A PERFORMER’S PERSPECTIVE ON THE EVOLUTION AND REALISATION OF EXTENDED FLUTE TECHNIQUES: A PORTFOLIO OF RECORDED PERFORMANCES AND EXEGESIS

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ABSTRACT

The study examines the development and performance of extended flute techniques since Berio’s *Sequenza* of 1958 to 2001. The project considers the unprecedented expansion of flute techniques since the *Sequenza* and the profound impact this has had on performance practice in new music composed for the flute. It addresses a number of critical issues faced by flautists in the absence of a standardised pedagogy and inconsistency of notation, and explores the role of the performer as a contributor in the performance of new music. The submission takes the form of four compact disc recordings of repertoire chosen from a wide timeframe, beginning with Claude Debussy’s *Prélude à l'après-midi d’un faune* of 1894 and moving through to Daniel Börtz’s *Tinted Paintings* in 2001. The repertoire was selected in order to highlight and explore problems encountered when performing extended techniques, and to demonstrate the ways in which various extended techniques are used by composers. In so doing the study brings into focus important issues of modern flute performance practice, and suggests possible strategies for addressing various technical and interpretative challenges.
DECLARATION

I hereby declare that the recordings and the supporting exegesis that comprise this submission are my original work.

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Copies of recordings may be sought directly from the principal performer and author of the Exegesis.

CD DECLARATION

The recordings submitted are studio recordings for commercial distribution that have been professionally produced and edited according to industry standards. They were recorded in studio sessions at Move Records with a number of takes and were edited and produced by Vaughan McAlley.

SIGNED: __________________________ DATE: _______

VERIFICATION OF RECORDINGS

The Principal Supervisor is required to verify that the recordings have emerged during the course of the program of study.

SIGNED: __________________________ DATE: _______
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INTRODUCTION

The current project examines the development and performance of extended flute techniques since Berio’s *Sequenza* of 1958 to 2001. The unprecedented expansion of flute techniques since the *Sequenza* has had a profound impact on the way flautists approach the performance of new music. The virtuosic demands of this repertoire inevitably turns the performer into researcher. As flautist Pierre-Yves Artaud observes:

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 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.¹

Flautists are faced with learning new, varied and subtle techniques on the instrument and require a unique set of interpretive skills to perform new music. A survey of the literature reveals an increasing discussion about extended techniques in the flute repertoire. However, many publications take the form of catalogues, each focusing on a limited number of techniques. Several of the initial resources are now obsolete and contain fingering errors, conflicting terminology and inconsistent notational symbols. There is no clear and instantly discernable system of notation that identifies a required playing technique, and sound quality. Conflicting terminology for new flute techniques, and a scarcity of information on the application of extended techniques in the context of specific repertoire, presents problems for those wishing to perform new music.

The current study addresses a number of critical issues faced by flautists in the absence of a standardised pedagogy and inconsistency of notation, and explores the role of the performer as a participant in the decision making processes needed to realize the notation of contemporary music. The study considers the various methods of producing individual techniques, the variation and efficiency of notational symbols and terminology, and suggests alternatives to unrealisable fingerings,

articulations, rhythms and interpretations of graphic scores. Several interpretive issues which need to be resolved at various stages of preparation, rehearsal and performance are given in the context of musical examples from the chosen repertoire. These insights suggest ideas for solutions and further investigation in order to develop a more fluid approach to performing the extended technique repertoire.

The repertoire for the current study, which provides source material for the exegesis, was chosen from a wide timeframe, beginning with Claude Debussy’s *Prélude à l'après-midi d'un faune* (1894) and moving through to Daniel Börtz’s *Tinted Paintings* (2001). The repertoire was selected in order to highlight and explore problems encountered when performing extended techniques, and to demonstrate significant changes in the use of these techniques by composers. The pieces performed and recorded as part of the submission demonstrate the vast range of extended techniques currently extant, and highlight the various, and at times conflicting notations used to identify them. In so doing the repertoire brings into focus important issues of modern performance practice.

Structurally, the exegesis is presented as five chapters. Chapter 1 examines the existing array of flute technique resources that attempt to help flautists become fluent in recognising, interpreting and realising new musical symbols. It outlines the first generation of catalogues, dealing with initial issues of the production and notation of extended techniques. In more recent years writers have contributed books, studies and journal articles focusing on particular elements of performance using extended techniques. The lack of a consolidated source of information and commentary on the experience of preparing repertoire for performance produces challenges for flautists in the acquisition of skills associated with extended techniques.

Chapter 2 explores the historical precedents that led to the expansion of flute techniques according to the following considerations: the advent of the Boehm flute; the evolution of the instrument’s character and transition into the 20th century; preliminary explorations in extending the timbral possibilities of the instrument; and the role played by post-World War 2 composers in fostering a new virtuosity in flute performance. The increasing importance of timbre and texture in composition in the early twentieth century brought about an initial experimentation into unconventional flute techniques, which in turn required new forms of notation and unfamiliar practical skills for performers. The chapter presents the developments of extended
techniques in an historical context, and draws upon significant musical examples from the flute repertoire. These areas have informed the preparation and process of performance of the repertoire included in the current submission.

Chapter 3 considers the developments in flute repertoire since Berio’s landmark *Sequenza*. The *Sequenza* foreshadowed future explorations into the abundance of timbral effects and techniques possible on the flute. In addition to using flutter tonguing, harmonics and key clicks, Berio was the first to approach the possibility of creating polyphony on the flute, through his introduction of multiphonics. Electronics and recording technology in the 1950s threatened the existence of the live performer by highlighting the limitations of live performance on traditional instruments. The chapter examines the evolution of new techniques as they were introduced into the flute repertoire, the diversity of their notation, and surveys several significant compositions exploring the instrument’s timbral and textural resources from 1958 to 2001. This new repertoire demanded a new set of skills from flautists in order to read and produce the extended techniques called for, and in turn raised issues relating to the performer as interpreter. Several widely diversified forms of notation are illustrated through musical examples drawn from the repertoire. It is shown that, owing to the lack of a standardised notation, the performer needs to be conversant with these diverse notational practices.

