. The performer is further partitioned into flutes, voice, gesture and reality/illusion components, leading towards characterization through tone colours and rhythm, instrument qualities and range, the imprint of physicality and the flow of performance activity, and the extended identity of the flautist evolving from these realities and illusions presented on stage. Sound projection and technology, the interactivity, diffusion and effects, generate the altered functionality and effects. Theatrical space is explored as spaces within themselves – the stage, the audience and the virtual – the places of change and new experience. Interpretative goals and structures come together to deliver cohesive and dramatic portrayal through choices and influences.

Wedge 3: Habitat

The development of a habitat for performance, with an ecology of functioning elements, connections and projections of artistic concepts demands in-depth consideration of both composer and performer ideals. The simple set-up diagram for *Sleeplessness* shown below (at Figure 41) illustrates the basic starting point for these investigations: the positioning of musicians, hardware and audience in performance. The areas are well defined and visible spatial relationships are clear. The real space of performance here, the stage[86], is the area of activity, the focus of attention, the visual place of the musician. The virtual space engendered through the sound placement and illusions of the rooms of the house and the head of the narrator are projected from and into the hall[87] to create the illusory constructs of the work.

The visual appearance of the performer and performance space, the readability of gestures, the context, and the formality or informality of approach influence the projected sense of place (Schick, 2006). The sonic environment created in *Sleeplessness* expands on these elements, utilizing the electronics to activate effects and to conjure up a space with enlarged fields of sound creating a sense of immersion, extending the field of activity into the listener's space, an implication of shared space drawing the performer and listener into the imaginary darkened house.

[86] The local field (Emmerson, 1996).

[87] The outer field (Ibid).

There appear to be three spatial fields: the performance space (the sound source), the listener's space (the virtual space, where illusions become constructed through recognitions and spatialised sound) and the mental space (the imaginary space – where the drama is played out).

These spatial illusions are supported by the indistinct air and whistle tones of the flute, bouncing echoes from reverberation effects, a portrayal of multiple personas through shadowing harmonizations and, tangled, agitated lines overlapping and reverberating.

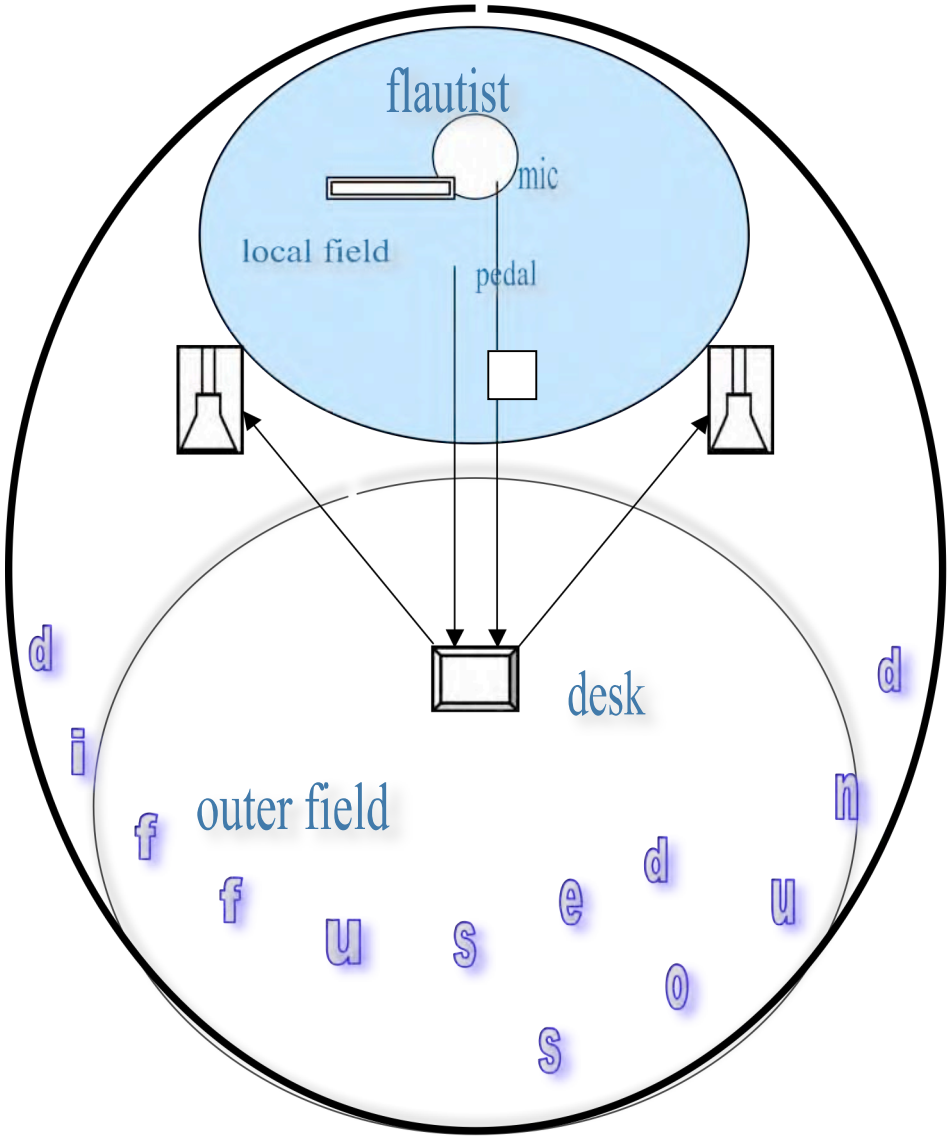


Figure 41: Set up and sound fields

Performer's response: Creation of habitat

In preparing for a performance of *Sleeplessness*, I dream of evoking a vibrant sense of place, an arena for psychological explorations in sound. Multiple flutes, loud

speakers, music stands, pedal, microphone and cables connecting to the desk will surround me. The placement of these items will determine the design: the location of sound, the location of performer and the location of audience. Negotiating this space will include managing flute changes and pedal functioning, and developing physical gestures that allow a free expression of the dramatic elements.

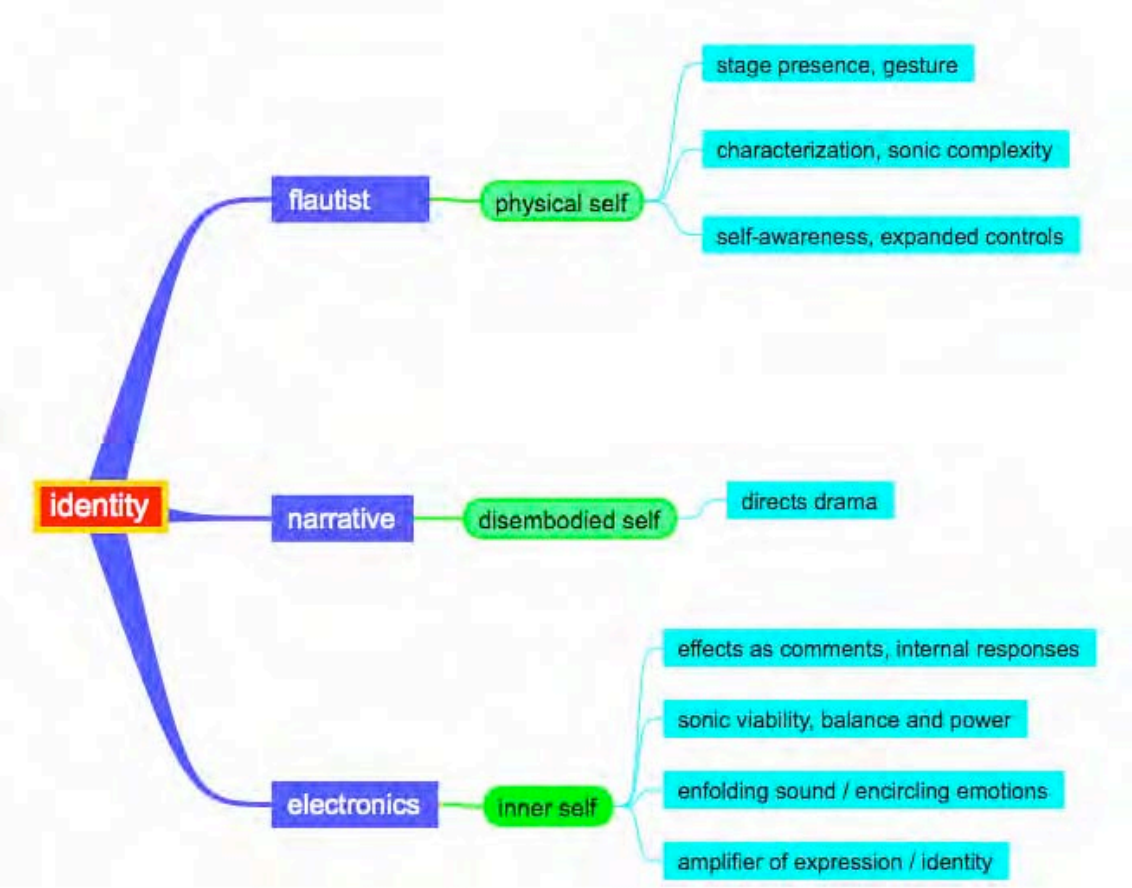
The impact of the electronics on defining this space turns out to be radical: the reverberation anchors and describes it, the harmonizations create additional presences, the virtual constructs trigger recognitions of shared life experience. Reverberation, and its absence, is a crucial musical tool: its presence creates a sense of space around the performer, a wide open head space, that at times gives way to a dry non-reverberated sound, that draws the listener in to a very close, personal head space.

The sound of ricocheting pizzicato, the rustle of whispers, the energy of sharply articulated breath sounds; all attest to the power of the microphone in this work. Projective clarity of these sounds is not possible in an acoustic situation, they would blur into a void, changing the complexion of the music completely. A sense of this power transfers to the self, and enriches the experience through a sense of performative control, and expressive competence. The impact of the voice in the space too adds further dimensions: my own voice is heard from above and in front, calling the pace of the drama. My performance identity is thus raised as a question, as it envelopes the space, interpolates and directs from the stage and throughout the hall.

Wedge 4: Personae and identity

Sleeplessness explores the multiple layers of the individual through the flautist (physical self), the narrative (disembodied self) and the electronics (inner self) (See Mind Map 8, below). Reflective of this multiplicity of selves, the musical and spoken sides of the character are differentiated both spatially in the room and in sonic content. The opening of the work introduces this other persona, the recorded voice, diffused through the hall. It becomes integrated through the flute's commentary, which re-focuses attention back to the stage and flautist; but the character of the flautist has become layered, a commentator, an accompanist, a

partner. This personality is expressed through the sonority of the flutes and the transformations of that sonority: the power of amplification (balance, viability of expression, enfolding of sound and atmosphere), the impact of the effects, artistic projection, emotionality and self-expression.



Mind Map 8: Identity elements, Sleeplessness

Performer's response: Transforming identity

The projection of the self through performing style, interpretative choices, the disclosure of inner perspectives, responses and emotions, and priorities of sonic emphasis creates a self-awareness and strong sense of position and expressive persona in *Sleeplessness*. A key objective is to define and convey the multiple dimensions of the characterisation expressed in the dialogue. The performer takes on the characters in a real way, as the musical expression becomes part of the inner and outer self, and a sense of affinity is set up.

The sonic possibilities presented serve to broaden the performer's control, as traditional sonic goals and expression are extended. Permission is granted to alter

emphases, to exploit the inexact, to abandon restraint. A physical energy takes over as the breath and body gestures are directed towards these goals, the air sounds, the whistles, the hovering sustained tones, mobile, darting figures, and sounds that embody fear through tessitura and volume. The player is thus extended physically and perceptually as the drama unfolds and performative control expands. The physical gestures become, through self-awareness and rehearsal, completely entwined with the emotionality, and the identity of the performer bound up with the physical responses and outcomes of expression.

The electronics emerge as a representation of the inner self, as both driver of and reactor to the drama. The disembodied voice tells the story, presenting the performer as invisible, character actor role. This invisibility underlines the internalization of the anxiety, and solitariness of this journey through the night. The sound effects act as amplifiers of this expression, expressing internal responses, the jangles and jitters, the magnified emotions and the dialogues with unease. The amplification and power of projection give the flautist a vastly extended field of play: the capacity to be flautist, narrator and commentator, entrained in a drama of multiple selves, to extend flute playing into unusual sonic explorations, and to control the pace and progression of the piece.

Border Crossings

The experience of performance analysis here has seen an emergence of defined connective elements encountered in electroacoustic performance. This varied appraisal of approach, response and presentation, the search for meaning and expanded understandings through the inner world of the performer brings us to the edge of this research project. In crossing over now to a contemplation of tangible conclusions, of drawing together disparate, identifiable and emergent factors opens up a new space, an unbounded arena from which to activate further research streams and performance pursuits. The following chapter presents these reflections, findings and future ideals.

PART V: CONCLUSION

8. THE JOURNEY OF UNDERSTANDING

For the most part musicians do not like to write about their work.
(Zorn, 1997, p. iv)

The Experience

This research project emerged from a fascination with intuitive aspects of contemporary performance, and the observations of the impact of electronics on my own practice. As I contemplate the collation of conclusions from this 'journey of understanding', I am confronted with conflicting responses. The last four years have seen intense self-evaluation, amazing revelation, built and dashed hopes, and a renewed search for deep engagement with music. This study is far from impartial: I have applied categories that reflect my ways of thinking, and have provided illuminations that I have chosen to see. These contemplations, the dreams and thoughts, have set their own pace: they have demanded from me time, space and patience, and clarity has emerged erratically and in surprising forms. These explorations are not finite, they may be barely measurable, but my hope is to contribute to, inspire and enrich artistic musical practice, and to share some aspects of the alluring, astounding world of new music performance. An enduring inspiration has come from the encounter with music and musicians, with ideas and new expression.

My aim has been to uncover understandings of the self and others, to develop insights into the practice by focusing on specific techniques and technologies in specific circumstances, and to determine their influences on the transformative performer. Explorations have traced the foundations of the genre – the flute sound and the microphone – and the evolutions to spatialisation, expanded sounds, expanded technologies and interactivity. The recitals created unique opportunities to construct auto-ethnographic analysis of performer responses in an electroacoustic environment; the analyses presented a defined, renewed approach that permitted a distinct variety in structure and content. Part 1 of this dissertation introduced the origins of this research, my background and impetus, and the methodologies employed to carry out the investigations. Using auto-ethnography as the primary

method, the stance from which to consider the insider viewpoint, has been valuable and enlightening. Writing in the first person, indeed, has given a strong sense of ownership of the work, and of the creation of a researcher as well as the research.

Diverse reflective procedures were integral to this research: on performance experiences, in performance presentation, about performance practice. During the reflective discourse there were many times when I peeled off layers of previously entrenched reserve, in an attempt to authentically represent the actuality. These pages were the most difficult to structure into the contours of research, as they often arose from allowing an immersion in a thought through an unrestricted stream of consciousness. This construct was thus an emergent one, developing from one thought to another, then assembled into a format suitable for the discussion – a rather entangled, slow process at times. Previously acquired knowledge, the private practice, the professional performance and teaching experience, the collective musician's intuition and understanding: all created the basis for these reflections. My performance approaches were revealed as intuitive, rather fluid processes, dependent on motivation, somewhat inefficient, and subject to myriad tangents.

Changes of emphases have occurred through the course of the project. My approach began to establish a very strong emphasis on self, as literature surveys revealed limited availability of source material directly involving practitioner research or auto-ethnography, and dialogue became difficult to extend. I also found, to my astonishment, that there was a striking cathartic effect coming from the explorations and articulation of my own responses, impelling an inward concentration which endured throughout. Re-newed approaches, developed clarity, momentum, emerging freedoms, establishment of a research position, discoveries and ownership have had a vigorous impact on my work. This could be categorized as self-development, as could the conference presentations that I have given during the degree, in Brisbane, Copenhagen, Sydney and Melbourne[88]. These have, in turn, led to some coveted publishing opportunities.

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[88] Musicological Society of Australia, Islands Conference, Brisbane, November 2007; Re-New / CMMR Conference, Copenhagen, Denmark, May 2008; Australasian Computer Music Conference, Sydney, July, 2008; Musicological Society of Australia Conference, Melbourne, November 2008.

Thus, the impact of electronics on the flautist may join the public arena of discussion, bringing people into the sphere through discourse, familiarisation, and normalisation of new elements, breaking down barriers of uncertainty in flute players, and evoking recognitions in listeners (as discussed in Chapter 1, this dissertation). In addition to this, however, these multidimensional structures, the inward focus on the microcosm of the flautist, and the journey of investigation itself have come together as a reflection of what it is to be a performer, reaching out beyond the sphere of the flautist and electronics to take on a global relevance, an essence of musical performance experience.

Findings

The major focus of the project has been to assess the impact of electronics on the flautist: this has revealed an evolving, enactive performance practice captured here as *The Extended Flautist* – a transformed and transformative entity incorporating musician, instruments, electronic devices, spaces, interconnections and sounds. Tracing the journey towards musical presentation through a narrative that gives voice to the performer, that tilts the focus inwards, that prioritizes intense observation of performance elements has given a vision of the microcosm of the flautist within the evolving meta-instrument and interconnections, performative expansions and new expressions. These elements find application and resonance in the wider field beyond the flute, the electronics and the set of musical works examined here.

The imprint of technology on contemporary flute playing has been observed through the experience of the performer. A multi-dimensional enquiry has formed, fore-grounding the performer's experience in the context of music for flute and electronics. Through the research structures outlined, and the interconnections of self (flautist), other (instrument, technology, music, composer, other performers, audience) and context (performance), new insights and understandings of the impact of electronics have emerged. These revelations pertain, in the first instance, to intimate playing perspectives and actions, intuitive responses and newly evolving partnerships and relationships. Emerging knowledge of process (both technological and academic) has informed the research, assisting the evolution of defined approaches, insights and understanding. These processes have, indeed, become part

of this research itself – the performer's transformative journey, the experience, the essence of this enquiry.

Technology reveals performance aspects that include layers in the music, hidden structures and processes, spaces in sound, spaces in the performance, altered positions, illusions, dialogue and dialectic relationships. It has been seen to additionally reveal a great deal about playing techniques, musician responses and interconnections in performance. New attitudes are provoked by these elements, and new meanings sought.

The sound

These changing experiences may begin with the element most protected in a flautist's playing: sonority. We have seen that the changed sonic environment and re-defined sonic goals emanate chiefly from extended techniques, amplification, timbre manipulations, capturing and re-playing of sounds and a new use of space. The impact of technologically altered sounds on musical meaning is vibrant with techniques such as the amplified breath sound (projecting the inner world of the performer and grainy, indistinct tones) and diffused vocalization or whispering with flute (as seen in the 'voice and meaning' discussion in Chapter 6). This magnification of the intimate to the extrinsic, and the creation of immersive environments draws the player and listener into a re-defined space. The microcosm is thus expanded, shifting the emphasis and location of the sound, and permitting the player to pursue alternative sound structures and nuances. A tremendous sense of freedom can follow, or a deeper sense of expression. Micro sounds are given validity and prominence as they are transformed into vividness, fragility and luminosity, or gargantuan others. At first an uncovering of the inner self through amplification or interactive processes can seem confronting, but one quickly accepts the change, and revels in the renewed expression. Adjusting to the new balance, the new power and the increased opportunities for subtlety or strength, for example, is quickly made. An increased sensitivity to shape and structure and an encouragement to experiment further expand the expressive field. A new sense of unfolding time may even materialize through amplification and reverberation as the past, present and anticipated future of the sounds (Oliveros, 1995) mix and project.

The body

The relation of sounds to physical actions can create a divergent, perhaps conflictive, situation. For instance, the way microsounds are heard and played shows significant disparity. Whistle tones evoke a whistle, a picture of pursed lips, a nonchalant demeanour. They require, however, a fierce but cool concentration, carefully judged minute muscular sensitivity and steadiness, both deep in the body (stomach, abdomen muscles, diaphragm), close to the aperture (open throat, shaped mouth, relaxed but directed lips) and externally (steady arms, legs, core). The means to this sound is complex, the result appears simple; the process of taking one to the other is practised.