Chapter 4 presents a discussion of three works for solo flute which explores issues of accuracy of notation, the transference of non-western flute techniques and notations, and the impact of notational challenges as a structural element of composition. Performance analyses of Fukushima’s *Shun San* (1968), Ferneyhough’s *Cassandra’s Dreamsong* (1971) and Perezzani’s *L’Ombra dell’Angelo* (1986) are based on my research and reflection through the process of performance, from the initial stages of negotiating the notation, becoming familiar with the production of extended techniques and their incorporation into the pieces, and finally, performance.

Chapter 5 discusses strategies for preparing new music for the flute in the absence of a standardised notation. It includes a graded list of pieces and studies designed to familiarise students of varying capabilities with the range of extended techniques. The chapter also offers strategies I developed while preparing the recorded repertoire in order to isolate and incorporate difficult techniques into performance.
CHAPTER ONE

Composers are challenged to create instantly discernable symbols, particularly when layering symbols with multiple instructions, describing unknown techniques without aural examples, or when translating techniques from other cultures. New notational practices are currently being strained in order to adequately communicate information to performers, particularly when symbols are necessary to convey several requirements at once. The challenge is whether an individual symbol can express all elements of a particular sound. Pierre-Yves Artaud sums up the flautist’s predicament well:

In order to understand fully the mentality of the performer, let us imagine a motorist on a winding road: he drives in accordance with the road signs, relying upon their symbols which instantaneously trigger off in him certain technical responses enabling him to follow the road in complete safety. Clearly, if the symbols were replaced by a long phrase such as “look out for the dangerous bend to the left, reduce your speed, pull back, do not brake on the turning”, an accident would be inevitable! Although the crucial information, “... bend., left”, is present, it is submerged in a flood of additional, indeed useless, secondary indications, and even if this information is extracted and placed alone it has in no way the same force of persuasion.²

The contemporary flute repertoire challenges performers to become fluent in recognising and interpreting several diversified forms of notation. The lack of a consolidated commentary on the experience of performing the repertoire produces difficulties for flautists in the acquiring the skills necessary to use extended techniques. At this point flautists need to consult a large number of different resources in order to demystify notation and develop the expertise required to play this music. The current chapter offers an overview of the principal and more reliable of those resources.

With the introduction and more frequent use of new flute techniques from the 1960s onwards, composers and players began writing about their practical application in journal articles. The complexity of these new techniques required texts to explain their production, which led to the publication of several catalogue and guidebooks by composers attempting to notate and describe the new effects.

Among the earliest publications to explore new flute sonorities was a 1963 article in the Instrumentalist by Robert Cantrick, which became a catalyst for

building more interest in available flute sounds.³ James Pellerite’s *A Modern Guide to Fingerings for the Flute* (1964) was a collection of fingering charts (traditional, alternate, multiphonic, trills and quarter-tone fingerings) as well as brief instructions on how to produce them, still an invaluable resource for flautists today.⁴ Of pivotal importance in the development of new flute techniques was an article in *Perspectives of New Music* by John Heiss.⁵ The article reached a large number of flautists and composers, and heightened the consciousness of the flute’s timbral potential amongst readers. It was the first time information on multiphonics for flute had been published, and was the first of three articles written by Heiss between 1966 and 1972. In his article of 1972 Heiss stated:

> Many performers and composers currently have their own individual techniques and fingering charts for new sounds. The present need appears to be one of communication and consolidation, and it is in this spirit that I offer what follows … Since precise verbal description of the timbres produced with the above techniques is difficult, if not possible, composers are advised to consult with performers.⁶

In 1967 Bruno Bartolozzi published the first book to explore in depth some of the new extended techniques found in new music for woodwind players. *New Sounds for Woodwinds* (complete with an LP recording of examples) provided composers with examples of what kinds of effects were possible and gave the first notation for these techniques.⁷ Unfortunately it contains several unreliable fingerings and notations (some of these are errors, and others are dependent on different makes of instruments, and the inconsistencies of different instruments). This has caused many problems in pieces in which composers have used the book as a reference point. Many of the techniques Bartolozzi described on the flute resulted in extremely soft dynamic levels, barely audible when performed with other instruments, which may have resulted in many pieces from this era being written for solo flute. Although many new discoveries have been made since, making several of his notations obsolete, this book influenced much of the literature that followed it.

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Phillip Bate’s *The Flute* (1969) offered an historical overview of the instrument, and provided fingering charts. In 1974 *The Avant-Garde Flute: A Handbook for Composers and Flutists* by Thomas Howell was published, charting 1826 multiphonic fingerings and instructions on how to produce them. Its chapters covered timbre, intonation, special effects, alteration of pitch and amplification, giving diagrams and fingering charts throughout.

One year later, in 1975, Robert Dick’s *The Other Flute* detailed how to produce multiphonics, whistle-tones, micro-tones, percussive effects, singing while playing, and alternate fingerings. At the time it was the most comprehensive source on a variety of techniques and is still consulted as one of the best quality guides on extended technique as it is accurate, concise, and clearly presented. The book’s strength is that it deals with the variety of tone and pitch of individual multiphonic fingerings for the first time, although it is not comprehensive of all techniques and fails to give examples in musical contexts.

These texts allowed performers to better interpret new music and gave composers the knowledge of what was possible on the flute. The texts focused on creating new notation, fingering charts and instructions on how to produce new techniques on the flute. That said, in keeping with the spirit of exploration that was the hallmark of the 1960s-70s, much of this literature contains errors, is confusing in terms of notation and terminology and is simply not comprehensive. Although no one notational system or fingering system is used by composers, Robert Dick and James Pellerite’s charts continue to be the more frequently used points of reference.

Nancy Toff’s *The Development of the Modern Flute* (1979) outlined 19th and 20th century developments on the flute, discussed the pre-Boehm flute, and gave charts of avant-garde notation with a timeline of players and instruments. Toff has also written *The Flute Book* (1996) which contains a chapter on modern flute repertoire. These early publications provide material that builds our understanding of new skills required for contemporary performance. Each of these texts describe a number of extended techniques and have a particular utility, however they primarily

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take the form of catalogues rather than delving into the practical details of producing these effects for performance.