A focus on the microcosm of performance techniques such as this inevitably leads to the highlighting of body use in performance. Technological influences increase bodily awareness in the performer, and change the meaning of movements in numerous ways. Mapping the music and performance movements to the body, as we saw, is integral to early learning approaches, and many changes can be perceived in merging these processes with electronic elements. Most obvious at the start is a striking increase in self-awareness, a magnification that co-relates to the microphone effect. Each part of the body is examined for contributions to performance. On the micro-scale, for example, actions such as hitting the flute for percussive effects imply and demand a new attitude to flute performance and the relationship to instrument. The microphone also provokes the close scrutinization of techniques, through, for example, an enlargement of the sonic effects of minute mouth movements, which themselves seem magnified with the effect.

We have seen that body movements open up a new world of cause and effect in combination with electronics, new ways to construct meaning in performance, and ways to establish transparency or obscuration. The physical requirements of movements normally associated with playing the flute may confirm meaning through gesture, but additional actions extend this into a wider spectrum. For example, using the foot for pedalling creates a new set of balancing requirements, which in turn impacts vigorously on posture, breath and playing position. These actions can highlight the sensation of the music, and create a sense of involvement for player and audience. In studying Saariaho's *NoaNoa*, the pedalling gestures become imbued with the drive of the music and the meaning of the sound effects produced. Whole

body gestures triggering events, such as in Burt's *Mantrae,* create intense focus and movement. The electronics in this case provide a setting to accentuate and embody the conceptual basis of the piece - the position and actions of the chanter within a surrounding chaotic world. Kinaesonics are thus elicited through the connective processes of the electronics, providing a tangible form to these that underlines compositional ideas. In this way, the flautist's physicality is repositioned and expanded in both appearance and effect.

The meta-instrument

Shifting emphases have arisen from the development of the meta-instrument, an inclusive array of elements forming the performing entity, and facilitator of performance dynamics. This symbiosis, or integrated ensemble, has been shown to generate changes of attitude that give permissions, controls and scope for expanded roles, expanded space and integrated narratives. Relationships of flautist to instrument, flautist to technology, and flautist to technologist are altered, adjusted and expanded in this environment. The relationship of flautist with computer may initially feel like an alien association, full of confronting and arcane features: the computer has nothing at all to do with a flute, it doesn't look like a musical instrument, and the sounds it may make, in general, may seem decidedly unmusical. The unfolding of this relationship sees a remarkable change, as a sense of other is dissipated through a developing collaboration. The computer has become the cohort, the accomplice in musical adventures, and knowledge of technological processes greatly enhances this development. The fragility of this relationship is nowhere better demonstrated, however, than when functionality fails to occur, and lengthy, exhausting delays are created finding technological solutions. The apparent oneness of performer and technology then incites questions: the energy, the immersion, the magnification, the control that comes from this powerful unit – Does it have real meaning? Is it a mere illusion? Is it a separation, a world of intangibles, without control at all?

The rhythms of exchange of this meta-instrument, where body, instrument and electronics meet, become a fully responsive actualization of virtual and real factors, developed through familiarity, an understanding of potentials and limits, and a merging of new and pre-existent performance practice. New performative patterns

are added to the body, new cognitive responses and a new sense of a multiplicitous identity is generated. This construct assimilates and extends the concept of 'flautist' through exterior, visible means and interior awareness and expression of the self. The act of mapping new movements, approaches or sonic procedures reveals divergence and oneness, fresh aspects of the self, and develops a wider space of experience, an amplified space in the room.

Essential in this network is the collaboration of the sound technologist: a title that is both bothersome and inadequate. The music for flute and electronics included in this study all required the use of a perceptive, responsive musician at the mixing desk. This partnership constructs the functional zone for performance, teams together to create ensemble and balance, carries out experimentation and aims collectively for a perfect presentation of the composer's ideals. An open approach to finding solutions, to using what works without judgement of right and wrong, of preparedness to take risks and to commit time and energy have been shown as vital priorities. The success of this relationship can provide sustenance for imaginative excursions, and encourage new angles and approaches to performance. A failure in this relationship can elicit a performative disaster.

An improvisational interlude was included in Recital 2, in order to briefly explore a contrasting world. Alto flute micro-sounds were used as a basis for real-time interaction with plug-in software effects. This episode (the only improvisation reference in this research) was a valuable digression, demonstrating the immensely different actuality of this style and providing a place from which to observe further interactive responses of flautist and technologist. The immediate sense of freedom attained, the sense of personal expression and the increased fluidity of interchange provided a marked contrast in performance style and approach: an interesting reference to the composed music performance explored in the rest of this research. The traditional elements of chamber music were here extended to the screen which showed patches of contrasting visual material to indicate changed sound manipulations. The introspective atmosphere established appeared elevated, the sound treatments mirroring the exploratory micro-sound language used in an environment of ongoing change.

Also presented in Recital 2, as a reference to another sound world, was a series of movements from a work for solo acoustic flute. The contrast of sound achieved here was partly due to the removal of amplification, and the specific delicacy of the sounds of these compositions. Some audience members remarked on the softness of dynamic, urging a full resonance, a search for an extensive range. This to me indicated a wish to place the flute in its 'rightful' place of fulsome beauty, regardless of the appropriateness of expression. Turning from amplification to acoustic presentation in performance certainly illustrated a marked contrast of delivery that demanded a strong re-focussing of mental attitude and a reviewed perspective of the hall's dynamics. The power of the meta-instrument was vividly demonstrated in these exceedingly solo, almost vulnerable, moments, and a questioning of identity arose as the accoutrements of electroacoustic performance remained silent.

Shared experience

Shifting forms such as these create challenges for the audiences through changed expectations, unfamiliar sounds and constructs, and visual ambiguities. The performance space is a malleable and adjustable force, subject to imagination and electricity, and new relationships with audiences result as diffusion, sound and performer location, components of sounds, the physicality of performance, the stillness or energy, the visible and invisible elements create different experience. Virtual space may be discreet, as spatio-dramatic effects, immersion, dialogue, the context and ensemble are familiar elements in music, but re-directed through electronic devices these change character and impact. Invisible elements such as the pitch and threshold triggering, the spatialisation of sounds and voices, and interactions with the sound technologist were shown to create a sense of mystery, uncertainty and ambiguity through veiled and implied interactions. Unawareness of the processes and misunderstanding of the intent can occur, the sense of the open or closed environment can alienate, the visual scene can be informing or confusing, the changed physical manners can surprise and provoke question. Alternatively, the audience may respond with pleasure to a repositioning of performer, to illusions of intimacy, to complex sound configurations and challenged expectations. These elements were all demonstrated in the responses to both recitals.

Familiarity looms as a powerful force of acceptance or rejection in new forms of performance, and the growth of experience seems to relate also to the growth of familiarity. Questions immediately arise from contemplation of aspects of audience reception. If the performer dares to step outside the familiar territory of flute sound, does this compromise the efficacy of the communication? Does uncertainty within the listener have an impact on the success of a performance? Do timbral alterations take away the known and bring forth questions of quality and resistance relating to levels of understanding? Anxiety and fear in the performer can be re-channelled into expressive outcomes, through experiencing the moment and listening, but how is this transferred to the listener, creating an environment of acceptance and appreciation? And is this important?

The flautist's ID

Exploring the identity of the performer (and self) as an evolving process of inner and outer elements that merge and emerge as contexts and practices change has provoked significant self-questioning and revelations of self. Cumming argues that the establishment of the 'sonic self' (Cumming, 2000) occurs through recognized tonal characteristics developed in one's practice that become entwined with the self and other's perception of a performer. The player and instrument may additionally appear as an entity, through style, interface and self-projection in performance. Accepting the instrument as an amplification of self (Emmerson, 2000) affirms this principle as the music and the performing persona are projected into the performance space. This performing persona is an evolving process of inner and outer elements, subject to context and change. Electronics add to this an interplay of here and there, real and unreal, and shifting discourse.

The Extended Flautist is a re-located, re-shaped performing persona, subject to identity shifts within changing contexts constructed through electronics. Extended flute techniques begin this expansion of acoustic sound; electronics multiply the territory still further through the new sonic capacities provided by technology. These new sounds and processes become part of a new representation of the self in sound, extending the musical choices and power of the performer. This is a permissive environment, where the performer can transform sonic goals, and project an image or

style with new characteristics. As these new sounds and techniques are embedded in the performance practice, so too are new perceptions and formations of the self.

Musical sounds are "humanly produced (with or without electronic modification)" (Cumming, 2000, p.124) and meld into the performing persona, the image of sound elicited from the instrument by a specific player. The 'evidence' of identity, or exterior identity, is this sound and the physical actions that contrive to construct that sound. Gestural shaping arises from interpretative decisions as different motions reveal different emotions. To the player, the action of playing the instrument is entwined with self-image and the musical projection of that self. Electronics extend the image into new motions, new associations and new experience.

We have seen that an enlarged sound gives the power of projection to micro-sounds, and a sense of liberation and flexibility to the player. Amplification additionally influences the perception of location through creating feelings of proximity or distance for the audience, and openness and exposure for the player. Reverberation adds to the sense of location, the reflective layers of multiple selves and mirrored identities. The impact of this on the player depends on the context, but includes a sense of expanded self in the layers, a discovery of self and an affirmation of tonal directions. Replications of the sounds through recording and play-back, layering and mirroring gives the impression or illusion of separation of the soloist into other disembodied, melded or constrasted entities. Added to this may be the use of the player's voice, for example, which creates other presences that are underlined and extended through the electronics via amplification, sound placement and other technological manipulation.

The extended flautist experience

As the microscope is taken to tone and performance, a disclosure of inner perspectives and clarification of minutiae occurs. An extended awareness of physicality arises as the attention is focused on a hugely varied scale of operation. Minute shifts of embouchure or breath, throat or fingers; large arm, leg or full body movements; these alter the balance, muscular and visceral responses, and the performer's experience is thus extended. The mapping of sounds to the body reveals the self and opens questions about priorities and emphasis. Sound movement and

interactive technologies further extend this experience, as the player becomes part of an ensemble of sounds in virtual space, merging and emerging, opposing and supporting, dominating or yielding. The meta-instrument is thus reflective of an expanded identity forming new capacities and relationship dynamics, an ecology of sounds, processes, machines and people.

The symbiosis of the meta-instrument creates intense enrichment in my personal performance practice. I relish the opportunity to explore unusual sounds, and thus unusual ideas. Invisible presences and dramaturgy elements enhance and deepen my performance as new partnerships with sound transpire and new works are explored. New procedures and adapted techniques provide an exciting, opulent artistic setting from which to encounter and realize music as performance. A list starts to form in my head about personally beneficial aspects of this research project, but I know that this list comprises just a few components of the real picture of this significant journey of *The Extended Flautist*. Here it is:

- Development of repertoire and knowledge of works in the field.
- Development of knowledge and skills with electronics, in particular interactive technologies as they pertain to instrumental performance with electronics: gesture, pedal, threshold, pitch triggering.
- Renewed approach to collaborations and performative relationships.
- Expanded approach to tonal and timbral projection, and greater preparedness to take risks with developing manipulated sounds.
- Greater understanding of using space and interactive processes for musical and dramatic effect.
- Greater sense of freedom in performance with regard to permissions for sound utilization, physical movement, interpretation, intermedia feedback and improvisation.
- Greater determination to explore detail and layers of depth in music performance as well as the interconnections of the instrumentalist to technologies.
- Expanded skills and interest in exploring and developing written responses.
- Revitalized approach to all performance, research and outcomes.
- A commitment to the narrative of the self, the journey of evolution.

This research project has additionally revealed an approach to performative writing that follows, affirms and magnifies the performer's transformative journey. A multi-layered approach is articulated here, through reference to the unfolding of the music, the journey of discovery. The music has been presented in performance, but the performances belong in a continuum of development, from idea and concept, through explorations and rehearsals, to performance and reflections. Questions and tangents have arisen along the way, often inserted as they came up, as an interruption to the prose or soundscape. This gives the research process a rehearsal/performance analogy, where ideas and adjustments are confronted within the process, and immersion, waiting and revelation have applied to each element. The unfolding of the narrative is thus given a quasi-performative shape and drive, in this quest for insight into the technological impact on the flautist.

The impact of electronics on this performative journey is in some ways incidental: it is the human characteristics that are highlighted through electronics that create the rich field of investigation. These outcomes and revelations are magnified and clarified by the electronics. The performative emphasis has given this research project its unique stance, as the nexus of electric and acoustic performance is revealed as the journey of performance itself.

The Future

Now, at the end of this research project, I have an overwhelming sense that it has only just begun, that each element of the research has been a door opening up a wealth of possible discoveries. The changing physical demands of new technologies, changing listening demands, changing thought processes invoked, the influence of voice / breath and proximity on the instrumentalist and audience, or the influence of the highly intuitive interactive technologies currently being developed (such as Antescofo[89]), suggest rich areas for expanded investigations.

The transformative potential of the musician and technology establishes the foundation of varied encounter with meaning and revelation centred on performance.

[89] A 'live synchronization system' that extends score following by enabling concurrent representations of audio streams, and allows explicit control over event temporalities for compositional and performative aspects of interactivity (Cont, 2008).

Valuable research on these facets of musical performance could additionally embrace a phenomenological approach, in which the experience of performance is referenced against philosophical knowledge. The ways in which others, such as computers, become part of the performer's thought, gesture and listening, illuminating further connections, sensations and layers of reflection. Aligned to this are explorations of the relationship of the electroacoustic instrumentalist to the sound technologist. Applying phenomenological investigations to this connective, inter-dependent and potentially rich performance practice, the meta-instrument partnership, would bring this performing entity into a sharper focus.

Of significance in an appraisal or contemplation of future pathways is the further application of the writing form that has emerged. Following the basic tenets of an auto-ethnographic form has assisted in the illumination of strands of investigation and ways of highlighting the experience of performance. This experience is an intensely personal journey; it provokes questions of a musical and personal nature, self-scrutiny and reappraisal of methodology and interpretation. Discoveries of self and relationship dynamics evolve with every encounter.

The extension of these questions into other performance and education research includes the transformative potential of the research process itself, connection to teaching practices and environments, and the employment of auto-ethnographic explorations to further understand and expand the experience of contemporary music performance.

Simon Emmerson looks towards the retention of the human essence in electroacoustic performance, and the importance of the living presence of the musician (Emmerson, 2000, 2006, 2007a). My belief is that the acoustic instrument will always contribute to music, that new expressions of acoustic music may include the use of electronics, and that the meta-instrument, the combination of these and other factors, will continue to take increasingly intuitive and creative forms. The concept of 'instrument' may transform, but the player will always exist, albeit within an evolving relationship. *The Extended Flautist* has become in my mind part of a continuum of change, reflecting contemporary experience, and new musical aspirations.

POSTLUDE

The final stages of writing this dissertation have been completed within an environment created by volatile Australian living conditions. Life here in the forested mountains just outside Melbourne in February 2009 has become a time of refocused attention, vigilance against natural forces, appalling events, evacuations and not a slight amount of unease. The bushfires and ensuing threats here have made it difficult to achieve the deeply immersive reverie most conducive to this work. I feel an acute sense of urgency to move on, and a resolve to build on this work outside this research framework. Questions even arise about the relevance of such work. These questions gradually turn to further resolve about the place of music in our lives. I come across a transcript of a life affirming speech on this topic at a critical moment:

> Remember the Greeks: music is the study of invisible relationships between internal objects . . . I expect you not only to master music; I expect you to save the planet . . . If there is a future of peace for humankind, if there is to be an understanding of how these invisible internal things should fit together, I expect it will come from the artists, because that's what we do . . . the artists are the ones who might be able to help us with our internal, invisible lives. (Paulnack, 2009, para. 21)

A week or so after the most devastating fires, an opportunity arose to perform *Canto del alba* at a commemorative gathering. This piece was programmed to represent the beauty of the forest, the experience of that intense environment, the allure of nature, and to remind people why we live amongst such potentially dangerous materials. The experience of the performance became a defining moment of connection and validity. It was my first performance of *Canto del alba* since March 2007, and returning to it revealed so much that I have striven for in this research: the revelation of the sound in the space; the embodied gestures of amplified extended techniques; the sensitivity to nuance and fragility; the uncovering of self within a highly emotive performance; and, above all, the sense that these sounds, techniques and effects were absolutely imprinted on my own self-perception as a flautist.

The intense emotional responses of the people listening, albeit in an environment of heightened sensibility, confirmed the connective power of

renewed artistic expression – not as a comfort, but by taking them into a new sound world, a new set of experiences, and in revealing a powerful connection between their internal and external lives. My work as a musician and researcher felt validated through these connections, through the ability to create spaces for sounds and thoughts, and the discovery of deeper understandings.

In preparation for this performance I worked close to the window view of my garden in Kallista: the northern hemisphere trees darkly traced against a backdrop of the gigantic mountain ash of the forest; dappled light, a slight breeze, the occasional flash of a rosella or cockatoo. The intermittent bursts of the fire siren cut across this beauty like a jagged knife.

Jean Penny, February 2009, Kallista, Victoria, Australia

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

The questionnaire was conducted by email and post in 2006, and responses are presented as follows:

Appendix 1A: Anne la Berge
Appendix 1B: Cleo Palacio-Quintin
Appendix 1C: Elizabeth McNutt
Appendix 1D: Jane Rigler
Appendix 1E: Sabine Vogel
Appendix 1F: Helen Bledsoe

Ethical clearance documentation can be sighted in Appendix 1G

Preface to Questionnaire
The extended flautist: techniques, technologies and perceptions in the performance of music for flute and electronics.

The following questions encompass many of the issues I have personally encountered as a performer in the flute and electronics genre. The aim of this questionnaire is to create a set of reflective documents that will add to the understanding of this performance style and the changes in the sonic aesthetic of flute music. The target audience is largely fellow professionals working within this and similar genres, advanced students, educators and musicologists. Composers may also have an interest in the responses, as may technologists and sound projectionists. The aim of the research is to inform the performance practice, incite change and understanding, and create new reflection, awareness and understanding.

Please feel free to be as brief or extensive as you wish in your responses to questions. I appreciate that your time is valuable, and if you would prefer to answer selected questions only, please do so. Any further comments would also be welcome.

Jean Penny

APPENDIX 1A: ANNE LA BERGE (ALB)

Anne La Berge is a pioneer flutist/composer, working her entire career with interactive computer systems, microtonality, improvisation and contemporary chamber music. Anne La Berge grew up in Minnesota, USA and has lived since 1989 in Amsterdam. She currently performs in improvisation and chamber music projects in Europe and the US and can be heard in a range of settings from modern chamber music to improvised electronic music. http://www.annelaberge.com

Q1: What are your experiences of working with electronics and flute performance?

A1: I have been performing with electronics which includes reel to reel tape and amplification since 1974. This includes composed and improvised works both as soloist and in ensembles and bands. I work currently with commercial and non-commercial hard and software for sound modification, filtering, interactive live sampling and triggering pre-recorded material.

Q2: Are you drawn to any particular repertoire, or style?

A2: I am considered an experimentalist which to me means that I am drawn to two basic processes of making art: 1) I am actively creating by taking existing means of making music and art and combining those means in new ways and 2) I work with what can be considered new musical and artistic styles.

This approach of mine falls inside the art-music or serious-music and the art-music improvisation fields. I am not a jazz artist nor an electronic music club artist.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?

A3: My approach is relatively the same when I use or don't use electronics in my setup. I use electronics as if they were part of my instrument. That is, as if the electronics, my flute and I are one instrument. In electronic setups that I most often use I need to pay extra attention to the technology to make sure that it works as well as it can. This often takes more time and attention than simply unpacking an acoustic instrument but does not, in any significant way, seem "different" than making sure my flute is working or my music stand is in an appropriate location.