The two most notable, more recent books are Pierre-Yves Artaud’s *Present Day Flutes* (1980)\(^{13}\) and *The Techniques of Flute Playing* by Carin Levine and Christina Mitropoulos-Bott (2004).\(^{14}\) Artaud, a flautist and pioneer interpreter of new music, described extended techniques and fingerings for all four standard flutes used today (piccolo, C flute, alto and bass flutes). His book gives a great diversity of techniques focusing on fingerings, and embouchure techniques to create multiphonics and air sounds. It is a comprehensive (though not exhaustive) compendium of many of the extended techniques that exist at the present time. Its drawbacks are cumbersome fingering systems, symbols for aeolian sounds which can confuse rhythmic instructions, and the use of notation symbols not widely used outside of France. Levine and Mitropoulos-Bott’s comprehensive book *The Techniques of Flute Playing* includes catalogues of fingerings and short descriptions on the execution of techniques, which is often lacking in other texts. Many extended techniques are described, an example of notation is given and a practice tip is included for each technique. The examples chosen demonstrate a variety of different notations for techniques that has not been acknowledged in previous texts.

Several of the resource books are enhanced by audio examples in the form of tapes and CDs. A comprehensive sound catalogue does not yet exist, but recently performers such as Robert Dick\(^{15}\) and Matthias Ziegler\(^{16}\) have recorded audio and video on their websites to demonstrate individual techniques. Swedish flautist Mats Möller provides a short manual on new flute techniques on his website\(^{17}\) and John McMurtery’s\(^{18}\) website features videos, scores and explanations of extended techniques. Several new music soloists and ensemble performers offer valuable insights in their blogs on performance practice, including Helen Bledsoe, who has

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provided a functional list of new music repertoire and describing the difficulty of their techniques.\textsuperscript{19}

Several exercises and instructional pieces have been written as pedagogical studies on the practical application of extended techniques. Dick’s \textit{Flying Lessons: Six Contemporary Concert Etudes} (1983)\textsuperscript{20} and \textit{Tone Development through Extended Techniques} (1986)\textsuperscript{21} are both accompanied by an instructional CD. These studies are designed to enable the flautist to develop the embouchure strength and the ability to play multiphonics, whisper tones, natural harmonics and other extended timbres, while simultaneously developing control of tone for traditional flute repertoire. \textit{Quodlibetudes for Solo Flute} (1988) by Harvey Sollberger focuses on introducing players to new technical and conceptual demands, and is designed to be studied in individual segments or as a complete recital piece. Aurèle Nicolet has collected and edited a number of short works by several composers. Entitled \textit{Pro Musica Nova Studies for Playing Avant-Garde Music} (1973), the volume features brief introductions on extended techniques employed in the various studies. Wil Offerman’s \textit{For the Contemporary Flutist} (1992) provides twelve creative exercises intended to develop the control required for several extended techniques.\textsuperscript{22}

The US National Flute Association initiated the High School Soloist Competition in 1987, and has commissioned several works intended to introduce new techniques to young players on a yearly basis. The works, which include Elizabeth Brown’s \textit{Trillium}, John Heiss’ \textit{Fantasia Appasionata} and Jennifer Higdon’s \textit{Song}, offer students and teachers a wider variety in the choice of repertoire at this level. Collections such as \textit{Flute Update: New Music for Young Flutists} by Walter Wretschitsch and several of Wil Offerman’s publications are aimed at introducing high school level flautist to new music. \textit{Easing Into Extended Techniques} by Linda L. Holland contains several etudes which introduce the intermediate level flautist to 20\textsuperscript{th} century sounds.

Several articles from the \textit{Perspectives of New Music} journal provide insights into important elements of performance over several decades. ‘Transmission, Interpretation, Collaboration – A Performer’s perspective on the language of

\begin{footnotesize}
\textsuperscript{19} Helen Bledsoe, \textit{Flutin’ High} http://bledsoe22.blogspot.com (accessed 27 July 2010).
\textsuperscript{22} Wil Offerman, \textit{For the Contemporary Flutist} (Frankfurt am Main: Musikverlag Zimmerman,1992).
\end{footnotesize}
contemporary music: An Interview with Sophie Cherrier’ by Nina Perlove (1998), discusses the relationship between performer and composer and the difficulties in defining notation. Benjamin Boretz and Edward Cone have compiled several articles from Perspectives of New Music in the book Perspectives on Notation and Performance (1976), which discuss issues of modern notation. Chapters include ‘Problems and Methods of Notation’, ‘Programmed Signals to Performers’ and ‘What Indeterminate Notation Determines’.  


But over and above these resources, the best pedagogical resources come from those flautists who have collaborated directly with composers. Flautists such as Sophie Cherrier, Roberto Fabbriciani, Harrie Starreveld, Camilla Hoitenga, Robert Aitken, Aurèle Nicolet, Robert Dick, Mario Caroli, Matthias Ziegler, to mention just a few, have had many works written for them, and have worked closely with

23 Benjamin Boretz and Edward Cone, Perspectives on Notation and Performance (New York: Norton, 1976),
25 Ronda Benson Ford, A door to extended techniques: Five analyses and composer interviews from the National Flute Association’s High School Soloist Competition. DMA Dissertation, University of Southern Mississippi, 2005.
composers. Formal and informal contact with these performers has been, and remains, invaluable.

In sum, while there are several guides to extended flute techniques, there are limited resources that address directly the practicalities of incorporating techniques into the performance of specific pieces while demystifying the notations used. It follows from this that these resources provide little insight into interpretative approaches, which often obliges performers to resort to the end product – a recording or performance of a work – in order to decipher practical problems generated by a given score. Needless to say, this last resort results in the kind of imitation that this study seeks to redress.
CHAPTER TWO

This chapter explores the historical precedents that led to the development of extended flute techniques, illustrated by significant musical examples from the flute repertoire. Developments in flute design and the subsequent change in the instrument’s character during the nineteenth century had a significant impact on twentieth century flute repertoire. The new capabilities of the instrument enabled composers to explore unfamiliar timbral possibilities, and the altered construction of the flute allowed new playing techniques to be developed. As composers such as Arnold Schoenberg and Luigi Russolo began to focus on the importance of timbre and texture, so too was there an increased interest in the potential of unconventional flute techniques to yield greater possibilities on the instrument. These developments resulted in composers having to find a language to notate these effects. In turn, instrumentalists were faced with having to acquire new virtuosic performance skills in order to play works which incorporate extended techniques.