When I perform with electronics, especially in improvisations, my imagination for sonic possibilities is often more awake, more active, seeing that I actually have the means to extend the sounds of the flute.

Q4: How do you keep abreast of technological advances / changes?
A4: I have colleagues that do that very well and I keep track of what they are doing by playing with them, going to their performances, or even just hanging out with them. I use the internet as a resource and I attend concerts and perform with different musicians who are true mavericks in various areas of technology.

Q5: What further developments would you like to see?
A5: Presently I would like to be able to build hardware myself, using various filters and oscillators, and be able to assemble the hardware in a flexible and transportable setup. This would be something like using guitar pedals but I would like the sound quality to sound less like a commercial and more raw. I imagine this could be done by using a kit which can be clicked or screwed together to make an individual setup for different occasions. I would like this little hardware kit to somehow circumvent soldering and the computer and be light enough to pack into my luggage with other equipment.

Q6: How would you describe audience perception of the medium?

A6: Audiences differ so greatly for each venue and event that I can only describe audience perceptions per specific setting. Perhaps you can be more specific in this question.
If you are referring in this question to a classical chamber music audience, I think that they are often pleasantly engaged given a certain sound and stylistic presentation. They are sometimes confused when volume or timbre or structure are extreme. In evaluating a public's response one needs to set up a few specific criteria to make an evaluation, such as:
style of music
style of presentation
instrumentation
use of time, volume, instruments, electronics, space, visual media

Q7: Do you know of educational courses which cater to the acoustic performer in music for instrument and electronics?
A7: Many higher learning institutions with instrumental instruction and electronic studio departments have this possibility. The notion that two rather diverse departments need to cater to students might be considered obsolete only in that each artist has such specific needs when developing a setup that suits his or her tastes and interests. I think most major universities and conservatories in the US, Australia and Europe have these departments. What tends to slow the interaction down between the acoustic and electronic instrumental collaborations are the faculty, not the facilities. Therefore, it is the responsibility of the students to build their own educational path using the resources of the institution they are enrolled in. I think perhaps all the major institutions have a recording and electronic music studio. If, by chance, the faculty is collaborating interdepartmentally, then the students have a path and a protocol that is already functioning. These institutions are less abundant and they change depending on the faculty and graduate student members and interests.

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: I will speak as a flutist. Microphone technique is a priority simply because the signal needs to be sent to the electronics. Extended flute techniques are of no real importance in combining acoustic and electronic instruments but flute technique in terms of control of pitch, volume and sonority are essential simply because these are fundamental musical elements and because it gives the flutist more control over the signal being sent to the electronics.
From playing the flute to running an electronic setup is another step where the flutist needs to make many small decisions, perhaps over a period of years, as to how involved he or she would like to be, or actually NEEDS to be in the electronic technique. One can learn computer programs, one can build hardware and software instruments to suit specific musical goals, one can pay a team of technicians and composers and crew to handle every imaginable technical details except playing the flute.
I am a hands-on person. I continue to learn new programs which will suit the direction my work is taking which range from very simple editing or midi programs to MAX/MSP. I have purchased and continue to upgrade a limited but significant amount of hardware to be able to perform with my own system. That includes speakers, mixers, computers, controllers, microphones. For the work I do, knowing as much as possible about how the hard and software functions is important and creating work using this ever-changing body of information remains a challenge.

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: When I receive a new work or I make a new work, I use the history of western music notation and performance practice as a reference. Therefore, I look for any similarities that I can find to works I've seen or heard or played in the past. Because I've dealt with a broad spectrum of styles and working processes, the assimilation seems easy to me and efficiency never seems to be an issue. I like to puzzle things out and to practice and I don't concern

myself with finding the most efficient way to work. I am interested in finding the deepest way to work through a composition, improvisation or performance art piece.

Q10: What rehearsal techniques do you employ in the preparation of electroacoustic music for performance?
A10: As the performance nears, I try to create the setup that I will be using on stage. That is, getting the physical coordination and orienting myself to how the physical setup and the sonic situation function is important. In the end I run the works many times to be able to feel comfortable and creative with the setup before I use it in public.

Q11: How do you access equipment for rehearsal? (studio, institution, own?)
A11: I own most of it. For larger groups, we rent a space that has a sound system and the musicians bring their own equipment. I am not regularly affiliated with an institution that can provide studio equipment although I am friendly with a few institutions from where I can borrow various pieces of equipment.

Q12: How do you go about trialing or developing new techniques?
A12: I dream about them. I have been experimenting my whole life and when I practice I try things out. Always.

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: The flute has a magnificent timbral flexibility. Hardware and software which can expand the timbral possibilities interest me. The flute is historically known as an instrument of speed and dexterity. Again, it is a priority to me that this bit of historic baggage be heightened. Therefore I use external hardware which can be manipulated easily and has very few CPU issues. Flutists have their hands occupied and would like to be able to switch from piccolo to flute to alto flute to whatever other flutes one has in one's collection. That means that a microphone unattached to the flutes is easier when handling the changing of instruments and that other body parts than fingers need to be used to send controlling information to the electronics.
I use:
Clavia Nord Modular – for my filtering, sound manipulation of the flute because it is compact, easily edited and has a very good sound.
Custom pedal system – developed by STEIM which, in combination with the program junXion can send MIDI to any device connected to the usb ports on the computer (and any program running on the computer) I use this STEIM board because it is light, flexible and very very handy.
Headset microphone in combination with a stand microphone. The headset is to send the signal to the FX's and the other mic is for high quality flute amplification.

Q14: How have you approached the acquisition of computer language and engineering skills?
A14: When my work demands new knowledge, I learn it. This takes time, thus my schedule needs to have some room when I am learning new material. If I need help, I either pay for a few private lessons or I call a colleague and get help.

Q15: What spatialization techniques have you worked with?
A15: Stereo and quad and 8 channel. Nothing complicated.

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: I listen in the hall for a while to see how it sounds. Most of the time my audiences are small and we are all surrounded in the sound. I am also not particularly interested in precise spatial movement. I prefer a bit of chaos or very specific sounds designated to specific speakers.

Q17: What interactive or gestural techniques and equipment have you used?
A17: I use the flute and controller pedals and have the Clavia patches programmed to respond to pitch, amplitude, timing and midi controllers to respond in a flexible way.

Q18: Do you use a modified flute? If so, how is it modified?
A18: I play on a Brannen Kingma system flute and a Kingma system alto flute. These are quarter-tone flutes.

Q19: Can you describe how playing a flute with attachments compares to playing acoustically?
A19: I don't attach things to my flute.

Q20: What new physical responses are required in the negotiation of gestural or interactive equipment?
A20: Microphone technique is very important including using distance from the microphone and amplifying different areas of the flute. Because I use foot controllers, the techniques are: 1) remembering which pedal does what in each setup 2) developing an instinct for what each controller does and how that effects the sound.

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?
A21: This is a difficult issue but with careful studio work there can be satisfactory results. Multi-track recording is essential.

Q22: How does the performance venue impact on your playing?
A22: The speakers, the hall, the placement of the public, the location of the speakers, the need and/or sound quality of the monitors all play a role in my playing. I enjoy the challenge of making a performance that integrates the situation with the musical and artistic material of the pieces.
I never expect or try to re-create what I imagine to be a perfect environment. I find the variations more interesting and each setting brings different aspects to the work being presented.

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: I work with my paraphernalia as an integrated instrument. There are always flaws. Certain aspects of the equipment interest me more and less in different phases of my career. Right now I'm working with the problem that most speakers are big black things that hang around and have such a static force in the performance. I've been taking speakers apart to let people see the insides during the performance; to give more life and personality to the speakers.
Acoustic instruments are also a form of paraphernalia in the most pure sense of the performance of music and physical expression. It is sometimes a great restriction to be holding a flute and blowing on it! What a distraction to the artworld, that silver stick!

Q24: In what ways has the expansion or manipulation of your flute sound through electronics affected your approach to playing?
A24: It has enhanced my skills to use soft and intimate flute sounds in diverse musical situations. It has given me great power to be heard in situations where the amplified acoustic flute still wouldn't penetrate the ensemble volume. It has kept my imagination vitally active in coming up with sonic material for my own work and for working with others. It has encouraged me to dare to play whatever comes to mind and to see how that can be further enhanced or changed through the electronics.

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: These are two different situations. I work with my own sound in many situations and likewise, I work in situations where my sound is altered by others. Both are very satisfying or horrifying depending on the situations.

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: Yes.

Q27: How have you approached the assimilation of technology in your performances, and how has this developed your understanding of your own musicianship?
A27: Using an electronic setup has allowed me to develop a more informal presentation style where I allow the audience to see me interact with the equipment. I stop playing, I push buttons, pedals, talk about what I'm doing, pick up game controllers, change flutes – with an ease that is more pedestrian than a typical classical music concert presentation protocol.

Q28: How does the machinery alter your perceptions and interactions as a flautist?
A28: I think I've covered this question above somewhere. The only thing to add perhaps is that I thought for many years that I was one of the guys. That is, I could carry, setup, program, use my equipment all on my own and play just as fast and loud as they could. Only recently have I deeply come to grips with the fact that I am a woman playing the flute and that is still the picture that is seen and heard by the audience. The machinery hasn't changed the audience and colleague perception of the woman-who-plays-the -flute as much as it has changed me.

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: Amplification has allowed me to be heard in many more situations than before. It has also allowed me to use some very special, wonderful, intimate sounds in settings where they would be inaudible if not amplified.

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: Absolutely not. Computers are live organisms. They are beings. They are lovely. If I had been using the computer as an instrument as long as I've been using the flute, I would be as emotionally attached to them in the same way that relate to my flute. The problem is that computers have shorter lives, we can't blow on them or hold them when we perform.

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: I just need to keep track of myself in relation to the controllers. That is, we dance together. My fingers move on the flute, my body moves to play the flute, my body moves to play the controllers. If I could have pedals built that felt as delicate and sensitive as the springs on my flute I would.

Q32: What are your experiences of working with technicians in performances?
A32: This is a book! It is always a treat to work with a technician who understands what I am working towards and who has their own special skills at making the performance even more interesting, even more dynamic. The opposite can also happen. A technician can potentially ruin a performance although that is hard to do with my setup just because I try to keep a significant part of my setup onstage and under my control.

Q33: What characteristics do you look for in the sound projectionist / technicians?
A33: Intelligence. Experience with experimental music. Ability to communicate with me and others in the project. Sense of humor. A good ear. Access to good equipment.

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?
A34: We come to an agreement over how we're going to collaborate in the performance or project. If we have a good relationship I enjoy trusting the hall mix and/or whatever is necessary for the stage tech to the technician. I would rather share the responsibility than worry about the details that I can't control.

Q35: Have you commissioned notated works for flute and electronics?
A35: yes

Q36: To what extent have these compositions included collaboration or input from you?
A36: Usually the colleagues who compose these works know me very well so the relationship implies that their is input from me. Otherwise they usually then compose the piece and we work on final details together but we rarely co-compose works together.

Q37: Is this collaboration important to you?
A37: I would prefer to have works created for me than to receive new works "out of the blue".

APPENDIX 1B: CLEO PALACIO-QUINTIN (CPQ)

Cleo Palacio-Quintin is currently completing doctoral studies in composition at the University of Montreal, Canada. She is noted for her development of, and performances on, the hyper-flute. This flute is interfaced to a computer by means of electronic sensors and Max-MSP software. Initially focussed on improvisational work, Cleo is developing compositions with the aim to create a repertoire for the hyper-flute.

Q1: What are your experiences of working with electronics and flute performance?

A1: In 1999, I developed my Hyper-Flute (a flute extended with electronic sensors). With this instrument, I perform flute with live electronic sound processing. As a composer, I am writing lots of chamber music with live electronics, and sometimes ensemble works include my instrument to control the electronics not only applied to the flute sound, but also to other instruments.

Q2: Are your drawn to any particular repertoire, or style?

A2: I am interested in new sound research, not much to traditional notated "classical" flute style. I mostly use my hyper-flute in improvisational contexts, but sometimes also to perform pieces written by myself. Too few as been composed for this new instrument until now. I wish to ask other composers to write new music for my instrument in the near future.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?

A3: For me, the electronics is used as an extension of the acoustic performance.

While working for years to control precisely each sound I produce, I developed a very special hearing and feeling for my acoustic flute sound. Each little sound becomes a complete world. I can analyse and be conscious of the micro-structure of the sound I produce. Each sound includes many components, even a simple pitch played with a 'classical' sound;
• burst of noise at the attack
• sustained pitch slightly varying with air fluctuations, lips position and controlled vibrato
• harmonics components varying according to the shape of the mouth, lips and tongue position and air pressure
• wind noise in the flute and at the embouchure
etc...

These micro-components of the sound are not so easily hearable for someone who does not play the instrument himself. The advantage of using electronics is that you can amplify them, exagerate them so they become audible for an external listener. Besides of trying to conceal the noise and variations in the sound, I prefer to use them as expressive tools.

Most of the time, all the electronics I use comes from live processing of the acoustic sound of the flute.

Q4: How do you keep abreast of technological advances / changes?
A4: I try to attend international congresses on live electronic music as often as possible. I keep in touch with the universities and artistic centers working on this topic, and receive lots of e-mails from various lists on the subject.

Q5: What further developments would you like to see?

A5: Developments are actually often going too fast and it is hard to catch up with all that is going on. I of course hope that efficient hardware will become easier to find in Canada. Electronics sensors are not much in use here yet and are difficult to get.

Q6: How would you describe audience perception of the medium?
A6: People hearing my hyper-flute for the first time are usually very impressed by all the sonorities I can achieve with it while playing by myself. Most people from the audience are curious to know how it works, and find it fascinating. It gives a complete new impression on the flute instrument.

Q7: Do you know of educational courses which cater for the acoustic performer in music for instrument and electronics?
A7: I made my first steps in using live electronics during a summer course at the Dartington International Summer School of Music in England. The trumpet player Jonathan Impett (using a Meta-trumpet extended with sensors) was teaching there together with the dutch Engineer Bert Bongers. This course was called "Interactive Electronic Music Composition/Performance". I guess that it still exists. (I attended it in 1998.)

The university of Montreal is now offering a seminar to graduate students in interpretation to work specifically on pieces with electronics.

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: Of course using a flute extended with electronic sensors is not an easy step to make. I spent years practicing to get a good control on the acoustic flute playing, and had to put years again to get use to play with the hyper-flute involving other skills of control. After several years, it became quite fluent if I keep using the same live processing software. Each time I change parameters in my interface, or perform a new piece, I have to rehearse a lot to get use to the new electronics reactions linked to the gestural controllers. It's an instrument always evolving with the software development I keep doing. I keep learning to program computer interfaces to achieve better artistic results. It's a never ending story. There is always something new to learn.

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: I play my own music, so I don't need to assimilate someone else's language.

Q10: What rehearsal techniques do you employ in the preparation of electroacoustic music for performance?
A10: First working on the acoustic flute, then adding the electronics.

Q11: How do you access equipment for rehearsal? (studio, institution, own?)
A11: I have all my own equipment installed in a nice large working space at home. I think that it is the best way to rehearse, develop my instrument and compose comfortably.

Q12: How do you go about trialing or developing new techniques?
A12: My artistic work is a constant research and development of new sounds and new music.

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: I play with a Shure headset microphone witch I like a lot because it is very sensitive and placed very close to the embouchure. It is perfect for the type of sound I wish to get for electronic processing, and I never get any feedback problems.
Since I started to play flute with electronics, I always used a MacIntosh portable computer to process my flute sound using Max-MSP softwares. (I never wanted to have to carry heavy hardware effect processors that are more limited.)

Q14: How have you approached the acquisition of computer language and engineering skills?
A14: When I realised that I really wanted to get into computer music, I went to the Royal Conservatory in The Hague (Netherlands) to make the Sonology course. There I learned all the basics of computer music and some engineering skills I needed to develop my hyper-instrument. Since then I keep learning by the practice, and also do some formations when I have opportunities to do so.

Q15: What spatialization techniques have you worked with?
A15: I mostly work in stereo diffusion settings when I perform hyper-flute. I prefer then to have too small speakers close to me so that the acoustic sound and electronics comes from the same direction.

When I do music for multimedia performances or some compositions (sometimes including the hyper-flute) I often work in quadraphonic diffusion, which give many other possibilities, but changes the relation with the acoustic sound.

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: Not only spacial, but simply the balance between flute and electronics is very difficult to gauge. I never hear what the public is hearing. When I play, my acoustic sound is very loud and right in my face. I always need loud enough monitoring of the electroacoustic sound to hear it. I want the public to hear a good combination of both, but it is always difficult to know if the balance in the hall is good, as I can never hear it. I have always recorded my performances, so I could hear how it sounds from the hall, and now I trust my experience (and-or a good sound engineer) to gauge the balance. A good colleague knowing your sound and music is always a precious person to have in a hall during sound-checks.

Q17: What interactive or gestural techniques and equipment have you used?
A17: My self-made hyper-flute and a Microlab Interface, transforming the sensors data into midi protocol to send it to a computer (with a midi interface)

Q18: Do you use a modified flute? If so, how is it modified?
A18: See my article "The Hyper-Flute" in Proceedings of NIME-2003 for complete details on the sensors installed on my flute.

Q20: What new physical responses are required in the negotiation of gestural or interactive equipment?
A20: Most of the sensors I use give very few haptic feedback while playing, but when the link to sound parameters is well done, the sound result is the reference. The physical response needs to be rehearse as much as it is for acoustic playing.

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?
A21: I did not make professional studio recordings, only live performances recordings. When good equipment is used, they are quite satisfactory. I prefer to have the reality of live performance in front of an audience, mostly for improvised music. Studio recordings are not very appealing to me.

Q22: How does the performance venue impact on your playing?
A22: The acoustics, the sound system placement and monitoring in a venue changes how comfortable you are for hearing what you play. There is much more variations possible then if you play only an acoustic instrument. I try to use my own monitors as often as possible, so I can get almost the same sound reality I have in my rehearsal studio and be more comfortable. That is impossible when you are touring, so you have to be flexible and get use

to the new venue very fast (sometimes with a bad quality sound system). It's part of the game of using electronics. For me it does not change my acoustic playing and musical intentions.

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: I am used to it. I don't notice it anymore.

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: My own sound includes electronics alterations. It is part of my flutistic research.

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: Yes, see question General Experience #3

Q27: How have you approached the assimilation of technology in your performances, and how has this developed your understanding of your own musicianship?
A27: Integration of technology as been part of my practice since my first professional concerts and came naturally to me in my research of new sonorities. It is an important part of my musicianship.

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: The sense of control of the sound is different. You don't just control the acoustic instrument, but also have to deal with loudspeakers. It's a completely different sonic reality, but I never wonder about freedom.

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: This is a very complex and endless question. Maybe my doctorate thesis will answer some aspects of it.

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: I designed my hyper-flute trying to use the most natural gestures for a flutist, so the kinaesthetic feelings are similar to the ones whilst playing acoustic flute. There is of course some new ways of moving, but I simply add to learn to deal with them through rehearsing with my hyper-flute.

Q32: What are your experiences of working with technicians in performances?
A32: I mostly try to control everything myself. Technicians not knowing my music cannot really know what sound I look for, and generally, they never have heard something reassembling it. So it is always difficult to make them understand what I want.

Q33: What characteristics do you look for in the sound projectionist / technicians?
A33: Besides of technical professionalism, their artistic sensitivity makes all the difference in their understanding of my sound quest.

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?
A34: Depends of who it is. Sometimes it's easy, sometimes it's a nightmare. Keeping myself the maximum control on my sound is always the 'safer' solution.

Q35: Have you commissioned notated works for flute and electronics?
A35: Not yet, but I will.