The nineteenth century Industrial Revolution saw the flute become enormously popular in middle class Europe. More people had the financial means to attend concerts, take part in amateur music-making, subscribe to music journals, and buy printed music and instruments. It was the era of traveling virtuosos who were no longer attached to a court or aristocracy. Middle class families invested in a piano to play transcriptions of their favourite opera melodies at home. Young ladies learned an instrument to achieve social graces and gentlemen played flutes which doubled as fashionable walking sticks.28 This trend stimulated flute manufacture, music publishing, and the development of the performer who would write his own compositions for virtuosic display. The latter were often salon pieces based on operatic or popular themes of the time, bravura variations and imitations of birdsong. Traveling virtuoso flautists such as Charles Nicholson achieved enormous popularity. However, music composed specifically for the instrument by the leading composers of the day was conspicuously absent. This dearth was linked to the insufficient power and variety of tone of the early nineteenth century flute.

These and other deficiencies generated a vast assortment of flutes, fingering systems and mechanisms intended to offset them. By the 1820s most flutes had a mechanism with eight or nine keys, but still faced the problem of having an uneven

quality of sound and pitch throughout the instrument. When Theobald Boehm applied for a licence in 1829 to establish his instrument making business, he proposed that his flutes would have the following characteristics:

1. Pureness of intonation
2. Evenness of tone
3. Facility of operation
4. Secure speaking of the highest as well as the lowest notes
5. Beautiful profile
6. Thoroughly neat and robust workmanship

Boehm’s instruments serve as the antecedent for the modern flute, and shaped the subsequent repertoire. The major design alterations he made to the instrument created a more immediate response of sound, more effective articulation, and metal flutes allowed subtle and extreme ranges of dynamics and tone colour. The Boehm flute was embraced in France from the 1850s but took many decades to be accepted as the unrivalled fingering system and instrument throughout Europe. Changing fingering systems mid-career was a difficult undertaking for professional flautists, and there was also debate over the instrument’s character and sound. The orchestral flautist Rudolf Tillmetz justified his return to a pre-Boehm style of instrument in the 1880s as follows:

I eventually had to convince myself from my own experience that the various objections on the part of the informed authorities were to a great extent justified. When I participated in the Parsifal performances of 1882 in Bayreuth as an orchestral player I noticed that Richard Wagner showed no sympathy for the cylindrical flute. Specifically he gave it the name “cannon”. I therefore decided, urged still further by the Royal General Music Director Hermann Levi, to change over to the conical ring-key flute, which I did not regret …

The overtones, harmonics and quality of sound available on the Boehm flute began to influence compositions written for the flute towards the end of the nineteenth century. The structural transformation of this instrument had a direct impact on the later expansion of flute technique in the 20th century. Improvements to

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the fingering system, intonation and sound quality and the instrument’s mass production by the early 20th century resulted in performers and composers redirecting their attention to timbral aspects of flute playing, rather than being hindered by the mechanical issues that had limited the flute’s use in the 19th century.

The Boehm flute’s equality of sound in all keys, larger dynamic range, and improved intonation over the entire range of the instrument, saw it integrated eventually into orchestras. The orchestral flute parts by Brahms, Wagner, and Strauss exploited the extremes of dynamics and register, in addition to focusing on sound quality and colour. The flute’s new key mechanism and fingering system also enabled the use of alternate, harmonic and half vented fingerings. Early examples of notated harmonics in flute music which were used as a timbral effect are found in Doppler’s Hungarian Pastorale Fantasy and in Ravel’s Daphnis et Chloë.

Paul Taffanel, who was the first to perform and teach on the Boehm flute at the Paris Conservatoire, developed a teaching method which focused on producing variety in tone colour and a homogeneous sound throughout all registers of the flute. His method has become one of the most influential on flute players and is still used as a standard teaching resource in conservatories around the world today. Taffanel’s playing inspired a wealth of repertoire, including works by Faure, Widor and Tchaikovsky, all which exploited the characteristics of the new metal Boehm flute and Taffanel’s unique style of playing.

A shift emerged from the virtuoso style of the 19th century to the development of repertoire which demanded more extremes in tonal colour and technique. Works such as Saint-Saëns Romance for Flute (1871), Faure’s Fantaisie (1898) and Debussy’s Prélude à l’après-midi d’un faune (1892-4) demonstrate the development in the use of colour and timbre and a change in the flute’s musical identity. Pierre Boulez grasped the significance of this change in identity in Debussy’s Prélude à l’après-midi d'un faune:

The flute of the Faune brought a new breath to the art of music. What was overthrown was not so much the art of development as the very concept of form itself, here freed from the impersonal constraints of the schema, giving wings to a supple, mobile expressiveness, demanding a technique of perfect instantaneous adequacy. Its use of timbres seemed essentially new, of exceptional delicacy and assurance in touch; the use of certain instruments – flute, horn, and harp – showed the characteristic principles of the manner in which Debussy would employ them in later works. The writing for woodwinds and brasses, incomparably light-handed, performed a miracle of proportion, balance, and transparency. The potential of youth possessed by that score
defies exhaustion and decrepitude; and just as modern poetry surely took root in certain of Baudelaire’s poems, so one is justified in saying that modern music was awakened by Prélude à l’après-midi d’un faune.31

Debussy composed this piece for a smaller orchestra, unlike many late romantic works of the time, and gave particular significance to instrumental colour and timbre. The opening flute solo, comprising of the almost chromatic descent to the tritone, pushed the boundaries of tonality and exploited the new flexibility of nuance available on the metal flute. The use of colour particularly in the flute, horn, and harp elevated timbre to a new level of importance and was taken up further as a musical technique by Schoenberg. Schoenberg adopted the term Klangfarbenmelodie in order to describe timbral and textural contrast in his Five Pieces for Orchestra (1909). His belief that “timbre is thus the large area of which pitch is but a precinct” had a major impact on timbre as a structural element in later composition in the 20th century.32 By the early 20th century the flute had established an important role in orchestral music in addition to having a long tradition as a virtuoso instrument. It became an ideal instrument for experimentation with its flexibility in sound and high degree of virtuosity. As composers began to investigate new possibilities in sound the solo repertoire for the flute experienced a degree of growth which it had never been seen before. One area of timbre which composers began to gradually explore was the use of extended techniques in the flute repertoire. These are defined in Groves Music Online: “unconventional instrumental or vocal performance techniques used to expand the way music is communicated”.33