APPENDIX 1C: ELIZABETH MCNUTT (EM)

Virtuoso flutist Elizabeth McNutt discovered her passion for new and adventurous music almost as soon as she began playing. She has worked with such recognized figures as Pierre Boulez, Brian Ferneyhough, Harvey Sollberger, Cort Lippe, Philippe Manoury, Russell Pinkston, Roger Reynolds, Joji Yuasa, and Joan Tower. Particularly drawn to the new sound worlds of electronic music, she collaborates intensively with composers and technologists to create groundbreaking works for flute and live interactive computer systems. In 2005 McNutt joined the faculty of the University of North Texas. http://elizabethmcnutt.net

Q1: What are your experiences of working with electronics and flute performance?
A1: I've been performing with interactive electronics for 12 years. Commissioned at least a dozen new works for flute and technology (or piccolo). Have collaborated with countless composers; and released a CD of flute and computer music

Q2: Are your drawn to any particular repertoire, or style?
A2: I prefer interactive to fixed media; I enjoy more "experimental" works than "traditional". I also love to incorporate extended techniques with technology.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?
A3: In general, I view working with electronics as a sort of chamber music. However, the approach varies greatly, depending on the piece – the technology, the mic-ing, the style, the notation.

Q4: How do you keep abreast of technological advances / changes?
A4: I am more interested in good music tha 'good' technology. I've noticed, though, that composers who interest me are often pushing new technologies forward. I also attend conferences and read journals to keep up.

Q5: What further developments would you like to see?
A5: More flexible systems for score following. More interesting 'relationships' between instrument and tech. Better notation. Better flute mics!

Q6: How would you describe audience perception of the medium?
A6: Young audiences love it. Classical/traditional music lovers think it is weird (but like it better than expected). New music fans like it.

Q7: Do you know of educational courses which cater for the acoustic performer in music for instrument and electronics?
A7: At my university, students typically sign up for the new music ensemble to have me coach them as they work with electronics. A new course here will bring performers and composers/technicians together.

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: Too numerous to mention. My article in O.S. goes into this. Practicing with the tech is essential – many flutists don't. Also understanding how these interfaces work – what they are supposed to do – helps me to give the computer what it wants.

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: I work with technology in improvising, but I guess I don't really understand this question. Sometimes the language I hear is different that that intended, but it always works

out for the best.

Q10: What rehearsal techniques do you employ in the preparation of electroacoustic music for performance?
A10: Rehearsing with the tech early on in the process. Lines of communication with composers/technicians. Collaborating is the best! Also, looking for non-traditional solutions. Also, depends largely on the piece.

Q11: How do you access equipment for rehearsal? (studio, institution, own?)
A11: I own a great deal of it. For certain pieces, in the past, I've had to borrow machines (for ex., Manoury's Jupiter used to be only workable in the SGI or 2 ISPWS!).

Q12: How do you go about trialing or developing new techniques?
A12: Playing (playing also as in fun) in the studio. Experimenting. Talking. Dreaming.

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: I find working with computer preferable. But I am more interested in the composition/collaboration than in the gear itself.

Q14: How have you approached the acquisition of computer language and engineering skills?
A14: I'd like to, but haven't had time – too busy playing the stuff! I absorb a lot, though.

Q15: What spatialization techniques have you worked with?
A15: When touring, I keep it to stereo because that often taxes the venues enough! I've also don 4 and 8 channel pieces. Spatialization isn't a huge deal when you are standing at the front of the stage.

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: I walk the hall in sections I don't play. I am very uptight about getting the sound right. I try to have some I trust in the hall work the mix.

Q17: What interactive or gestural techniques and equipment have you used?
A17: SGI, ISPW, Mac, NeXT, sometimes running like freestanding hardware. Torque sensors, up to 8 foot pedals, MIDI. Pitch trackers. Up to 4 mics.

Q18: Do you use a modified flute? If so, how is it modified?
A18: I sometimes use an internal head joint mic.

Q19: Can you describe how playing a flute with attachments compares to playing acoustically?
A19: Attachments make it heavier, and change the balance. Can also alter the response and resonance of the instrument.

Q20: What new physical responses are required in the negotiation of gestural or interactive equipment?
A20: It depends on the equipment and the piece. There is no 'one size fits all' way to deal with it.

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?
A21: Yes – many times. The results have been OK. Its difficult to get the blend right, sometimes.

Q22: How does the performance venue impact on your playing?
A22: In every way! Just like 'traditional' music. The difficulty is that it can be hard to hear how you sound – mic and all – in new places.

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: Very much so. I try to minimize my set-up (fewer stands, reduced score, mic away from face, no monitor, etc). I try not to worry about it – and be as present as I can be for the audience's sake.

Q24: In what ways has the expansion or manipulation of your flute sound through electronics affected your approach to playing?
A24: It certainly encourages discipline – work towards a flawless tone, clean articulation and fingerwork, quiet breath. The microphone only exaggerates any weakness in one's playing.

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: Both – it depends on the context!

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: Yes, see question 1#. But also, interpretation of acoustic works can be influenced by trends in electronic music.

Q28: How does the machinery alter your perceptions and interactions as a flautist?
A28: It depends on the context. I haven't found a "one size fits all" way to play any kind of music, electronic or otherwise.

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: Freedom, not so much (problems of prosthetics, etc.). But power, yes! Certainly amplification and technology enables me to present a greater variety of musical styles, timbres, etc.

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: It varies greatly from piece to piece, composer to composer. However, overall I approach it as chamber music (traditional chamber music is itself varied).

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: My experiences with gestural controllers have been thus far limited to rehearsals and improvisations, so I don't know how to answer this.

Q32: What are your experiences of working with technicians in performances?
A32: Varied – sometimes horrible; sometimes fantastic.

Q33: What characteristics do you look for in the sound projectionist / technicians?
A33: Collaboration is key! Also, I need to trust they understand what I need, what sound I want, etc.

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?
A34: I try to work with people I trust! I always credit them in program and verbally. This issue can be so problematic, and is typically mis-understood by many.

Q35: Have you commissioned notated works for flute and electronics?

A35: Yes, many times.

Q36: To what extent have these compositions included collaboration or input from you?
A36: Most are collaborative works. This is how I prefer to engage in the commissioning process, acoustic or electroacoustic.

Q37: Is this collaboration important to you?
A37: Extremely, see above.

APPENDIX 1D: JANE RIGLER (JR)

New York based flutist, composer, educator and curator known for her innovations in new flute performance, techniques and unique musical vocabulary, Jane Rigler is a featured performer in contemporary music festivals throughout the U.S. and Europe as a soloist as well as within chamber ensembles. Jane's compositions cover simple solo acoustic pieces inspired by language to complex interactive electronic works that pay homage to painting, poetry and dance. http://www.janerigler.com

Q1: What are your experiences of working with electronics and flute performance?
A1: I started out, in about 1990, playing flute and tape pieces. Gradually, I began to work with the composers who were involved in interactive computer software designs. I have been working with interactive computer works (some hardware electronics) since approximately 1993. Before 2002, I was an interpreter, usually collaborating with composers and sound designers. Since 2003 I have been composing my own scores using Max/MSP. I still collaborate with engineers and composers, and quite often need their guidance as I create new interactive environments. I have also created a new triggering/control device to attach to the flute in order to interact with the computer in a more elegant way than with pedals or other controlling devices.

Q2: Are your drawn to any particular repertoire, or style?
A2: I'm most interested in sound environments that melt together the acoustic flute with electronic sounds, becoming some kind of hybrid musical language or sonic environment. I'm less interested in "dialogues" between machine and human, and more captivated by the combination of sounds, and electronic music that becomes "organic" and very controllable by humans…yet the aspect of creating electronic music that is also it's own "entity" and incorporating a randomness and unpredictability is where I'm also heading. I'm also interested in music that envelops an audience, so surround sound or multiple speaker pieces are the most intriguing for me. I'm very interested in music that you can literally feel. I wouldn't say that I'm only interested in that kind of electronic music though.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?
A3: Not much difference. I don't see any reason to approach playing acoustic music differently than playing music that employs electronics. Each time I play I use the same techniques. The body is used the same, so physically as well I see no difference. Though, perhaps, with the aid of microphones, I can play more softly and the audience can hear more of the intimacies of the instrument….I will think about this question more…it's an interesting one!

Q4: How do you keep abreast of technological advances / changes?
A4: This is very challenging, indeed! It seems that every minute there is a new change. I can't keep up, it's impossible. Occasionally, I'll log onto various Max/MSP forums online, surf the web to find some answers and interesting new developments. But I find the best way to stay abreast of the newest changes is by talking to other composers and engineers and constantly asking questions. Whenever I can, I go to concerts, festivals, lectures and demonstrations.

Q5: What further developments would you like to see?
A5: Hmmm. It's all going so fast already! I guess the best thing would be to have wireless capacity more accessible. It's coming…so I'm not too worried.

Q6: How would you describe audience perception of the medium?
A6: That varies tremendously on the audience and where they are from. I've been incredibly surprised with the acceptance of electronics in places where at first people were extremely cautious and reserved about it, to the point of warning me about how people may

not like it. Then, during and especially after the concert a huge crowd gathers to ask a million questions. Performing with electronics is like magic—people love magic and want to know the secrets.

Q7: Do you know of educational courses which cater for the acoustic performer in music for instrument and electronics?
A7: Well, I know that classes at universities here in NY offer courses in interactive performance with electronics. NYU for one. I believe Mills College does in California, and perhaps University of California, San Diego. But I don't know of specific courses or who the professors are. I'd like to investigate this myself, so this is a good question!

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: There are so many!
Flute techniques include: any of the same ones you might find in standard repertoire, but quite often composers who write for flute and electronics are also interested in "extended techniques". These include: circular breathing, key slaps, singing while playing, multiphonics, microtones, etc.

Physical gestures are added while playing w/electronics. If you play with pedals, there is a the "choreography" required: looking down at pedals and balancing your feet while you are managing to play into an air microphone (one that is not attached to you, for example).

Microphone technique is another world: it is important to know the microphone you are playing with. What kind it is (dynamic vs. condenser); how far away you should play, how close is too close, the angel it sounds best, you have to check for hard articulations (just like when you speak); the EQ of a microphone (a good relationship with the sound engineer is a must!) must be checked; check the angel also for air blowing, perhaps you need a screen for the mic.

Controllers: There are many ways to control electronics. Pedals were mentioned above. Some people use keyboards, or midi interface devices. I have designed my own trigger system that I attach to the flute. This has required a bit of practice to hold the flute and balance it a little differently while I play. It didn't take me too long to get used to it though.

Computer programs themselves are new techniques. For me, this is an ongoing process. It takes time away from the instrument, and I feel this is important to do. If an instrumentalist decides to go into electronics, it must be understood that a lot of additional time will be spent on learning a new instrument…

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: This is very broad. First, I cannot compare how I approach a new score versus an improvisation. They are two completely different things to me. Improvisation is improvisation. In performance, improvisation has nothing to do with composition for me. How I approach improvisation has to do with many years of improvising, and going through many crises. How I "assimilate the language efficiently" in improvisation is by improvising A LOT. It's the only way. Improvising, for me, must be done without electronics first. I must first have my playing in control in order to let it go. Using electronics comes after. But I must also practice improvisation with electronics so that I understand that language as well. As for a new score, I also have to practice it a lot. Dissecting a score is the best way to assimilate it for me. Then finding where the phrasings are. I was told by others that the music of my improvisations can often also sound like complete phrases. So I guess I work in those kinds of "classical" patterns, no matter how new, complex or seemingly scattered a piece may be. This is hard question to answer without a specific score in mind.

Q10: What rehearsal techniques do you employ in the preparation of electroacoustic music for performance?
A10: If I'm playing a score, I make sure I have plenty of time with the composition without the electronics first. I must first be completely comfortable with the flute part. Often, however, the flute and electronics is so integrated that one has to play both together, from the beginning. The sound system in my room must be set up so well, so that I can hear myself and the electronics equally well. This is important. If I can't hear myself, I tend to force the sound out, and that is not the way to practice/perform anything. I make sure that I am balanced (standing comfortably), that I am comfortable with the microphone. The practicing environment should be very similar, physically, to the performing situation. Since we cannot be certain of many performance situations, I sometimes make it difficult for myself in the practice room. Once I am comfortable with a piece, I begin to prepare for any kind of situation. I might purposely put the volume down of the electronics, or my own sound, so that I can't hear things very well. I might put on other music to try to distract me. Doing things in the practice room that make performing more difficult has been a technique I learned a long time ago, when I was competing… I've done all sorts of weird things (even practicing while riding a stationary bicycle)… it makes getting on stage a breeze.

Q11: How do you access equipment for rehearsal? (studio, institution, own?)
A11: I own and borrow everything I use. I have acquired a lot through several generous friends.

Q12: How do you go about trialing or developing new techniques?
A12: I'm fearless. I have no problems sounding bad, at least in front of myself. I imagine a sound, a place, an object…anything, and I work on making my instrument be that thing, sound, object, place. I don't care what it takes to make that sound, how I look, what it might mean. I just do it. If I want to do something I just do it. If it is impossible, then I try harder…sometimes, in performance, I have NO IDEA how I did something. I just hear it and it comes out….magic. But I guess it has taken me many years to get to that point.

Another good way to develop new techniques is that I play with other musicians who push me to approach my instrument in totally different ways I might not imagine. I search out these kinds of musicians. I don't want to play buried in my own dogmas. I want to constantly evolve.

Another good way to developing one's own style is by recording yourself improvising. Listen back without judging. Take notes of what you liked and how you played something. Notate it. That can help.

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: This is a very personal question. What works for one person maybe horrible for another. I've used hardware in the past, but now I use the computer exclusively. I do this for efficiency and dependability, and for quality of sound. I just enjoy it more. Not everyone will agree with this. I use an Apple computer, Max/MSP, Pluggo plug-ins, and various microphones. My favourite microphone is a DPA 4088, headset mic…but it's super expensive! I don't own that, but I borrow one whenever I can. In the meantime, I use a Shure SM58. I always use a screen of some kind. I've scratched my headjoint a bit from microphones.

Q14; How have you approached the acquisition of computer language and engineering

skills?
A14: Yes, I'm learning…it's a long haul, up hill. But I've applied for artist residencies and have been lucky enough to receive a few, so I've been graced by working directly with computer engineers.

Q15: What spatialization techniques have you worked with?
A15: Whenever possible, which isn't as often as I'd like, I use four speakers. I can control the spatialization from my flute trigger system and incorporate that control into the Max patch that I use. I use spatialization sparingly. It is a way to create an environment/sound space. It's a way to allow the audience inside a sound environment.

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: This is usually very difficult. While I'm practicing, I try to have four speakers near me and close to me. This is still not the same as in the hall. It's going to be different. It takes time to become comfortable with the fact that you WON'T hear everything they hear. It will always be different. This is not any different than playing acoustically in a concert hall either, for even then, you cannot really be in control of what people hear. I have to trust that my work with spatialization will work, and I ask people to listen during sound checks and rehearsals. This is an on-going process for me. I'm still learning.

Q18: Do you use a modified flute? If so, how is it modified?
A18: The modifications that I've made to my flute is also the "interactive equipment" that is referred to in the previous question. I have designed a triggering device that, at the moment (it's going to be modified again, soon!) utilizes 5 tiny push buttons that are attached to a small circuit board that can be temporarily attached to my flute with mounting tape. Two of the triggers go under the g# key, and the other 3 are placed under the f key, next to the right thumb. These triggers are then attached by wire to a midi-tron (developed by Eric Singer), which is then attached through a midi interface and an audio interface (I currently use a MOTU 828) and attaches to my computer, using Max/MSP, a graphic interactive software, where I use custom patches. The triggering device is temporary. I can attach it to the flute only when I need to. However, I am currently working with Bick Brannen at Brannen Bros. flute makers, to design a more permanent (right)thumb platform where I will have the triggers attached. This process has just started so I cannot say exactly yet how this will turn out. It should be ready by January 2007, though. It will be put on the new quarter-tone (Kingma system) flute that is currently in production by Brannen for me. So by next year I will have a quarter-tone flute with a triggering device attached to it. It will either be wireless or a small plug will be attachable to the platform so I can attach it to the miditron whenever necessary. But the flute could be used for playing tradition music too.

Q19: Can you describe how playing a flute with attachments compares to playing acoustically?
A19: It's heavier and the balance is more challenging. I have to take breaks a little more often, so I don't develop any strain issues.

Q20: What new physical responses are required in the negotiation of gestural or interactive equipment?
A20: See #7 above

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?

A21: Usually I record electroacostic music in 'real-time', that is, I don't record portions and then edit/mix the recordings. This way, the recorded version is a performance, which always has a more fresh quality about them.

Q22: How does the performance venue impact on your playing?
A22: The venue/space is like another player to me. It's extremely important to the performance and interpretation. If I play in a large concert hall, versus a small art gallery, versus an ancient church, versus an old barn, versus a tent in the middle of the mountains, versus an old prison on an island, versus in a theater (all of which I've done) , there are obvious repercussions to how I respond to both the music and the audience. The answer to "how" a venue impacts me is long enough to be several pages. To make it short, I can mention several parameters that are affected:

relationship to audience depending on proximity
lighting (whether dark or light)
smells in the room (dampness, undecipherable fragrances, dryness, etc.)
temperature (too cold, too hot)
reverberation or not
whether I can hear myself and those with whom I'm playing
creaking floor
ambiance noise
these are just some factors that affect the music.

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: It depends. Usually I don't find it distracting b/c it's part of the show. BUT, if I'm playing and the equipment is large and bulky, and the possibility of tripping over wires becomes a hindrance, I find that putting the equipment as far away as possible, or stacking the equipment on top of each other can help. I bring nice towels or table clothes to cover things, and I cover and collect the wires or tape them down as much as possible.

In general, this why I built my trigger system: to avoid the ugly visuals and awkwardness of all the equipment.

Q24: In what ways has the expansion or manipulation of your flute sound through electronics affected your approach to playing?
A24: Well, I've been thinking about electronics for a long time. Even before I played w/electronics, I studied it. When I learned Berio's Sequenza, I was already thinking about how my sound could be more electronic-like. Now that I play with electronics, I think my sound has changed a bit, but not too much more than before. I think it's when I don't play with electronics that I notice I'm playing differently. I'm trying to capture those sounds acoustically that I make electronically. It's quite a challenge, one that I'm up for.

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: I'm constantly trying to evolve my own, acoustic, sound. I use electronics to create a kind of magical environment, but I don't rely on them. I enjoy playing acoustically even more now.

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: Yes, see above answers.

Q27: How have you approached the assimilation of technology in your performances, and how has this developed your understanding of your own musicianship?
A27: Yes, I usually give performances of both acoustic works, as well as electronics. I rarely only give performances exclusively of electronics works, or I do that when it's specifically

an electroacoustic festival or the focus is interactive media. The development of my musicianship has been constantly evolving…I think this happens whether or not it's because of diving into electronics or not. It could have been Baroque music techniques, and my musicianship would have evolved and developed… However, electronic music has made me think about form and structure in NON western-european ways, more non-linearly, more multi-dimensional, now. I'm thinking more about texture, colors, space, ambience. I'm thinking more about intentionality versus non-intention, about light versus dark, about machine versus nature and all the implications of what it is I'm trying to say. I think about storytelling in a totally new light, especially non-linear story-telling and how new sounds, never heard before, might evoke new emotions and situations…

Q28: How does the machinery alter your perceptions and interactions as a flautist?
A28: I'm not quite sure how to answer this. The flute is a machine. Adding more machines can be intimidating. At least for me, it was and still is. But if I ask for help, there are plenty of people who want to help and guide me.

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: I have a love-hate relationship with spatialization. It can be a sense of freedom, and usually is. But it can also be over used and totally out of whack. If I use it sparingly, it does give me a sense of freedom.

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: Like I mentioned before, it is a new, hybrid language. It is ONE, united voice. This is how I treat it.

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: This also has to do w/my sense of balance, which I mentioned earlier.