Although the use of extended techniques such as glissando and even multiphonics were already used periodically throughout the 19th century, they were usually seen as a virtuosic novelty. The new placement of tone holes and open holed keys on the Boehm flute increased the range and variety of multiphonics and alternate fingerings. Glissando, microtones and some multiphonics became easier to produce using the open holed system. Flutter tonguing, one of the oldest extended

techniques, was first used in the orchestral works of Richard Strauss, Mahler and Ravel. It is possible to produce flutter tonguing in two ways: by rolling the tongue or vibrating the throat (the production using the throat being particularly useful for playing very softly in the low register). Schoenberg reconsidered the character of the flute in his *Pierrot Lunaire* (premiered in 1912), not only in the interplay between flute and the *sprechstimme* voice in “Der kranke Mond”, but by using a variety of articulations, extreme jumps through all three registers, and many examples of flutter tonguing in throughout the work. The following year (1913), Debussy wrote *Syrinx*, the first solo piece to be written by a significant composer in the 20th century, which inspired an unprecedented number of works for the genre over the next hundred years. The piece expanded the sound spectrum in solo flute music, using pentatonic and whole tone scales based on ancient modes, doing away with bar lines and rejecting technical display in order to utilise the instrument’s unique timbre.

During this time the Italian futurist composer Luigi Russolo also experimented with new possibilities in “noise concerts” promoting new music to be made up of the sounds of modern industry. In his *The Art of Noise* (1912), he grouped these sounds into six categories:

1. Bangs, thunderclaps, explosions
2. Whistles, hisses, snorts
3. Whispers, murmurs, rustling, gurgling
4. Screams, shrieks, buzzing, crackling, sounds produced by friction
5. Sounds produced by striking metal, wood, stone, china, and the like
6. Animal and human cries – roars, howls, laughter, sobs, sighs

Many of these characteristics have now been embraced into extended techniques of the flute literature of the 20th century. Techniques including flutter tonguing, harmonics, multiphonics, glissandi, key clicks and jet whistle were to be used sparingly into works prior to the 1960s. These were included a few pioneering pieces, almost exclusively in the solo repertoire, and were particularly influential on post-war composers.

In 1923 flautist Leonardo De Lorenzo published his “Sogno Futuristico no.17” (Futuristic Dream) from his *Eighteen Caprices op. 34*, which demands extreme technical display from flautists. The piece is one of the earliest pieces for the flute which exploits techniques such as altered fingerings and a brief quarter-
tones section. In the piece De Lorenzo gives instructions and notation for the quarter tones:

![Quarter tone notation in Leonardo de Lorenzo’s Capriccio XVII “Sogno futuristico” dal “Non plus ultra del flautista” op. 34 for solo flute (Mainz: Schott Edition, 1954), 3.](image)

Several different methods are used to produce microtones on the flute. On all flutes it is possible to play quarter tones by changing the embouchure and rolling the flute towards or away from the lips. On an open-holed flute they can be created by partially opening a key through only depressing the key rim, or by creating new fingerings. On a closed-hole flute the best possibility to create microtones is by embouchure adjustment. By the end of the 20th century, Dutch flute-maker Eva Kingma developed the quarter tone flute originally produced by Brannen Cooper. It is a Boehm flute with six extra keys that allow the possibility of a fully quarter tone flute, which can essentially play a glissando through the entire range. On a standard modern flute a continuous glissando can only be produced across the entire range by gradually covering and uncovering the key holes, sliding the fingers successively off the hole onto the key ring, however it cannot be done between a#-b-c-c#-d since there are no rims on these keys.

De Lorenzo notates the final two notes of “Sogno Futuristico” as harmonics, but indicates specific altered fingerings beneath each note. This fingering suggests a similar timbre to a harmonic, since these fingerings affect the tone colour as well as pitch. Even today there is such a complexity and variety of microtones that there is not always consistency among composers on their notation. The performer is required to research options if composers has not specified fingerings, and must take into account that microtonal fingerings also effect the tone quality. As a flute player and composer De Lorenzo gave graphic fingerings which are the most immediately identifiable notation for flautists to read (see over).
Another little known work which experiments with flutter tonguing in the high register, variations in vibrato, notated variations in pitch (quarter tones) and breath pulsations, is *Temperamental Mobiles* by the US composer Henry Brant.\(^{36}\) Written in 1932, Brant uses new effects including varied speeds of vibrato. Since there was no notation at the time to describe the effects he wanted, Brant used words above the staff, rather than symbols as instructions.

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**Figure 2**: Alternate fingerings in Leonardo de Lorenzo’s *Capriccio XVII “Sogno futurístico”*, 3.

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**Figure 3**: Instructions in Henry Brant’s *Mobiles I for Solo flute*. (New York: Carl Fischer, 1989), 4.

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An extremely significant work in terms of its use of timbre as a structural element was *Density 21.5*, written by Edgard Varèse.\(^{37}\) Composed in 1936 for the flautist Georges Barrère, the piece was a pioneering work for the instrument, being the first use of the percussive effect of key clicks, the extended fourth octave of the flute and extreme dynamics (with a range of pppp to fff). It was inspired by the tonal colour of Barrère’s platinum flute (21.5 being the density of platinum) and Varèse wrote key slaps to be produced in combination with normally produced notes.

There is sometimes confusion amongst flautists as to what kind of key click Varèse desired. While the instructions on the score are slightly ambiguous (causing many performers to use different types of key clicks), they do indicate that the performer is to produce a key click at the same time as using air to produce a sound. There is also confusion about the various dynamics written beneath the notes in the key clicks section. Obviously key clicks have an extremely limited dynamic range, and the footnote by the composer states to play all the key clicks softly. According to flautist Robert Dick these dynamics where only introduced into the score when Varèse revised the piece in 1946. In the original edition the whole section was marked pianissimo.\(^{38}\)

In August 1936 André Jolivet completed his *Cinq Incantations*\(^{39}\) for solo flute. According to Sharon Winton, the collection was written during a period when Jolivet strived for a musical language to give back to music its original, ancient meaning, when it was the magical, incantatory expression of the religious beliefs of human groups … My art is

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dedicated to restoring music’s original ancient sense, as the magical and incantory expression of the religiosity of human communities.\textsuperscript{40}

These pieces demand a new sophistication from the performer, on an instrument that has now become far more complex. The opening Incantation suggests a harmonic foundation representing the earth (a 3/8 metre), which is interspersed with large flutter tongued leaps across the instrument’s range symbolizing the spirits (in 12/8 metre).

![Opening Incantation](image)

Figure 5: Opening of André Jolivet’s \textit{Cinq incantations: pour flûte seule}. (London: Boosey & Hawkes, 1939), 1.

The movements contain directions such as as \textit{sifflant}, \textit{comme une grande respiration}, \textit{quasi tromba} and several glissandi and pitch slides. As with microtones, pitch bends can be produced by a lip glissando or a fingered glissando (on an open-holed flute).

Pierre Boulez’s \textit{Sonatine} for flute and piano (1946) went unheard until Severini Gazzelloni performed it at the Darmstadt Summer Course in 1954. Although its only extended technique is flutter tonguing, it was a radical departure in its sonorities and textures. In 1950 Heitor Villa Lobos and musicologist/flautist Carlton Sprague Smith experimented with Native American and modern flutes, and created the ‘jet whistle’ effect, resembling the sound of a jet plane’s blast. Notated in the finale of his \textit{Assobio a jato for flute and cello} by an x note head, the flautist covers the entire mouth piece with the mouth and exhales with great force on specified pitches.\textsuperscript{41} At the highest pitch of the exhalation a whistle sound is heard (see over).

\bibitem{sharon} Sharon Winton, “André Jolivet’s Cinq Incantations and Ascèses”, \textit{The Flutist Quarterly} 32.2 (2007): 33
\bibitem{Heitor} Heitor Villa-Lobos, \textit{Assobio a jato} (New York: Peer Music, 1953).
Composed as a final exam piece for the Paris Conservatoire, *Le Merle Noir* by Oliver Messiaen was commissioned in 1951 by its director Claude Delvincourt in an attempt to introduce some avant-garde musical ideas after the restrained musical environment under Nazi occupation. Its coda is one of Messiaen’s earliest experiments with serialism. The work has no specified meter and its improvisatory cadenzas employ flutter tonguing, rapid articulation and large leaps to imitate bird calls.

The end of World War II prompted a new period of musical thought. Composers no longer wanted to build on European cultural traditions and went to extreme measures to detach themselves from the past. Composers attending summer new music courses at Darmstadt led by Boulez and Stockhausen, began by promoting serialism, and then moved towards experimentalism and the use of electronics from the 1950s. They began exploring new and inventive possibilities in sound which demanded a new virtuosity and performance techniques from instrumentalists. The innovation of extended techniques was the logical continuation of the importance of timbre and texture first mentioned in Schoenberg’s *Harmonielehre*. The advent of new technology in the 1920s had led to composers to use electronic techniques writing for new instruments such as the ondes martenot and theremin. By the 1940s composers were experimenting with the tape recorder and amplification of instrumental sounds, and radio studios and universities began to set up electronic music studios. The advent of the new technology in electronics and recording were incorporated into musical composition leading composers to broaden how they defined music. This new age of technology threatened the existence of the live performer and in reaction, players and composers extended traditional instruments through new techniques, evolving them into essentially new instruments.

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These factors came at a time when tonality was on the brink of collapse and the tradition of Western classical music appeared to have run its course.
CHAPTER THREE

By the 1950s electronics had become an important component in musical composition as composers employed emerging electronics and recording technologies in such a way as to challenge conventional, live performance. Electronics were able to produce precisely accurate performances of highly organised music that highlighted the limitations of human performances. Composers now were able to explore the limits of instrumental technique, the capabilities of traditional instruments, and with that timbre, texture, and rhythm. All of these called for new means of notation. With regard to the flute, the exploration of the flute’s timbral and textural resources essentially created a new instrument. A number of significant pieces for flute in the 1950s and 60s began to use new notation to represent elements of pitch, tempo, rhythm, articulation, polyphony and timbre. Many performers and composers developed their own symbols for individual techniques, which resulted in widely diverse forms of notation that persist to this day. Owing to the lack of a standardised notation, today’s flautist needs to be conversant with the range of notational practices used in past works. In the current chapter I review the ways in which composers have adapted conventional and unconventional notations in order to communicate their intentions to the performer. I consider the challenges this presents to the performer and suggest strategies to address these problems found from performing the repertoire contained in the four CDs.

• Graphic Notation

Complex rhythms unrelated to a constant pulse were becoming more frequent in music of the 1950s. As rhythmic structures became more complex, conventional notation was incapable of doing justice to the subtleties and complexities. Henry Cowell in part had addressed one aspect of the problem in his Fabric for piano (1917) by inventing his own notation for notes that are not divisible by multiples of two (see over).43

43 Henry Cowell, cited in Kurt Stone, “Problems and Methods of Notation”, Perspectives of New Music 1.2 (Spring 1963): 17.
Figure 7: Cowell’s notation, cited in Kurt Stone’s “Problems and Methods of Notation”, Perspectives of New Music 1.2 (1963): 17.

Conventional notation limits the divisions of a semibreve to multiples of two (2, 4, 8, 16 etc.), and any alternative to this requires the use of dots or ties to prolong notes. In response to these limitations some composers began experimenting with graphic or proportional notation.

During the mid 1950s Luciano Berio was incorporating complexity and aleatoric music into his own expressive and often theatrical style. His *Sequenza I* for solo flute (1958) was the first of a series of seventeen sequenzas for different instruments, each one a virtuosic and experimental musical work aimed at attempting to overcome the technical limits of traditional instruments. Berio collaborated with flautist Severino Gazzelloni (who played a major role in the incorporation of the flute into contemporary music) on the *Sequenza*. The piece foreshadowed the direction of experimentalism to come, as Berio was the first to approach the flute as having a multitude of timbral possibilities, as well as confronting the possibility of creating polyphony on a melodic instrument.