Q32: What are your experiences of working with technicians in performances?
A32: I think I've experienced all types: the condescending ones, the respectful ones, the helpful ones. It seems strange, but the most knowledgeable ones are usually also the nicest and most humble technicians.

Q33: What characteristics do you look for in the sound projectionist / technicians?
A33: People who want to COLLABORATE! I'm looking for being on a team, to create an environment. Even if I work with someone one time, for one day, I see us as being a team. If I don't have that, it's a bit upsetting, and I do my best to try to get them involved somehow.

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?
A34: I try to get them involved by asking them questions about what they like, what they hear, how would they make it better, getting their advice, asking questions and being straightforward with what I want and need. I always try to bring as much of my own cables as possible, and I try to make sure that before I even get there, they know what I want and what I expect from them (a really good, clear rider is essential).

Q35: Have you commissioned notated works for flute and electronics?
A35: No, not from others…yet!

Q37: Is this collaboration important to you?
A37: Yes, it is. Though I haven't commissioned works from others, I do play other's scores, and I love being able to talk to composers and work out with them (again, collaborate) what works best for their works.

APPENDIX 1E: SABINE VOGEL (SV)

Born in Munich, Sabine Vogel studied jazz-flute at the Anton Bruckner Conservatory in Linz, Austria. She focuses on sound and improvisation, using extended techniques both acoustic as well as electronic, creating a very personal contemporary language for the flute. She has a busy concert schedule with performances in Europe and throughout America, working privately in group ensembles as well as collaborating with New Music composers. http://www.sabvog.de/

Q1: What are your experiences of working with electronics and flute performance?
A1: I work since about 5 years with flutes and electronics. For my own pieces and projects I work with a special microphone in the flute and some electronic devices like foot pedals – delay, pitch shifter, wahwah, Volume pedals etc...sometimes I also use the computer.
Working with composers - they mostly use samples of my sounds and treat them. Mainly they use the program Max/Msp

Q2: Are your drawn to any particular repertoire, or style?
A2: No, not really. I play improvised music and composed music, theatermusic, music for dancepieces. I also played in an avant-garde pop project.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?
A3: With electronics it is easier to make very quiet sounds hearable. Some of my sounds are very quiet and in an acoustic context almost not hearable. Also in projects with loud music I'm able to come through with the electronic sound.
Sometimes it's nice to be noisy and loud as a flute player – contraire to the prejudice of "being a fluteplayer" and playing soft and nice

Q4: How do you keep abreast of technological advances / changes?
A4: I'm bad with this. Still working with a very simple set up…
Also I sometimes think it's even good to have limitation and keep the focus on the music and not the technology.
But nevertheless I'm aiming for some new stuff. What I kind of like with the pedals is the physicality. Playing not just with hand also with the feet.

Q5: What further developments would you like to see?
A5: For me personnel I would like to have equipment, that's very easy to use without hands, which means by foot or some kind of sensors. I know that this exist somehow, but I haven't explored it yet…would like to, but it's always a question of time and money as well.
The equipment should also be not very big, so that it is easy to travel with.

Q6: How would you describe audience perception of the medium?
A6: I think there is a scene, but quite small.

Q7: Do you know of educational courses which cater for the acoustic performer in music for instrument and electronics?
A7: No, not really. Mostly it is just courses for electronics.

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: My way of learning is always try and error. I use little microphones that I'm putting inside the flute. The microphone I is connected to a Volume pedal, so that it is controllable and I can switch it off, when I'm not using "inside" sounds – which means when I want to have a real flute sound – acoustic flute sound. I also have a normal microphone for amplifying the flute in a normal way also these sounds can be treated by the foot pedals.

For my own compositions I use the computer on stage. I prepare the pieces with the program Logic. I use the tracks almost like a score.
Unfortunately I haven't had the possibility to try out gestural controllers.
I started to work a little bit with the program "pure data" which is a little bit similar like Max/Msp, but I'm in the very beginning.

I never ever made a course or something. I learn by trying out things and working together with people, who have experience.

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: It's the same like practising each new piece or improvisation. You have to get to know the piece, the sounds. You have to practise how and when to push the buttons…

Q10: What rehearsal techniques do you employ in the preparation of electro acoustic music for performance?
A10: Like I said above. I look at the electronic devices like an instrument and you have to practise them and to know them like your instrument. Also when you play together with somebody using electronics, treating your sounds, you have to rehearse together like with any other instrumentalists as well.

Q11: How do you access equipment for rehearsal? (Studio, institution, own?)
A11: It's mostly my equipment, but I always try that are active speakers or a P.A. in the rehearsal room. Maybe also a mixing board. But the rest I carry around or I rehearse at my working space.
Sometimes I also have the possibility to work in a studio like at EMS in Stockholm. Also with composers we mostly work in studios (like EMS or the TU studio in Berlin)

Q12: How do you go about trialing or developing new techniques?
A12: For me it is very important finding time just to play around and searching for new material and techniques.
Very often it also happened playing in the rehearsal room with somebody, that I'll find something, getting new ideas. At home I then can work them out.
The best is always having time and space, which is sometimes very rarely…

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: It's always hard to handle with the feedback problem. But I use a lot a delay pedal with a Volume pedal. I think Volume pedals are very useful, because then you have a good control about the Volume of the electronics and it's easy to vary the intensity and volume. Also if you work with feedbacks it's very necessary.

You always need a very good signal for the effects, for me it's easier to use the effects on the – I call it inside microphone – than using them on the normal, because in this case you very often have a feedback (which you don't want to have)

Q14: How have you approached the acquisition of computer language and engineering skills?
A14: I had a tiny little bit education in engineering in my music studies at the conservatory in Linz/Austria. This was mainly using a P.A., but also a little bit working on a computer. In these days I worked with an Attari. This course I just had for one semester.
After my studies I worked as a sound designer for a movie company.
I worked there in a student job, kind of research for photomaterial for a CD Rom. Then they needed somebody for creating sound for the CD ROM and because I told them, that I am a musician they gave me the job. So I had to learn in a kind of pressure situation to work with a (pretty easy) sound program – forgot the name - on the computer. Later I bought my own Macintosh computer and the program Logic and did quite a few CD – ROM productions for

them.
In this context I once also worked together with a drum and bass producer, I learned a lot about the programm "logic" from him and some general engeneering skills

Q15: What spatialization techniques have you worked with?
A15: Nothing extraordinary. Just sometimes, several microphones each are connected to a speaker in the room, so that I could send the sound through the room. Also in a context of a composition by the Japanese composer Shintaro Imai we had an 8-channel output

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: I think it's quite nice for the audience to sit sometimes kind of "inside" the sound, being surrounded by it. This could be a much more intensive experience, than just hearing the sound from the stage. But sometimes it's also nice, just using stereo or also to make sure to hear the acoustic sound as good as the electronic. It always depends on the music and on the intension.

Q17: What interactive or gestural techniques and equipment have you used?
A17: Nothing yet.

Q18: Do you use a modified flute? If so, how is it modified?
A18: No.

Q19: Can you describe how playing a flute with attachments compares to playing acoustically?
A19: It doesn't feel always so connected to the instrument than playing just acoustically. Sometimes you have to take care, that you not "play around" too much. You have to keep the focus on the music and not on the technique…

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?
A21: Yes

Q22: How does the performance venue impact on your playing?
A22: Actually it has quite a big impact, concerning the sound. And the sound has an impact on the playing. Sometimes. If you have an acoustic with reverb, which is nice for playing acoustic it's very often difficult with electronics. You get very easy feedback…

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: No, not really. I got used to it. It's just much more work, than playing acoustically.

Q24: In what ways has the expansion or manipulation of your flute sound through electronics affected your approach to playing?
A24: Difficult to answer. But maybe I practise less the "real" fluteplaying, which I sometimes miss. But with all this electronic stuff you are quite busy…. I always try also to play acoustically – concerts, rehearsals, sessions, so that I feel balanced.
With electronics I don't feel so much as a fluteplayer anymore – depending my own music. I feel more like a composer and musician in generally.
I do feel like a "fluteplayer", when I work together with composer and play written music. (Hope you understand the difference)

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: It really depends who is the one who got the sounds and works with them…but mainly I prefer to be independent and responsible for my sound. The set-up I use at the moment is,

that I have my own mixing board and the soundtechnicien just gets the sum of my sound. In the project ”A big dog in a small package” I work with both. It is hearable what I do with my sound, but I also give it away to the laptop-player who works with it and creates something new with it. This is the concept of the band.

It’s also different when I play music by somebody else, then I’m the flautist, the interpret and accept what happens with my sound. But as I said you have to trust and appreciate the work of the other person otherwise it feels not good…

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: I guess so. But not conscious.

Q27: How have you approached the assimilation of technology in your performances, and how has this developed your understanding of your own musicianship?
A27: I think I have been interested in this since very long. As a teenager I always played in bands (Rock, Punk) and I always was looking for getting out of this “flute cliché”. And I always wanted to play my own music and not just written music. This was the reason why I studied jazz and not classic. Lucky me, I had the chance to have classical lessons as well at the classic department.
The next step was getting into the world of sounds and extended techniques, which sometimes almost sound already like electronic music and I guess from this way of playing it is not so far adding technology.

Q28: How does the machinery alter your perceptions and interactions as a flautist?
A28: As I said above, I don’t feel so much like a “flautist” I look at me as a musician. And you have to know your skills, meaning your equipment and sounds.
I think with the machine you really have to take care not to get kind of “lost” in it, which I mean playing around with it and then forgetting a little bit to listen to the music and to see/hear what is necessary, what is not. You really have to be aware of it.

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: It is not possible to answer this question in general. Sure, sometimes you have to be amplified, otherwise you wouldn’t be hearable and sure, that is more freedom, more power. On the other hand if you have a sound technician, who is not used with working with flutes or creates a sound, that you don’t like (eg. putting too much reverb on it or stuff like this) or if you are not able to hear yourself on stage (which happens too often…) than you don’t have power at all……

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: I just had a few experience with this. The flautist is the source and the machine does more less the “main” sound. It really depends, if the acoustic signal is still hearable or not…

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: I don’t have any experience with that.

Q32: What are your experiences of working with technicians in performances?
A32: Very different. With some it’s great to work, they respect you and some think they know many things better…
You need somebody you can trust and then it’s good**.**

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?

A34: Like I said above, it always depends with whom you are working. If you trust and appreciate each other's work, then I have no problem and I trust the people I'm working with. But if it is not so, it can be very frustrating.

Q35: Have you commissioned notated works for flute and electronics?
A35: No, but there were notated works commissioned from other institutions for me and e.g. Malin Bång and Shintaro Imai and me.

Q36: To what extent have these compositions included collaboration or input from you?
A36: A lot actually. Both of them, Shintaro and Malin worked with my sounds. So, we went in the studio and recorded a bunch of material and they worked with it, created the electronic parts and also the notated parts.

Q37: Is this collaboration important to you?
A37: Yes, because it is a possibility to look at my sounds from a different side and I think this can be very interesting. For example they combined some sounds that I didn't think about like this

APPENDIX 1F: HELEN BLEDSOE (HB)

Helen is a native of South Carolina (USA), currently living in Cologne, Germany. Since winning first-prize in the 1996 Gaudeamus International Interpreter's Competition for Contemporary Music, she has had an active career as a soloist, ensemble player, teacher and improviser. Since 1997, Helen has been a full member of the ensemble musikFabrik of Cologne, and has been a regular guest with many other European ensembles. She is currently an assistant instructor at the Conservatory of Bremen (Hochschule der Künste). http://www.helenbledsoe.com/

Q1: What are your experiences of working with electronics and flute performance?
A1: Playing solo and ensemble pieces with tape or live electronics, with and without click track. Some experience with midi.

Q2: Are your drawn to any particular repertoire, or style?
A2: Musically I like the idea of music that uses live electronics and the possibilities of midi rather than tape. Pieces with tape are much more practical to perform, but are rather limited in timing and sound-scope.

Q3: How would you describe the difference in your approach to music employing electronics compared to acoustic performance?
A3: With electronic music, there is more prayer involved. Seriously, though, I approach an upcoming performance wiith the assumption that something will definitely go wrong, so just be as prepared as you can, and smile ferociously at everybody no matter what happens.
One difference is playing solo works: a solo work with electronics is not really a solo piece, (unless you do the electronics yourself – or you don't have a sound-person). It is often a collaboration. Dynamics are also a difference:
If I know my sound will be amplified and/or mixed, I am a little more relaxed about projection and feel more free to make quiet colors. Also, I need to be aware of the distance between myself and the mike.

Q4: How do you keep abreast of technological advances / changes?
A4: Talking to composers, mostly

Q5: What further developments would you like to see?
A5: like the fact there is less hardware necessary now, I would like more user-friendly and STABLE software (MAX Patch still has some bugs, to my knowledge). Being able to do more stand-alone versions of pieces would be practical money-wise. I would love to do away with the necessity of interfaces, quatros and the like. They seem to go wonky at the wrong times. Cables are a pain too, maybe more wireless connections (as if there weren't enough things traveling through the airwaves already). Wouln't that be great if midi could go wireless! Also, midi cables are unstable after a certain length (is it 15 meters or feet, something like that?).

Q6: How would you describe audience perception of the medium?
A6: Various. It is a problem that a lot of electronic sounds are associated with a certain time period. I just played Noa Noa and someone close to me (not a musician, even) described it as a "museum piece". Also I have done a lot of Varese lately (Deserts, and we programmed Poem Symphonique during an acoustical program). As much as I think these pieces are great, they still elicit a nostalgic giggle now and then.
Others reactions I've had are positive, but I don't think children are impressed by it in my limited experience.

Q7: Do you know of educational courses which cater for the acoustic performer in music for instrument and electronics?

A7: IRCAM might have something, although they seem mostly geared towards composers. Actually, most programms I know are for composers, really.

Q8: What are your experiences of learning new techniques appropriate for electro acoustic music? Please include reference to flute techniques, microphone techniques, gestural controllers, computer programs, etc.
A8: Haven't had much experience with this. Just controlling the distance to the microphone, working a foot pedal or roller.

Q9: Can you describe your approach to a new score/improvisation, and how you assimilate the language efficiently?
A9: I'm not sure what you mean, the musical language? Computer language? If you mean learn or internalize, I go about it by listening to the electronics (if a tape piece) or sound files, listening to a recording (if possible), talking to the composer, getting to know his/her other works, then sitting with the score and the metronome, etc.

Q10: What rehearsal techniques do you employ in the preparation of electroacoustic music for performance?
A10: Ideally, I like to have the technician there, and then have things set up so I can rehearse on my own during off-hours.

Q11: How do you access equipment for rehearsal? (studio, institution, own?)
A11: Mostly through our ensemble or through the technician, sometimes my own things (laptop, interface, microphone).

Q12: How do you go about trialing or developing new techniques?
A12: I don't get this opportunity

Q13: Which electronic equipment do you find particularly effective with flute, and why?
A13: Nothing particularly flute specific

Q14: How have you approached the acquisition of computer language and engineering skills?
A14: I leave that to the techies

Q15: What spatialization techniques have you worked with?
A15: We did this with my version of Boulez "Dialogue", my technician programmed the spacialisation, as described in the score.

Q16: How do you gauge your performances from the audience's point of view, given that the sound you hear is not the same as the sound the audience hears? How do you judge the spatial illusions?
A16: With difficulty, I always rely on another pair of ears in the hall for feedback

Q17: What interactive or gestural techniques and equipment have you used
A17: Midi triggers with foot pedal

Q18: Do you use a modified flute? If so, how is it modified?
A18: A Kingma system

Q19: Can you describe how playing a flute with attachments compares to playing acoustically?
A19: Haven't tried this, only a mike attached with velcro and that made not much difference.

Q20: What new physical responses are required in the negotiation of gestural or interactive equipment?

A20: Haven't noticed

Q21: Have you recorded electroacoustic music? Is the result satisfactory to you, or adequately reflective of the musical intent of the work?
A21: Yes, and it is more or less satisfactory. Of course, spatialisation is a problem.

Q22: How does the performance venue impact on your playing?
A22: I think there are the same concerns as with acoustical music, only more so. You have to be careful with overacoustic places not to have everything go awash.

Q23: Do you find the paraphernalia of electronic equipment invasive or distracting in the performance setting? How do you deal with this?
A23: Yes, I don't like having a mike in front of me. Better to have a clip mike. Also, cables can be tripped over, and may be unsightly. No special way of dealing with it, just have the cables well organized and maybe taped down safely.

Q24: In what ways has the expansion or manipulation of your flute sound through electronics affected your approach to playing?
A24: I don't think it has changed my approach, but has sometimes given me ideas for improv.

Q25: Do you specifically strive for the development of your own sound or enjoy 'giving way' to electronic alterations of your sound?
A25: I like giving way.

Q26: Has the experience of having your sound altered electronically influenced your acoustic playing?
A26: Sometimes I hear myself over a sound system and think about how much treble, noise etc. is in my acoustic sound. It makes me think about the spectral timbre.

Q27: How have you approached the assimilation of technology in your performances, and how has this developed your understanding of your own musicianship?
A27: Couldn't say

Q28: How does the machinery alter your perceptions and interactions as a flautist?
A28: Well, it is nice to hear the really quiet sounds amplified – this can free you up. If you are interacting with others under amplification, you have a whole 'nother spectrum to explore

Q29: Has spatialization or amplification altered your sense of freedom in performance? Or power, or exposure?
A29: Yes, see above

Q30: If you work with interactive live computer, how do you perceive this relationship of machine and flautist?
A30: Well, it is never 100 percent machine vs person, because someone programmed the machine, and in the performances I've given, there is someone "playing" the computer as well. Even without the person sitting there, the program reflects someone ideas, choices..

Q31: Are you aware of kinaesthetic alterations whilst using gestural controller equipment? How would you describe them?
A31: No

Q32: What are your experiences of working with technicians in performances?
A32: Extremely varied – I've had the good, the bad and the ugly. My recent experiences have been good.

Q33: What characteristics do you look for in the sound projectionist / technicians?
A33: It is ridiculously difficult to get a good flute sound sometimes, so I am always grateful for the technician who can: get good sound. Other qualities I appreciate are: preparedness (having looked at the technical rider), keeping cool when things go wrong, as they invariably do. A technician able to read music has saved a recent performance when a midi driver failed and all triggers had to be made manually.

Q34: How do you deal with the shared responsibility (with the technologist) for your sound?
A34: In my experiences, the boundaries of responsibilities have always been clear, but I always offer to help set up or collect cables, etc.. If possible, I always ask for the possibility to set up a stand-alone version for rehearsal purposes, so that I can practice without having to call the technician for each practice session. Also, I try to ask about the program running, how to run it myself, what troubles I might have in order to save paniced phone calls at inopportune times.

Q35: Have you commissioned notated works for flute and electronics?
A35: No but would like to

Q37: Is this collaboration important to you?
A37: It would be very important

APPENDIX 1G: ETHICAL CLEARANCE

Copies of the Ethical Clearance requirements of Griffith University as follows:
Informed Consent Form
Ethical Clearance Form

GRIFFITH UNIVERSITY

INFORMED CONSENT FORM

Topic: The extended flautist: techniques, technologies and perceptions in the performance of music for flute and electronics.

INFORMATION SHEET

Who is conducting the research

Jean Penny
Queensland Conservatorium, Griffith University
Contact Phone (**07) 3735 6367**
ContactEmail
Jean.Penny@student.griffith.edu.au Or **mjpenny@bigpond.net.au**

Why is the research being conducted?

This research is part of the documentation prepared for a Doctor of Musical Arts degree submission. The major purpose of this research is to explore the flautist's perspective and generate solutions to performative issues within the flute and electronics genre. Three main areas of research are linked through flute performance: Techniques; Technologies; Perceptions

What you will be asked to do

You will be asked to respond to a questionnaire about your flute and electronic performance practice and experience. The questionnaire and responses will be transmitted by email.

The basis by which participants will be selected or screened

The criteria used for selection are:
1. Professional flautists working within the genre of flute and electronics, and with experience in the specific technologies of this study.
2. Players from a range of backgrounds and environments/countries.