Influenced by John Cage’s spatial notation, Berio used a graphic score, depicting proportional notation. Traditional black note heads are used to indicate pitch and are placed proportionally into the context of dashes representing barline. Each bar is equal to a metronome tempo of 70 beats per minute.44

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In an interview with Benedict Weisser, Berio remarked:

Usually, I’m not concerned with notation itself. When I’m concerned, that means there’s a problem. The issue of notation comes, at least in my own music perspective, when there is a dilemma, when there is a problem to be solved. And that pushes me to find solutions that maybe I was never pushed to find before … At the time I wrote Sequenza in 1958, I considered the piece so difficult for the instrument that I didn’t want to impose on the player specific rhythmical patterns. I wanted the player to wear the music as a dress, not as a straightjacket. But as a result, even good performers were taking liberties that didn’t make any sense, taking the spatial notation almost as a pretext for improvisation. Certainly some sort of flexibility is part of the conception of the work. But the overall speed, the high amount of register shifts, the fact that all parameters are constantly under pressure, will automatically bring a feeling of instability, an openness which is part of the expressive quality of the work – a kind of ‘work-in-progress’ character if you want.45

The prevalence of performers giving inaccurate performances using the first edition of the Sequenza led Berio and his assistant, Paul Roberts, to make a new edition of the piece in 1992. This used traditional notation and was based on Berio’s early sketches of the piece. As a performer I find the spatial notation extremely difficult to perform with the rhythmic accuracy Berio requires. When I first approached the piece I was unaware of the second edition of the Sequenza which contains traditional notation. In an attempt to perform the rhythm accurately I enlarged the score, marked the rhythmically ambiguous bars into divisions of millimetres and wrote out my estimation of the rhythm in traditional notation. When I later compared this to the second edition, my estimations did not contain the same accuracy in rhythmic detail. In this way proportional notation does present problems in its accuracy in representing the rhythm. It appears to be more difficult for players to be accurate when visually subdividing rhythm that has been represented spatially, compared to using traditional noteheads. One of the problems with the graphic notation in the first edition of the Sequenza is that the first note of each bar is always placed after the dashes, which indicate barlines. The implication is that the notes are to be played after the beat. However the traditional notation employed in Berio’s revised edition makes it clear that this was not his intention (see over).46

According to Berio, the 1992 editorial process consisted of simplifying the rhythms so they would fit into a traditional meter. Paul Roberts offers the following account of that process:

The truth is that Berio originally composed the flute Sequenza in standard notation back in 1958. It was written using very strict serial rhythms, and was barred in 2/8 from start to end. The notation was very similar to his other works published by Suvini Zerboni, for example the Quartetto (1956), or Serenata I (1957). (It would be of no surprise to learn that Gazzelloni actually gave the first performance in Darmstadt from this original). This is the moment when proportional notation was “born” because Berio rightly felt that the original notation was too awkward. He therefore proceeded to transform this Sequenza visually into the version that we all now know. Unfortunately over the years, he became increasingly disappointed with how flute players approached this notation which is by no means as free as it seems. (This was the case, in effect, with all his proportionally notated pieces) … Berio asked me to process the original version on the computer (I worked from his personal original transparencies). With this in hand he “corrected” his own notation, smoothing the original rhythms down. In a sense he did in 1991 what he perhaps should have done back in 1958. There is no question that I began from a renotated version. The Suvini Zerboni publication is in reality a renotated version of the original. Just for the record, as far as I know, there is not a single piece of Berio’s that began life in proportional notation. This may disappoint some, but even the harp Sequenza was originally composed like the flute Sequenza.47

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Berio was faced with the dilemma of traditional notation being “too awkward” for performers to perform and yet his proportional notation also produced inaccurate performances. Although many flautists continue to debate which is the more effective score, I believe the second edition using traditional notation creates a more rhythmically precise performance than the spatial notation of the first edition. The second edition also contains a number of differences from the original, clarifying articulation, phrasing, register, dynamics and the placement of the key clicks, using more detailed notation. In the 1992 edition Berio uses a + symbol to differentiate clearly between key clicks and accented notes.

Figure 11: Key clicks and accented notes in Luciano Berio’s *Sequenza per flauto solo*, 1st ed. (Milano: Suvini Zerboni, 1958), 4, line 5.

Figure 12: Clarity in the notation used to differentiate key clicks and accents in the 2nd edition, *Sequenza per flauto solo* (Vienna: Universal Edition, 1992), 3, line 9.

Since its composition in 1958 the *Sequenza* has been performed by several generations of flautists and this has led to some performance practices becoming established. As seen in the excerpts below, the second edition contains added flutter tonguing, and the G# at the end of the crescendo is an octave higher than the original edition. This is much more effective on the flute in order to achieve a dramatic crescendo. According to Harrie Starreveld, flautist from Amsterdam’s Nieuw Ensemble, Berio suggested this idea to him in a masterclass. Berio also suggesting
that the phrase shown in Figure 13 begin with four staccatos on each note, followed by two staccatos (beginning from the first G#1) and finally ending with flutter tonguing to give more of a sense of a crescendo and forward motion to the end of the phrase.\textsuperscript{48} These ideas are now incorporated into performances by many flautists and are to be found in several of the recordings of the piece that I have listened to.

![Figure 13: Original notation in Luciano Berio’s *Sequenza per flauto solo* (Milano: Suvini Zerboni, 1958), 3, line 1.](image)

![Figure 14: Added flutter tonguing and use of G2 at end of phrase in Luciano Berio’s *Sequenza per flauto solo* (Vienna: Universal Edition, 1992), 2, line 7.](image)

The *Sequenza* was also important in introducing the first notated use of a multiphonic in the flute repertoire. This had an enormous impact on composers writing for the flute during the 1960s, as it opened up the new possibility of polyphony on the instrument. Berio introduces a multiphonic which he notates by a circle, producing the notes G2 and C3, which are trilled and then slurred to an A flat 2 and a D flat 3. A circle depicting a harmonic was an effective way of notating this multiphonic as it was based on a harmonic fingering, however later composers who used multiphonics would need to find notation for fingerings which were not necessarily based on the harmonic series (see over).

\textsuperscript{48} Harrie Starreveld, lesson with Kathryn Moorhead on Berio’s *Sequenza* (20 November 2000).
With regard to tempo, if composers want greater precision than that afforded by traditional ritardando and accelerando instructions, graphic notation can pose a problem. John Van Buren in his *Incandescence* for solo flute (1980) makes use of extended key click sections, flutter tonguing, timbral trills, and graphic representations of tempo changes. Van Buren indicates changes of speed with the regularly used method of distorting note stems to mark ritardandos and accelerandos as seen in Figure 16. This notation, or groups of notes under an arrowhead, indicate a momentary speeding up or slowing down and are easily read by performers. However, if composers require greater control it is best to translate tempo changes into exact rhythms.