The expected benefits of the research

Major outcomes include increased knowledge, techniques and understanding of performance in the flute and electronic genre, and the creation of accessible and useful information. Beneficiaries will include the professional flute playing community, music students and musicologists interested in performance practice. The questionnaire aims to broaden the scope of the research, and provide a vibrant picture of the artist practice of important musicians in the field.

Risks to you

There are no perceived risks in this study.

Your confidentiality

Interview responses will be presented in full in the final submission for this degree. Material from the responses will be referred to within the text of the commentaries. The sources of the material will be referenced throughout. If participants would prefer to remain anonymous, that would be acceptable if notification is given at the time of answering the questionnaire.

Your participation is voluntary

Response to this questionnaire is entirely voluntary. I would be delighted if you could answer all of the questions, however, please feel free to answer only those you feel are suitable to your discipline or situation.

Mechanism for distribution and return

The questionnaire will be sent via email, and the competed questionnaire should be emailed to the address given above.

Questions / further information

If you have any questions about the research, please do not hesitate to contact me at the email address above.

The ethical conduct of this research

Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Research Involving Humans*. If potential participants have any concerns or complaints about the ethical conduct of the project they should contact the Manager, Research Ethics on 3875 5585 or **researchethics@griffith.edu.au**.

Feedback to you

If you would be interested to receive more information about the research, and a copy of the submission (in full or part) this can be made available to you.

Privacy Statement

The conduct of this research involves the collection, access and / or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. For further information consult the University's Privacy Plan at www.gu.edu.au/ua/aa/vc/pp or telephone (07) 3875 5585.

Statement of consent

I have read and understood the information package. Completion of the questionnaire will indicate that I have consented to participate in the research, in particular:

• I agree to participate in the interview via email conducted by Jean Penny for her Doctor of Musical Arts research at the Queensland Conservatorium, Griffith University.

• I understand that my involvement in this research will include sending written responses to questions by email, within an agreed time frame.

• I consent to the publication of the responses within the context of the requirements for the degree - thesis, papers and DVD.

• I consent to the referenced use of the responses within papers and other publications relating to the research.

• I have had any questions answered to my satisfaction;

• I understand that there will be no direct benefit to me from my participation in this research;

• I understand that my participation in this research is voluntary;

• I understand that if I have any additional questions I can contact the researcher or research team;

• I understand that I am free to withdraw at any time, without comment or penalty;

• I understand that I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3875 5585 (or research-ethics@griffith.edu.au) if I have any concerns about the ethical conduct of the project.

Participant's Signature Date

The conduct of this research involves the collection, access and / or use of your identified personal information. As outlined elsewhere in this information sheet, your identified personal information may included in the written submission documents for the Doctor of Musical Arts Degree. Other than this disclosure, the information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. For further information consult the University's Privacy Plan at www.gu.edu.au/ua/aa/vc/pp or telephone (07) 3875 5585.

ETHICAL CLEARANCE FORM

My Ethics 04/20/2006 01:57 AM

Help

Griffith UNIVERSITY

HUMAN RESEARCH ETHICS COMMITTEE

ETHICAL CLEARANCE CERTIFICATE

This certificate generated on 20-04-2006.

This certificate comfirms that protocol 'Doctor of Musical Arts' (GU Protocol Number QCM/16/05/HREC) has ethical clearance from the Griffith University Human Research Ethics Commitee (HREC) and has been issued with authorisation to be commenced.

The ethical clearance for this protocol runs from 06-03-2006 to 14-12-2007.

The named members of the research team for this protocol are:
Dr Vanessa Tomlinson
Ms Jean Penny

The research team has been sent correspondence that lists the standard conditions of ethical clearance that apply to Griffith University protocols.

The HREC is established in accordance with the *National Statement on Ethical Conduct on Research Involving Humans*. The operation of this Committee is outlined in the HREC Standard Operating Procedure, which is available from www.gu.edu.au/or/ethics.

Please do not hesitate to contact me if you have any further queries about this matter.

Gary Allen
Manager, Research Ethics
Office for Research
Bray Centre, Nathan Campus
Griffith University
Phone: 3875 5585
Facsimile: 3875 7994
Email: g.allen@griffith.edu.au

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APPENDIX 2

PROGRAM NOTES RECITAL 1, MARCH 18, 2007

flute passages

music for flute and electronics

Jean Penny - flutes
Andrew Blackburn - electronics

Doctor of Musical Arts Presentation
Basil Jones Orchestral Hall
Queensland Conservatorium
Griffith University
3 pm, SUNDAY 18th MARCH, 2007

The Extended Flautist: Techniques, technologies and perceptions in the performance of music for flute and electronics

Today's recital is presented as partial fulfillment of the requirements for the Doctor of Musical Arts degree. This, the first of two recitals, explores electronic spatialization in music for solo flute. The second recital (on August 26) will explore interactive live electronics with flute.

Illusions, Identities and Imperatives

The centrality of performance in the life of a musician, the extension of self through one's instrument and electronic transformations, and the evocation of space, both real and virtual, are researched in this project. This recital gives a forum for detailed explorations of the imperatives of specific works, and a reference for new understandings of the genre. The sonic intersections of technique, technology and perception are investigated through interpretative and communicative influences, the embodied significance of spatialised sound to flute performance, and the search for sonic identity through transformation.

Compelling questions entice performer and audience alike when engaging with this genre: Illusions created by technology, challenges to one's sense of time, expectations of sound, and listening perceptions. How these illusions or ambiguities may obscure conventional cause and effect relations in performance. What changes in perception occur in the performer as a result of such illusions, or electronic interventions such as increased amplitude or sound manipulation? What is the significance of hearing micro sounds amplified (through magnification of playing techniques of a normally intimate nature, such as the use of tongue and mouth) or disembodied flute sounds? How does the confluence of divergent experience impact on the collaboration between instrumentalist and technologist? Is a minimization of the intrusiveness of technological machinery important? And, from a curatorial perspective: How crucial is the co-operation of venue managers and personnel in achieving an artistically compelling result?

The works in this program demonstrate expansion of the flute sound in the performance space, the creation of dialogue through spatialization techniques, the use of amplification to balance the live and recorded sound and to project the beauty and fragility of microsounds, the creation of illusions in the spatial field and blurred sound sources, and the use of Digital Signal Processing with spatialization.

Program

Jean-Claude Risset	*Passages* for flute, piccolo and CD
Mario Lavista	*Canto del Alba* for amplified flute
Thea Musgrave	*Narcissus* for flute and digital delay
Marco Stroppa	*little i* for flutes and electronic room

Program notes

Jean-Claude Risset – *Passages* for flute, piccolo and CD

Commissioned by the Bienniale di Venezia, 1982, 1st performance by Roberto Fabbriciani. Editions Salabert (Paris). Originally for flute and computer-synthesized 2-track tape.

This important work of the early flute and electronics repertoire provides an analogy for this study design. It invokes the flute as an identifiable character, journeying through changing sonic environments, sometimes merging, sometimes contrasting, but always itself – a study of musical identity. Jean Claude Risset (born 1938) is a pioneer of sound synthesis. His research has combined scientific and psychoacoustic investigations, especially concerning the perceptual dimensions of timbre. He has described this work thus:

> …..My musical research is tested and expressed in works which claim to be finished products and not of the experiments. They enabled me to solve certain enigmas and to achieve certain musical goals to which I aspired: to create an illusory sound universe, even paradoxical, whose identity is anchored in our perceptions rather than in the real world, and who, with the image of the dream, is malleable and unstable (Little Boy, Mutations, Songes); to put in scene meetings of this world dreamed with the external, "real", visible and palpable world (Dialogues, Passages, Warpings or South); to preserve a harmonic dimension which is prolonged in the stamp itself.
>
> **(Jean-Claude RISSET Art - Science – Technology, Seminar of March 20, 2002)**

In *Passages* the amplification is light, to balance the flute with the CD and to project effects such as whistle tones and key slaps. This projection establishes the viability of the micro sounds. The flute sound is identified clearly through one speaker, with the computer sounds diffused through multiple speakers. The synthesized sound thus provides a shifting environment through which the flute travels: flux and flow, water and whistle, wire of the spheres, vibrations and clusters, bell chimes, counterpoint with flutes and other visiting instruments, percussion, celestial sounds, water ripples, bells and voice.
Extended flute techniques include breath tone, headjoint finger glissandi, pizzicato, key clicks, embouchure glissandi, multiphonics, whistle tones, harmonics, altissimo register (up to very high F), vibrato trills, bisbigliando (altered timbre through varied fingerings), tongue ram on piccolo, and singing and playing together. These sounds meld into and exchange characteristics with the synthesized sounds. The dialogue between the parts produces a chamber music aura – something of an illusion, as the live flute must create the response and invoke the spirit of partnership.

Mario Lavista – *Canto del Alba* for amplified flute

Ediciones Mexicanas de Musica, A.C. Mexico, 2003

Mexican composer Mario Lavista (born 1943) explores new instrumental techniques and timbres in many of his works. He is professor of composition, analysis and musical language of the 20th century at the National Conservatory of Music, Mexico City. Lavista sent me this score in 2006.

Canto del Alba (Dawnsong) was inspired by a poem by Wang Wei:

> I sit alone in the dark bamboo grove,
> Playing the zither and whistling long.
> In this deep wood no one would know –
> Only the bright moon comes to shine.
> (trans. Liu Wu-chi)

Canto del Alba (1979) is a startlingly beautiful work which requires extreme sensitivity (embouchure, breath, finger slides, pitching) from the performer. Timbral aspects define this piece. The fragility of the multiphonics, and the luminosity of the gentle flute sounds enhanced by the amplification,

accentuate and affirm the subtlety of expression. The opening instructions are distant (*lontano*), like the uncertain light and grey preceding dawn. Long arcs of multiphonics, harmonics, tone colour fingerings, whistle tones and voice combine to create an evocative atmosphere throughout. A sense of Eastern tranquillity and meditation pervades the sonic ambience. The micro sounds are revealed, are given voice and validity as musical resources through the electronics.

Thea Musgrave – *Narcissus* for flute and digital delay

Commissioned by The National Endowment for the Arts for Wendy Rolfe, Harvey Sollberger, Patricia Spencer and Robert Willoughby.
Novello and Company Ltd, Great Britain, 1988

Scottish composer, Thea Mugrave (born 1928) has had a distinguished career as a composer, conductor and educator. Her music frequently explores dramatic themes and characters through extending the sonic possibilities of spatialised instrumental sound.

Narcissus (1987), a musical narrative of the legend of Narcissus, was written at a time of great upsurge and innovation in the flute and electronics genre. It demonstrates live manipulated and spatialised flute sound through digital delay, with the character of Narcissus being represented by the solo flute, and his reflections by the delay effect. The work begins with an extended flute solo, which gradually becomes entwined in the echo and responses. The mental chaos of Narcissus is depicted with a build up of the echoes and resultant harmonisation effects. The flute line is written in traditional notation (apart from some short 'improvised' passages with inexact or free notation) and the traditional sonority of the flute is exploited. A great variety of moods and textures are created, featuring fluid lines punctuated by angular bursts of energy and illusions of dialogue.

Narcissus was originally composed for the VESTA KOZA DIG411 DELAY which required the flautist to use a foot pedal with 3 controls: an on/off Bypass, an on/off Hold and a volume control for the outgoing delay signal. The flautist also controlled the delay system by hand (feedback control, modulation depth, delay time). In this new Max/MSP version, created by David Brooke Wetzel, the delay and control interface, with six digital delay parameters – delay times, repeating echoes, close delay with pitch oscillation, capturing of sounds and creation of loops, fades, and on/off - have been reconstructed in the software, and the physical controls are all operated through the computer. I have performed this work using a delay unit only, and also with the new software. The later version allows for greatly enhanced interpretation from improved response of the computer, more vivid effects, dialogues and characterization. The impact of these timbral changes on interpretative ideas is powerful, influencing both musical and physical responses. The chamber music feel here is striking and unusual, akin to an extension of self – feeling enveloped in one's own sound, and in dialogue with oneself.

> "Narcissus wanders through the forest, observing, enjoying…unselfconscious but self-absorbed.
> He sees a pool of water and then as he approaches notices his reflection in the water. He is intrigued and then jumps back in fright. Once more he approaches…it is still there. Narcissus steps away from the pool to consider this phenomenon. Several times he approaches, the figure is always there watching him.
> In the shimmering sunlight Narcissus seems to see this glorious and attractive being moving in the rippling water. He is dazzled and slowly holds out his arms. To his amazement the figure responds.
> In awe and wonder Narcissus approaches closer and closer, With a sudden change of mood Narcissus dances happily and playfully…the figure echoing him. But then Narcissus begins to question anxiously the lack of any independent response…is he being mocked? He gets more and more agitated and finally in a fury he rushes headlong into the water to grapple with the figure. The waves surge up and Narcissus is drowned. There is a distant shimmering vision of Narcissus and his reflection. Then in the setting sun the vision disappears, the forest is empty and the pool lies undisturbed."
> Score notes, Novello & Company limited

Marco Stroppa – *little i* for flutes and electronic room (1996)

Marco Stroppa is an Italian composer, researcher and educator, currently professor of composition at the Musikhochschule in Stuttgart, and teacher of composition at the Conservatoire National Superieur de Paris.

'little i' was written in 1996 for French flautist Cecile Daroux. It was inspired by the poem 52 extracts of 73 poems of e.e. cummings:

who are you, little i

(five or six years old)
peering from some high
window; at the gold

of november sunset

(and feeling : that if day
has to become night

this is a beautiful way).

In this remarkable piece the intimacy of the relationship of the musical partners - the instrumental soloist and other invisible presences - is explored, as the flute and the two sources of electronic sound (the technologist and the pre-recorded material) participate in an imaginary trio. The taped sounds (a palette of synthesized sounds and flute sounds recorded and processed by computer) are an "immaterial" part of the instrumentalist who "sees" and communicates with the invisible sound partners. The flautist takes four different positions in the performance space, creating echo effects, multiplication or separation of the flute and the electronic material. The flute score requires an extensive technique of microtones, multiphonics, glissandi, breath tones, whistle tones, key slaps, 'pizzicato' tonguing, tongue rams, flutter tonguing, and vibrato tremolos, and in addition highly evocative expressive markings such as 'like a thread of sound', 'furtively', 'foggy', "enchanted', 'in a fuss', 'voracious'. The structure of the work makes an arch.

1. LENTO, MAGICO: Tranquility is established in this movement, which is a very free canon between the alto flute and tape. The glissandi (both lip and finger) simulate an Indian bamboo flute, and extensive use is made of microtones, breath tone, multiphonics, single note and harmonic trills, and whistle tones to create a mystical aura and impression.

2.PRESTO HANTE: A joyful, limping gigue for concert flute with 3 musical characters - 1. A dance-like character which oscillates (limps) between 6/8 and irregular meters, including a "Bulgarian' subdivision. 2. A moaning, fragile, slender attitude. 3. Quite extreme, sometimes angry, or furious, or excited, or energetic. The recorded sound emerges towards the end of the movement, propelling it off into the ether.

3.MODERATO PERCUSIVE - MOLTO MINUZIOSO: Here the alto flute has a percussive, mechanical character, established with the use of a variety of articulations (pizzicato, flutter, tongue ram, key slaps). The tape creates a canonic relationship with the soloist, generating mysterious undercurrents and uncertainty.

4.VIF ENERGETIC - NOSTALGICO: This is the realm of the piccolo, which Stroppa describes as a nostalgic, facetious, whimsical character. The mood swings from nostalgic to hasty, melancholic to furtive amongst the short episodes.

5.FINALE - LENT HARMONIQUE: A summary of the previous movements, this leads to a state of further completion. An excited, passionate declamation precedes dolphin-like sounds and a "choral of

multiphonics" creating dream-like waves of sound. The work finishes with a return to tranquillity and intimacy.

Program notes by Jean Penny, March 2007

ACKNOWLEDGMENTS

Many thanks to Marco Stroppa, Laurie Radford and Mario Lavista for sending their scores and much inspirational email exchange.
Thanks also to: My supervisors – Dr Vanessa Tomlinson and Professor Paul Draper – for their insightful academic and administrative assistance; Andrew Blackburn for his wholehearted support, enthusiasm and willingness to donate his time and expertise to today's performance; David Corazza for his generous technical support; The music technology department of the Queensland Conservatorium; and
Griffith University for the opportunity to take up this research.

BIOGRAPHIES

JEAN PENNY is a graduate of the University of Melbourne. During her degree she was winner of the Ormond Exhibition, the Leslie Barklamb Flute Scholarship, and gained her L.Mus.A. Following studies in London and Paris, she worked extensively with many of Australia's major orchestras, including the Melbourne Symphony, Sydney Symphony, Tasmanian Symphony and Orchestra Victoria, has made numerous recordings, and regularly appears in concerts in Australia and Europe – including Hungary, Italy, Germany, Denmark, Spain, the Netherlands and Slovenia. Solo festival appearances include the 12th Australian Flute Convention (2005), the Melbourne International Festival of Arts (2004), Melbourne Flute Festival (1998), The Australian Flute Festival (2002), Organs of the Ballarat Goldfields (2005, 2004, 1999, 1997), Sonic Connections (University of Wollongong, 2004) and the 4th Slovenian Flute Convention (2002). In 2003 Jean established new music company, *hutes*, to present and promote diverse forms of contemporary art music in Melbourne.

ANDREW BLACKBURN is an organist, harpsichordist, music technologist and choral conductor. He graduated with Bachelor and Master of Music degrees from Melbourne University. Andrew is a prominent recitalist, his performances having included concertos with the Melbourne Symphony Orchestra, concerts and recordings for the ABC, the Victorian Arts Centre Trust and many concerts both in Australia and abroad. He is organist at Toorak Uniting Church and has established a vibrant Arts Centre at Kinross House in Melbourne. Andrew completed a music technology course at IRCAM in Paris in 1998. He is currently enrolled in the Doctor of Musical Arts degree, working to develop techniques for organ and electronics, including the creation of a toolbox for the use of composers and practitioners. Through this, he aims to encourage the composition of new works for organ with electronics in diverse forms.

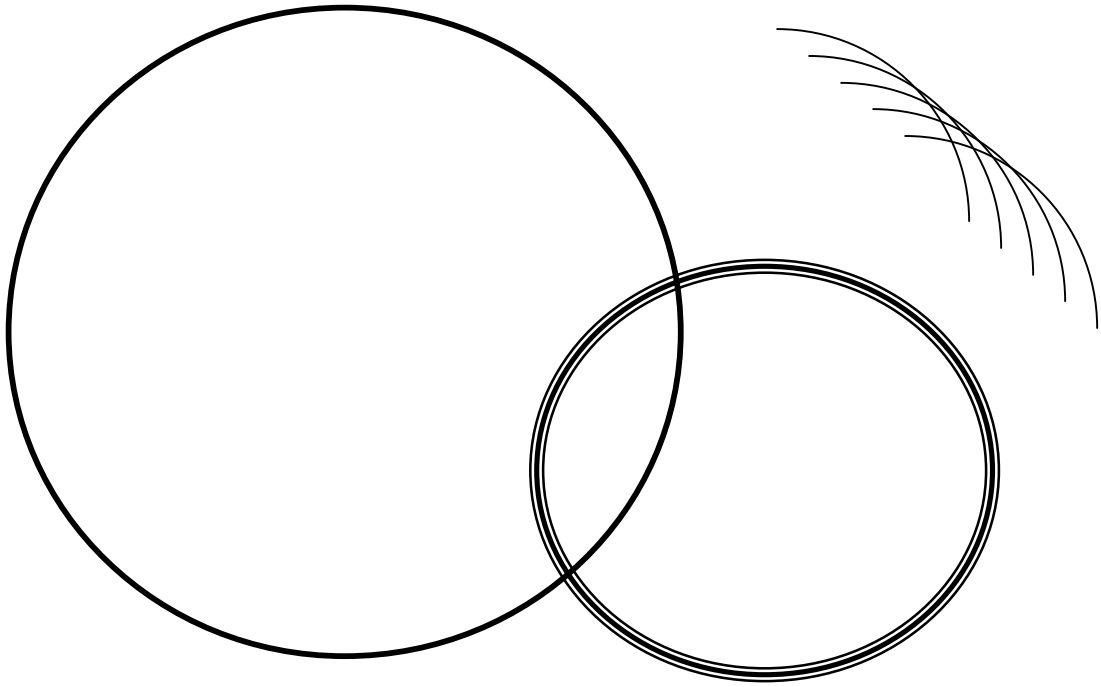
PROGRAM NOTES RECITAL 2, 26TH AUGUST, 2007

THE EXTENDED FLAUTIST

Music for flute and live interactive electronics

Jean Penny, flutes

Andrew Blackburn, electronics



3 pm, SUNDAY 26th AUGUST, 2007

Ian Hangar Recital Hall,
Queensland Conservatorium Griffith University

Doctor of Musical Arts presentation

PROGRAM

Kaija Saariaho *NoaNoa* for flute and electronics (1992)

(**Sveinsson: *Sounds of Snow***)

Russell Pinkston *Lizamander* for flute and Max/MSP (2003) (Australian Premier Performance)

(Sveinsson: *Sounds of Heaven*)

Warren Burt *Mantrae* (2007) for flute and live electronics (World Premier Performance)

(Sveinsson: *Sounds of Birds*)

Improvisation *veiled emergence* (August, 2007) for flute and computer

(Sveinsson: *Sounds of Sounds*)

Georg Hadju *Sleeplessness* for piccolo, alto and bass flutes, narrator and electronics (1988 /1997 /2007) (Australian Premier Performance)

Interspersed between the electro acoustic works are four interludes taken from *Twentyone minutes for solo flute* (1981) by Icelandic composer, Atli Heimir Sveinsson. These miniatures are included as suggestions of acoustic flute sound sources, as contrasts to electronically driven aesthetics, and as delightful, capricious moments of sound. The score instructs that none of these pieces may last more than a minute, a sharp sound signifying the elapse of time and end.

PROGRAM NOTES

The notion of interactive live electronic music performance conjures up images of musicians and gadgets, strings of cables across the floor, boxed speakers in carefully adjusted configurations, the microphone, computers, black mixing desks, and wired up people and machines: in short, a theatre of prospective sound devices. Clothing can be wired as sensors, the gestures of dance can become triggers for sound, and instruments can be draped with bunches of buttons and cords. In the vicinity of the performance space, there are often shadowy figures (usually the performer and technician) with white, slightly panicked expressions disguising their hurry and hope, or with the studied calm of *The Attention Revolution* (Wallace, 2006). Today's program includes many of these elements,

as it presents a program of music for flute and a variety of interactive technologies and styles. The works were written between the 1980's and August 2007. They include performer triggered effects using MIDI pedal, physical movement, pitch and threshold tracking, and technician / flautist improvisatory interaction.

Researching the flautist's perspective in performances with electronics is a journey through new imaginings, new streams of thinking, new physical responses, conflicts and constraints, invigorated musical thought, explorations of minutae, the extension of the human through technologies, reflection and exchange. A plethora of questions present themselves for investigation: The confluence of flautist and technician, the empowerment of the individual, implications of shared musical endeavour, the integration of technology in ourselves, the importance of the player's musculature and physical responses, implications of gestural nuance, the transformation of the performance space, the performer's identity, ambiguities, masking and projection of musicality and personae.

In constructing and realising a program that reflects my personal investigation of this performance practice I have focussed on presenting a varied program of music and technologies. A most rewarding aspect of this process has been made possible by a personal commission and grant from the Music Board of the Australia Council for the Arts. It is a great honour to be able to present the world premier of this work today as part of this concert.

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Kaija Saariaho's *NoaNoa* for flute and electronics (1992)

NoaNoa (Fragrant) is a dramatic, reverberant work which has become established as a major work of the contemporary flute and electronics repertoire. It was composed in collaboration with flautist Camilla Hoitenga, to whom it is dedicated, and realized at IRCAM with assistance from Xavier Chabot (flautist and sound technician) and Jean-Baptiste Barriere (sound engineer). The work explores sonorities of the flute and extended techniques, via electronic manipulations of the flute sound, as it seeks to evoke the spirit of Gauguin's Tahitian journal and paintings, *NoaNoa,* of 1891-1893. Implied visual images and perfumes of a tropical paradise generate a potent theatrical dimension through sound transformations come from the use of language (fragments of Gauguin's journal) and vocalization intertwined with flute, the use of the extended flute techniques and the use of electronic effects: amplification, reverberation, harmonization, the use of pre-recorded material (voice and flute). The flautist triggers the 63 Max patch changes with a MIDI pedal during the work, a demand that forces one to address performer to technology confluence and the embodiment of a new physicality in performance.

Saariaho is a Finnish composer who has established close relations with significant musicians, and whose interest lies "in urgent communication from composer to listener of ideas, images and emotions." (www.saariaho.org) Her flute works include solos for flute with and without electronics, chamber works, and a concerto. Regarding *NoaNoa*, Saariaho states: "I wanted to write down, exaggerate, even abuse certain flute mannerisms that had been haunting me for some years…." (score notes, *NoaNoa*).

Russell Pinkston *Lizamander* for flute and Max/MSP (2003)

This exuberant and flutistic piece requires two microphones, one for tracking, and one for amplification and audio processing. The computer program detects specific pitches played by the flute at precise moments in the score, at times searching for notes above or below a particular threshold, in other instances, an exact pitch. This identification allows movement to the next section, triggering such actions as capturing and granulating sounds, harmonization, or the playing of computer-generated material. The computer thus sets up a background of energetic impetus, driving and colouring the flute's melodic line. The use of microphones as the interactive force generates minimal technological impact on the
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flautist. This is liberating in the context of electronic music, with the effects activation simply demanding that the correct notes are played.

Russell Pinkston is Professor of Music Composition and Director of Electronic Music Studios at the University of Texas at Austin, US. His research has focused on developing software and hardware for real-time synthesis and digital signal processing, and the use of interactive technologies for dance.

Warren Burt *Mantrae* for flute and live electronics (2007)

The following notes are provided by the composer.

Anyone who has ever attended a Hindu temple, and heard the priests chant a longer mantra, such as the Lalita Sahasranama (the thousand names of the Goddess), quickly realizes that minimalism was not invented by a bunch of boys and girls in San Francisco, London and Budapest in the late 1960's, but has indeed been around for a long, long time.

BUT: the mantra itself lives in a peculiar world – it is neither language, nor music, but a hybrid between the two) or more fancifully, perhaps a common ancestor of the two?). When transcribed into traditional musical notation (as opposed to the way they're normally learned, by oral transmission), they lose their language connection and become wholly music. Through the use of accents and speech-like articulation, however, a transcribed mantra might at least nod in the direction of speech as it might be articulated by a musical instrument. (We recall here Dane Rudhyar's calling for a musical prose, not poetry; for a music of speech rhythms, and not dance rhythms.)

BUT: we do not use transcribed mantras here, rather, we create our own. We transcribed three shorter mantras, and listed their pitches and durations, and how many times in a mantra each appeared. We used these percentages in composing the new material. For example, if, in a given mantra, "E" appeared twice as often as "G", that would be the case as well in our composed mantrae. The statistics of 2 of the 3 mantras were used in each of the 3 different mantrae that the player uses. Each mantrae is on its own music stand.

The player alternates between the music on the three stands, creating a larger scale structure by feely leaping between the three pages of music. This changes an essential aspect of the mantra – its repetitious, circular nature – into a more forward moving, yet non-directional structure. The challenge for the player is: through the use of articulation, accent and dynamics, to return the music to as much of a "speech-like" state as possible.

The mantrae become the offering, the essence of the individual. HOWEVER: the individual lives in the world, and one's essence is continually being altered by the world – hence the electronics. HOWEVER: one's actions in the world continually alter how the world alters the individual. Hence, the interactive nature of the electronics.

While the flautist assembles the mantrae by moving between the music stands, using improvised articulation to try to return the music to a dynamic speech-like state, the flute sound is played through a computer using Hipno sound processing modules, which change the sound in fairly radical ways. The flautist's practical motions, moving between the stand, are picked up by the camera. This motion is used to change the nature of the sound processing in a non-linear way (that is, one motion does not produce one specific change in the sound). The balance between the sound processors is altered by a random mixing routine set up in Plogue Bidule, the host program for the processing. The result is a musical world where the driving sound of the flute is constantly altered in changing and non-predictable ways. The challenge for the flautist, in this work, as in life, is to maintain a sense of focus and inner-calm in the midst of a constantly changing and unpredictable world.

The software used to compose the flute mantrae was John Dunn's ArtWonk. The computer sound modification software was Plogue Bidule and Cycling 74's Hipno. The sound processing was developed by Warren Burt, together with Jean Penny and Andrew Blackburn.

Improvisation *velled emergence* for alto flute and computer **(August, 2007)**

Strands of sounds from the verge of the flute – breath, percussion, whistles, multiphonics, glissandi - emerge and merge, concealed, disguised and expanded by amplification and digital signal processing. An interactive dialogue between the two performers explores this fragile sound-scape of microscopic flute tone structures, proliferating, reflecting, shimmering, reverberating. We are assisted by Cycling 74's Hipno software.

Georg Hadju *Sleeplessness* for bass, piccolo, and alto flutes (1988 /1997 /2007)

Hajdu's own poem *Sleeplessness* provides a setting for this music, which explores the unsettling nature of psychological anxiety. The three flutes create this sense of disturbance through contrasting epicses, each exploirting their won innate characteristics. The bass uses air tones and disjointed accents to establish an undercurrent of unease, the piccolo sets off panic as it screeches in the high register, and the alto flute leads from jagged awkwardness to a sense of repose and acceptance towards the end.

The flautist activates the MIDI pedal to trigger 71 effects and playback during the piece. These effects include reverberation, delay and ptch shift. Structurally, there are 13 parts (corresponding to the 13 characters of the title) in 3 main sections (corresponding to the 3 syllables of the title). These are used as the basis for a formula that determines the formal plan and the details of the composition:

Expo S ition
Rust L e
E xchange
Chang E
Low P oint
C L imax
Rep E titions
Compo S -
ite S
N ovelty
Memori E s
Ce S -
S ation

Georg Hajdu is professor of multimedia composition at the Hamburg School of Music and Theater. His areas of interest include multimedia, microtonality, algorithmic, interactive and networked composition. He has developed an internet performance environment – Quintet.net. His assistance in preparing this new version of *Sleeplessness*, specifically for today's recital, (and including the incorporation of my own narration of the poem) is gratefully acknowledged.

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APPENDIX 3

ADDITIONAL COMPOSITION NOTES

Kaija Saariaho: *NoaNoa*

The following text, fragments from Gauguin's Tahitian journal and paintings, *NoaNoa,* of 1891-1893, is used throughout the work.

L'arbre sen-tait la rose la rose tres odorant sen-tait rose rose sentait rose
s r t s t s t s t t t t t
Sen-tait la rose
Mes yeux voiles mon coeur-rr
Sentait la rose la fleur
La fleur
Tttttt tres…odorant
melange melange melange…d'odeur l'arbre sen-tait la rose fleur-r
Tr tr tr
Fleur fanee fleur feur l f l f r
Melange d'odeur par-fums de san-tal tres…odorant s f tr f s z t f
L'arbre sentait
Fleur…dpree Je…reviendrai
Mes yeux yeux la fleur-r fleur fleur fleur fanee
T r t r t t t t t t t t Je
Lf sa tr t t t t t s t s t k s t k s t k s t k k tr ro je je t je t ta ka ta ka ro tr re fl sa ka tr s z t
k z t k
fl tr z t k ro fl tr
Ka z t fl tr ro z t k fl tr z t k st s
La…fleur……..la fleur

Articulated through the flute, usually whilst playing low register air tones, the words distil the poetic basis for the composition. They are not particularly intelligible to the listener, but add strength to the atmospheric sensations and sensuousness of the work through the unusual sound mix of breath tone and whispers, and the illusion of bodily proximity that this infers. This merging of the flute and breath tones with the voice, which can be whispered or partially vocal, creates an exciting other presence, rather unsettling and uncertain. There is a masked quality to the sound, the flute masking the voice, and vice versa. At times the words interrupt a sustained trills or multiphonics. As the work progresses the words become more and more disjointed, often becoming strings of consonants or explosive sforzandi, interjected through the flute line. At times flutter tonguing emerges from the rolled *r's*, or repeated *t's*, similar to normal flute tonguing, are anticipated in the manner of a stutter.

The following notes for performance and technology were provided by Warren Burt:

Mantrae

for flute and live electronics

Warren Burt, June – August 2007

for Jean Penny, commissioned with funds from the Australia Council.

Set up:
On stage, have 3 music stands, all separated by about 1 meter, each facing towards the stationary flute player. The two outer stands are tilted inwards towards the player at an angle of about 60 degrees. On each stand is one page of the score. The stands should be close enough to each other so that the player can easily bob and weave between them without moving her feet, clearly reading the music on each stand. They should be far apart enough, however, so that the player has to move her upper body to reach, and read from, each stand. This movement will serve as a control mechanism for the electronics in the piece.

A web-camera is looking at the player. It should be aimed so that the full movement of the player between the three stands fills the frame of the camera. The player should be in focus. This webcam is plugged into the computer, which is running Plogue software, with Hipno plugins, with the supplied patch. (See illustrations at end.) The Hipno plugins – Amogwai, Spuntortt, and Modulator.VMotion also have their own patch presets, which are also supplied. (Also see illustrations at end.) The flute sound is processed through this patch. The player's motion, picked up by the web camera, changes settings on the Hipno plugins. The player's motion is to some extent responsible for the changes in the modification of their sound, though not in a direct, 1 to 1 manner.

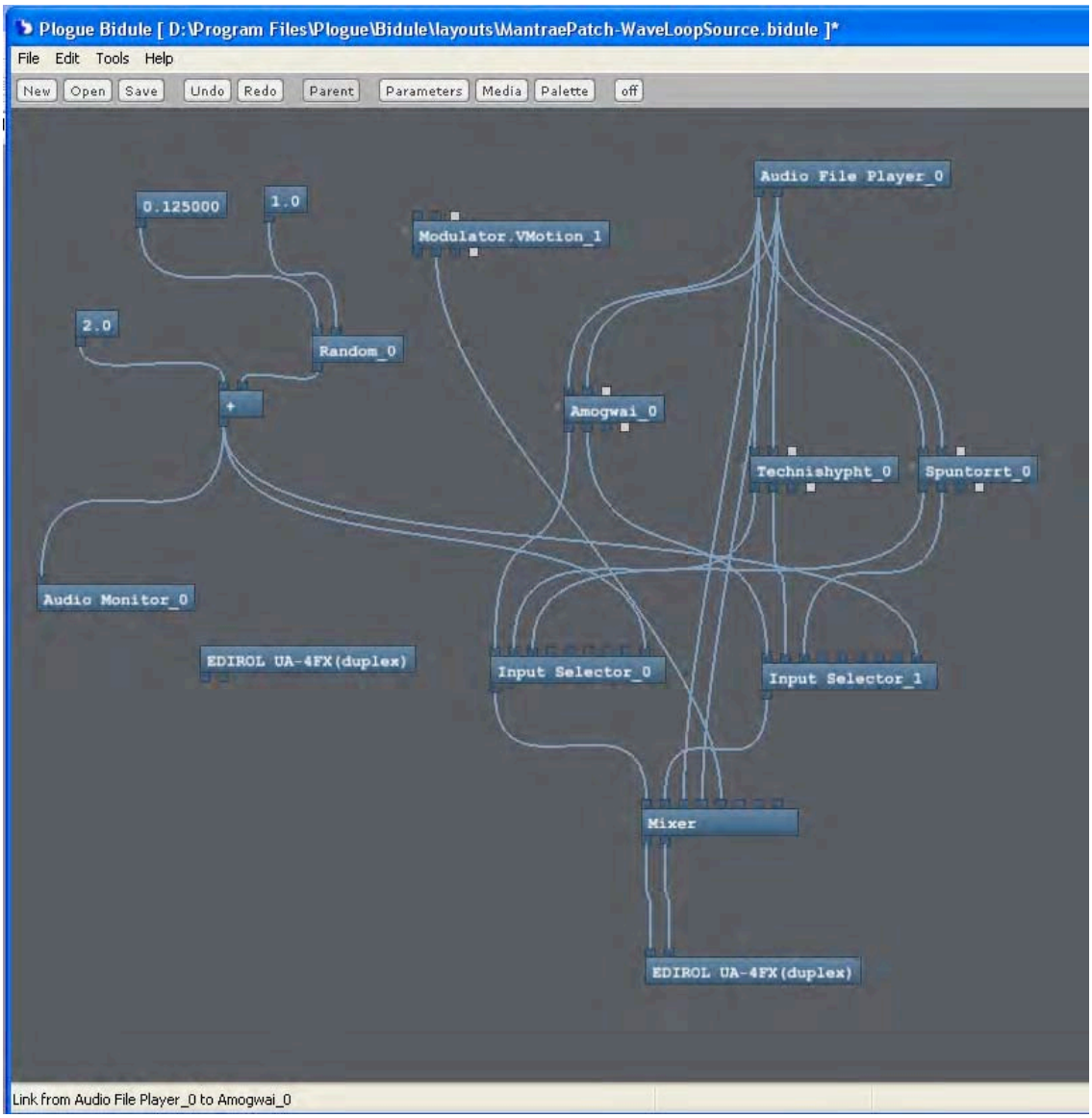
Additionally, some mechanism, whether a footpedal, a mixer with a preset volume slider, a push-button control of some sort, is needed to suddenly bring in, and turn off the effects. If, for example, the unprocessed flute is mixed through one channel of a mixer, and the computer is mixed through some other channels of that mixer, a “solo” button on the flute channel would produce the effect wanted. A footpedal suddenly bringing in the computer sound, and suddenly turning the sound off would also work here. The flute and electronics should be evenly balanced in sound level.

Performance instructions:

At the start of the piece, the flutist stands as if frozen, then suddenly, as if you've already been playing, and the audience is suddenly coming in on the motion, subito, begin playing. The flute is playing solo, without electronics. Play in a punchy manner, with many sudden and unexpected accents, as if speaking an unknown language. Play in an intense manner, forward-driving, unrelenting, going from page to page of the score as indicated on the score pages. At any rest on any score page, you may quickly switch to the beginning of any other phrase on any other score page, and keep playing from there.

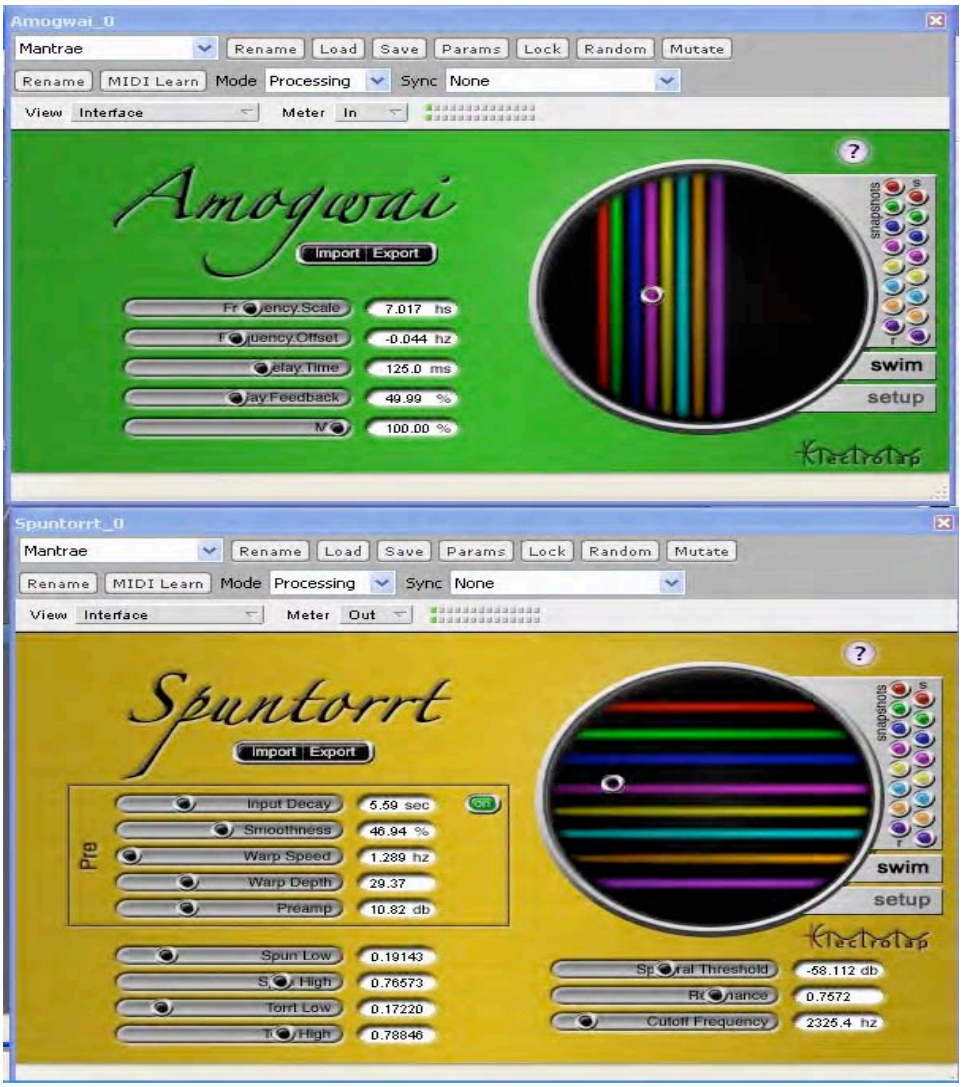
After about 30 seconds of solo playing, the electronics are switched on suddenly. For 7 minutes, keep playing with electronic accompaniment. At about 7:30, the electronics are just as suddenly switched off, leaving the flutist playing solo again. Continue playing for about about 30 seconds, and then, subito, stop playing, and again, be frozen, immobile, as if in freeze frame, until the audience applauds.

The patch:



On your computer, the output module will be different, but all other modules should match this setup. **NOTICE** the value of the uppermost left constant module. It is 0.125000. This is changed from earlier versions of the patch, where the value was 2.000. If you have an earlier version of the patch, change it to this.

Plug-ins Settings 1:



The supplied patch settings for Amogwai and Spuntortt are called "AmogwaiMantraeSets.fxb" and "SpuntorttMantraeSets.fxb." If, on loading these sets, (using the "Load" button at the top of each module) the module's control window does not look like the above, with horizontal or vertical coloured stripes, go to the upper left patch selection window on each module, select any other patch from the drop-down list, and then re-select the "Mantrae" patch. The proper settings should then appear.

Plug-ins Settings 2:

This is trickier. These are the settings for the Modulator.VMotion module. This illustration does not show what the module will look like when the patch set "VmotionModMantraeSets2.fxb" is loaded. When the patch is loaded the Device List on the lower left hand corner of the video input screen, will have the name of your web camera on it, and the four "Modulation Parameter" slots, at the upper right of the module, will have "No Connection" listed in them. You will have to manually set these four "Modulation Parameter" slots to set them to the control destinations shown in the illustration. Also notice that the "Frame Rate" at the lower right of the video input screen is set to 1 frame per second. This means that the computer updates the video image only once a second. As well as saving computer power, this produces a slower rate of potential change to the control destinations, allowing the effects settings to be heard for slightly longer lengths of time. Again, if the settings are not as shown when the patch set is first loaded (with the "Load"

button at the top of the module), then simply select any other patch, and return to the "Mantrae" patch and all the settings, except for "Modulation Parameters" and "Device List" should be as shown.

Georg Hajdu: *Sleeplessness* – Information from the score.

Text

Poem:
SLEEPLESSNESS (Georg Hajdu)

You'd been restless the entire day.
You sat down in the evening,
you still wanted to accomplish something.
There was this word. . . . .
Strange, what does it have to do with you?
You pulled yourself together,
focussed your thoughts,
but it refused to recede;
it was as if one part of your mind
had detached itself
in order to egotistically
drive itself into your conscience.
You undressed, washed
and went to bed.
And although you tried to read
you quickly gave it up and stared
at the ceiling, suddenly a sea
of tiny red, blue and yellowish-green dots.
Here it was again—this word.
You turned the light off,
shut your eyes,
tried to sleep.
But it refused to recede.
It spiraled deeper and deeper
inside of you,
granting you just a superficial sleep.

My god!!
You're dying.
Your heart is beating like mad,
your head is inside a suction cup.
You're running out of bed,
you don't know where.
You're dying. . .
But less and less so.
Soon you'll know:
You're running into the bathroom,
the faucet on,
your head underneath,
the suction cup off.
Slowly this pump, your heart,
this funny muscle is slowing
down from a gallop,
down from a trot,
down into a step.

What happend?
I can't remember!
I can't remember!
I can't remember!

You're dragging yourself back into your bed.
You can't remember what you've been dreaming,
whether you've been dreaming.

You should change your life
You should take more breaks.
You should go on vacation.
You shouldn't be so anxious
about the world.
You shouldn't worry about drinking water,
eating vegetables,
raising your children.
You should accept the noise,
just breathe the air.
You should do your job,
think positively,
entertain yourself sometime.

You shouldn't
should
oudn't
oud
sh

It's endless, your tossing and turning,
immesurable your fear of further gymnastics of
your heart,
and yet, you'll wake up the next morning,
feeling somewhat weak,
a bit hung over,
with the certainty
that you've, once again,
even more, ...

xii

***Sleeplessness* Introduction, Flute Techniques and Technology Notes**

Introduction:

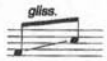
The 13 characters of the title were the basis for a "formula" which determined both the formal plan and the details of the composition. Therefore, it consists of 13 parts which develop 5 different types of material. The syllabic structure of SLEEP-LESS-NESS devides the piece into three large sections with breaks after the 5th and 9th parts. During these breaks the performer changes his/her instruments.

The present version now includes a poem with the same title written in 1988--the same year the composition was originally completed. This poem can be performed by either a narrator or through playback from a sampler or the computer hard disk.

On the instrumentation:

The flutist performs the piece with three flutes in different registers. He/she starts with the lowest flute, changes after the P part to piccolo and takes a medium-register flute after the S3 part. For example, the piece can be performed using a contrabass flute, a piccolo and an alto flute.

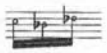
Special markings:

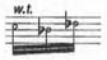


Glissando (discrete steps)

Portamento (gliding pitch)

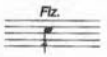

Slap tongue


Air tones without sounding pitch



Whistle tones with key clicks

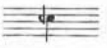

Accents with diaphragm



Flutter tonguing


Key slap


Raise pitch slightly (with fingering or embouchure)


Quarter tone lower (ditto)


Multiphonic (the written pitch corresponds to the most salient pitch)

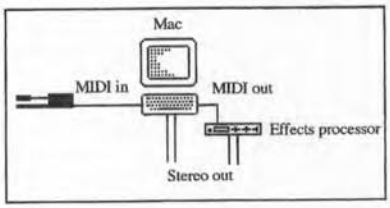
viii

On the electronics:

The interaction between the performer and computer is controlled by a stand-alone program written in Opcode MAX. It is available from PEER Hamburg on request.

System requirements und setup of the electronics:

Apple Macintosh or PowerMacintosh with 8 MBytes RAM and 25 MBytes hard disk space (or a SampleCell card with 32 MBytes RAM). Opcode's OMS ought to be installed.



Effect processor:

The effect processor should have the following features:

- Reverb, up to 15".
- Stereo delay, with at least 1.5" delay and feedback (left and right channels should be individually adjustable).
- Stereophonic pitch shift with at least 0.6" delay (left and right channels should be individually adjustable).
- Monophonic pitch shift, interval size controlled by MIDI note-on messages.
- Gate Reverb

For example, these requirements are satisfied by the YAMAHA SPX series (SPX 90, SPX 900, SPX 1000, etc.)

The effects:

The following seven effects should be programmed and stored into the memory of the device. The programs will be recalled via MIDI program-change messages:

0. Bypass.
   Marked OFF in the score.
1. Reverb: 15".
   Marked LREV in the score.
2. Stereo delay: left: 0.333" delay, right: 0.167" delay; 30% feedback on each channel.
   Written with x-ed note heads on the one-line system below the flute line.
3. Reverb: 1".
   Marked SREV in the score.
4. Monophonic pitch shift
   Notated on a separate five-line staff with x-ed note heads. The transposition interval is controlled via MIDI and can be derived by calculating the interval between the written pitch and C5. For example, if the flute plays *b* and the effects processor has *a*, an added *g♯* will be heard .
5. Stereo delay: left: 0.642" delay, right: 1.285" delay; 38% feedback on each channel.
   Written with x-ed note heads on the one-line system below the flute line.
6. Stereophonic pitch shift: left: minor second up, 0.3" delay, right: one second down, 0.6" delay. Written on five-line staff with regular note heads.
7. Gate Reverb: Type=Random, Room Size=2, Liveness=5
   Marked GREV in the score.

Generally, the settings of the effects processor are represented by x-ed note heads, whereas regular note heads symbolize the audible output of the device.

ix

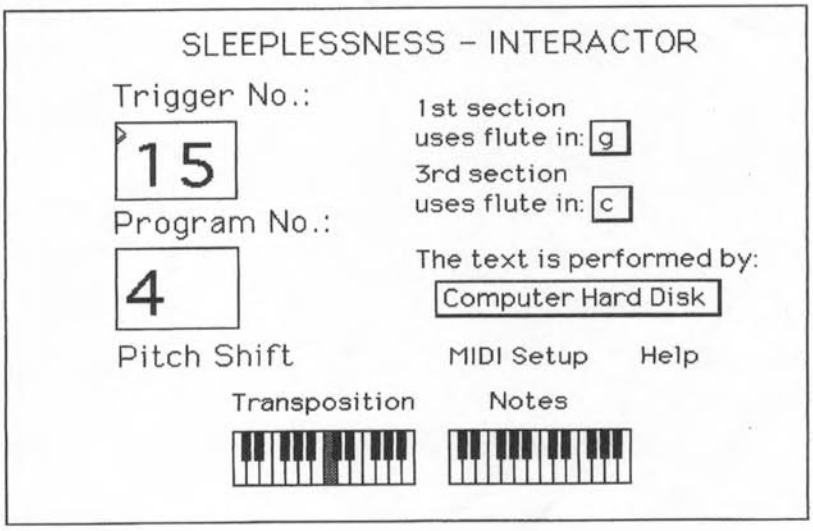
The pedal:

The performer uses the pedal in order to trigger the effects programs as well as the playback of the sample (a mix of high-pitched flute sounds notated on a separate staff) and--in case no narrator is present--the text. The 71 triggers are represented by a circle with an arrow on the separate line above the flute staff.

Text playback must be triggered even with live narration.

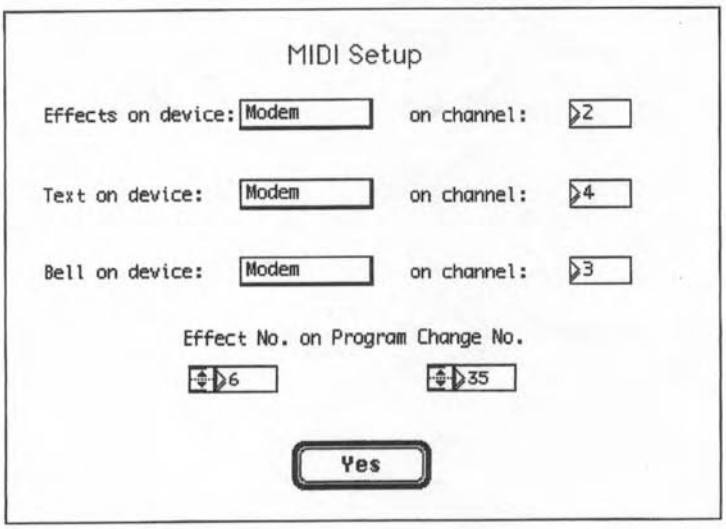
The pedal should be connected to a MIDI device and send *Controller-64* messages (sustain) to the computer.

The Interactor program:

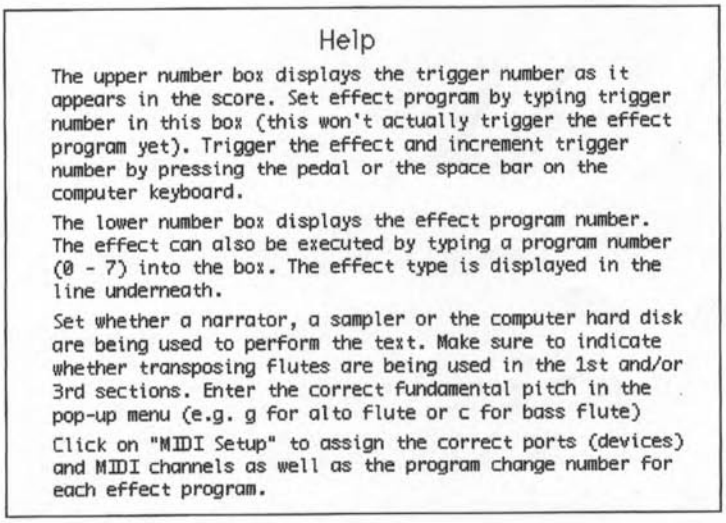


Main *Interactor* window

x



MIDI Setup window



Help window with explanations

APPENDIX 4

SOUND TECHNOLOGIST RESPONSE

The following notes were written at the author's request to assist illuminate the perspective of the technologist musician in one composition.

Andrew Blackburn: The sound technologist's perspective in Marco Stroppa's *little i*

'*little i'* is a quite different piece of music to manage technologically. Over the years of working with the piece, some of the techniques used have changed as access to different equipment has occurred. All the changes, such as using a single headset radio microphone, have been driven by a desire to make the performance of the music faithful to the known intention of the composer, and to simplify the setup, reducing the visible impact of the technology.

At various points throughout the years, Jean has conducted email communication with Marco Stroppa. In these letters he made his intentions for the musical and performative purposes in '*little i*' very clear. The role of the technologist was not as a controller of sound and switching a cd on and off; the control of the CD the role was that of a musician managing a most ungainly and sometimes unresponsive musical instrument - a CD player - making it respond to the flexibilities and musical needs of an ensemble - sometimes leading, but often acting in concert with the flute - moving in and out of the sound adding musical points, undercurrents or highlights around a complex flute line. Stroppa noted that this was like a chamber ensemble performer, and he is right - the skills needed are those of the chamber musician, at one with an instrument, working together with the other performer in the group, and always aware of the 'other' virtual performer in the ensemble - the performance and listening space which is integral to the performance. Stroppa sees the amplification as an instrument or separate personage.

The layout is also unconventional. While the equipment list calls for seven speakers and a sub-woofer, their disposition is set as four stations (three with a pair of speakers set about level with the music stand [one either side] and one [centre rear], a single speaker and sub-woofer both facing the rear wall, providing reflected sound only). The manner of treatment is also acoustically interesting - four mono channels (although there are pairs of speakers at each performing position) the sound of the tape or flute is placed quite specifically in one of the quadrants of the performance space. The effect for the audience is to hear a physically located sound from the performance space in the same way they might hear a single instrument sitting in a set position on a stage. The instruments are mono, but the listener hears the spread of sound created by the physical space itself.

The work is effectively un-recordable even with 5.1 or 7.1 surround sound. The mixing and placement of the sound - acoustic and recorded - within and around the space as well as the sense of the theatrical flute positions that define the space creates a sense of involvement for the audience which is an essential part of the performance. For example the sound of the flute player at the opening is acoustically inaudible, but amplified and mixed with the tape sounds. The sound of the flute is projected to the audience from speakers which are placed at the diametrically opposite point of the stage. To add to the sense of displacement, tape sounds which (although derived from flute sounds) are obviously processed, are projected from the station where the flautist is standing. So, visual cues provided by the flute player facing away from the audience at the rear of the stage are spatially displaced - the sound of the flute coming in an aurally obvious manner from the very front of the stage, while processed sounds issue from the place from which the acoustic sounds seemingly should emanate.

This positioning and displacement of audio and visual cues for the audience is shifted radically during the work, and again this is a musical and ensemble issue more than a technological one. The mixing console specified by Stroppa for '*little i*' was the Yamaha 02R, which at the time of composition (1996) was the most advanced digital desk available. Its ability to instantly move between scene setups that include routing of inputs to different outputs, varied volume and gain settings, as well as EQ is integral to the essence of the work. The sense of displacement noted above is frequently recreated in various musical contexts and serves to give the performance and listening space a musical identity and role that is distinct from the physical performers. For the performance in Brisbane 2007, a Yamaha 03D was used, which, though smaller than an 02R, had a sufficient range of input/outputs, memory and other settings. Today other digital desks or a Max/MSP patch could be utilized.

June 2008

APPENDIX 5

Audio and Video Files – Accompanying DVD

These audio and video files consist of referenced material from within the dissertation text (Tracks 14 to 26), and full recordings of each work discussed herein (Tracks 1 to 13). The recordings are of live performances[90]. They are not flawless studio recordings, but rather moments in time, artifacts captured from each of the recitals given as part of this degree. Although the spatialisation and interactive live electronics are not clearly perceivable through this data, I have striven to present a picture of the events and the sounds within these to create a context for the discussion. Video of Risset's *Passages* is included to show the context of the first recital. Video of Burt's *Mantrae* and Hajdu's *Sleeplessness* are additionally intended to demonstrate visual elements – the gestural triggering (Burt) and MIDI pedal use (Hajdu) – that occurred in the second recital.

Track 1: Risset – *Passages* [video] [14:10]
Track 2: Lavista – *Canto del alba* [audio] [7:57]
Track 3: Musgrave – *Narcissus* [audio] [18:00]
Track 4: Stroppa – *little i* [audio] [22:50]
Track 5: Saariaho – *NoaNoa* [audio] [8:36]
Track 6: Sveinsson – *21 Minutes for solo flute*, *Sounds of Snow* [audio] [1:01]
Track 7: Pinkston – *Lizamander* [audio] [9:00]
Track 8: Sveinsson – *21 Minutes for solo flute*, *Sounds of Heaven* [audio] [1:01]
Track 9: Burt – *Mantrae* [video] [5:00]
Track 10: Sveinsson – *21 Minutes for solo flute*, *Sounds of Birds* [audio] [1:01]
Track 11: *Veiled emergence* [video] [4:23]
Track 12: Sveinsson – *21 Minutes for solo flute*, *Sounds of Sounds* [audio] [1:02]
Track 13: Hajdu – *Sleeplessness* [video] [12:48]
Track 14: Musgrave *Narcissus*, p. 8, system 1
Track 15: Breath tone, *little i*
Track 16: Glissandi and microtones, *little i*
Track 17: Percussive articulations and breath tones, *little i*

[90] All recorded and produced by undergraduate students from the Queensland Conservatorium Griffith University

Track 18: Opening, *little i*

Track 19: Vocalisation, *NoaNoa*

Track 20: Opening, *Sleeplessness*

Track 21: Bass flute air tones, *Sleeplessness*

Track 22: Reverberated piccolo, *Sleeplessness*

Track 23: Disjunct accents, *Sleeplessness*

Track 24: Piccolo agitation, *Sleeplessness*

Track 25: Alto flute calm, *Sleeplessness*

DVD Contents:

Audio files (as above)

Video files (as above)

Dissertation text file (PDF)