György Kurtág’s set of absurdist miniatures, *The Little Predicament* (1978) for piccolo, guitar and trombone, use graphic notation to depict notation for piccolo and trombone glissandos, piccolo fluttering trills, dynamic and tempo markings. At times arrows indicate a change in dynamics and tempo. The third movement is a pointillistic scherzo using unconventional notation to dictate the length of silences. The piece has planned silences in which the rests are replaced by square fermatas, indicating the suspension of all controlled rhythm for a specified time. This is useful as a dramatic effect and one assumes the composer was not concerned about having some ambiguity in specific of length of rests (see over).  

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If a piece using graphic notation has questions which are not explained by a key or notation, the most common possibility is for the interpreter to define his or her own parameters by which to make decisions. When rehearsing this piece with my ensemble I found the imprecise nature of the notation created problems in the final pages of the work. All three players need to coordinate their individually flexible parts to arrive at several points simultaneously. In Figure 18 a contradiction is found in that the composer has given some traditional elements, such as a demisemiquaver rhythm in the piccolo part, but he has not used a key signature or traditional notation to indicate how the rhythm aligns between the three parts. This leads the players to align the rhythm graphically, while the trombone notes are to be of equal length and speed, despite the note heads not being spaced evenly on the staff. The guitarist must take into consideration the length of rests dictated by ambiguous semi circular pauses, while aligning to both the trombone and piccolo parts. An alternative would be for one of the three parts to be notated more specifically (traditionally or otherwise) which the other players would follow, or for there to be more frequent indications for points of alignment. When performing this piece my ensemble found the best solution was for both the piccolo and guitar parts to attempt to align themselves with the trombone’s descending scale, despite it seeming impossible for the piccolo’s demi-semi-quavers to align accurately against proportionally spaced notes in the trombone part. The final recording was the closest attempt we could make to align all of the parts together (see over).
• Air Sounds

The flute’s open embouchure hole makes it particularly well suited to altering timbre. Aeolian or residual sounds are created when air is blown over the embouchure hole, without making a traditional, pure flute sound. There are several terms used to describe these sounds (which can lead to confusion) including pitched air, hollow tones, wind tones, residual tones, Souffle in French and Soffiato in Italian. All of these sounds retain a sense of pitch, so when a composer chooses a notation to indicate the use of an Aeolian sound, the notation must also be able to specify a
pitch. A commonly used symbol for these sounds contains hollow note heads, however this can cause problems with rhythmic definition.

In 1959 Ernst Krenek composed *Flute piece in nine phases*. The first movement is essentially for flute solo with a few percussive interjections by the piano, while the second movement is for flute and piano. Both movements are divided into nine sections or phases in which a twelve tone row is developed serially. The number of notes in each phase, their durations, speed and density of textures are the result of serial predeterminations. It incorporates extended techniques including what Krenek calls ‘Flüsterton’ (which he translates as whispering sounds – not to be confused with whistle tones), as well as harmonics, flutter tonguing, extreme third octave and striking wood. It was Krenek’s intention for the flautist to use what is now commonly called aeolian or air sounds.\(^\text{51}\)

\[\text{Figure 19: Diamond-head notation for air sounds in Ernst Krenek’s *Flute piece in nine phases* (Kassel: Bärenreiter, 1961), bar 12.}\]

In this situation, despite having open diamond noteheads, the rhythm is quite clear because the subdivisions can be recognised by the note stems. However, when using these diamond heads it is not possible to differentiate between a crochet and a minim. Despite this shortcoming many composers notate aeolian sounds by using hollow note heads. In their guidebooks Carin Levine\(^\text{52}\) and Pierre-Yves Artaud\(^\text{53}\) use the following notation of aeolian sounds:

\[\text{Figure 20: Diamond-head notation for air sounds in Pierre-Yves Artaud’s *Present Day Flutes*. (Paris: Editions Musicales Transatlantiques, 1980), 118.}\]


James Dillon in his piece *Sgothan* (1985) uses a similar symbol:

![Figure 21: Altered note-heads for air sounds in James Dillon’s *Sgothan* (Michigan: Peters, 1985), bar 29.]

Robert Aitken’s *Plainsong* (1977) uses round hollow noteheads:

![Figure 22: Hollow note-heads for air sounds in Robert Aitken’s *Plainsong* (Canada: Universal Edition, 1980), preface.]

Robert Dick’s notation is identical to his symbol for a whistle tone but has an ‘R’ for residual tone underneath it.

![Figure 23: Notation for air sounds in Robert Dick’s *The Other Flute: A Performance Manual of Contemporary Techniques*, 2nd ed. (New York: Multiple Breath Company, 1989), 141.]

However, giving multiple instructions beneath a symbol that itself has also has multiple meanings creates problems for immediate recognition. It has become common for composers to use various forms of hollow note-heads to represent air sounds however specifying rhythm with these symbols leads to problems. I suggest that rhythmic confusion can be offset through the use specific rhythm notation above the hollow diamond head notes (see over):

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There are times when composers wish to specify an articulation or change in the air sound which requires additional information to be added to this notation. Wil Offerman’s *Tsuru-no-Sugomori* uses the following method to indicate breath attacks which also would be effective when added above a diamond headed note:

![Figure 25: Notation for air attack in Wil Offerman’s *Tsuru-no-Sugomori*: A Traditional Japanese Shakuhachi Piece (Frankfurt: Zimmerman, 1999), 9, line 4.](image)

Rather than writing a description above the staff or requiring a table in the preface of a piece, Kaija Saariaho in her piece *Noa Noa* indicates a change from an air sound to a normal sound very effectively by using a dotted line connecting a closed circle to an open circle above the staff:

![Figure 26: Notation for change in air sounds to traditional flute sound in Kaija Saariaho’s *Noa Noa: for flute and electronics* (London: Chester Music, 2002), 4, line 1.](image)

I find this notation easier to instantly react to than Artaud’s method of notation for changing the air sound:

![Figure 27: Notation for change in air sounds to traditional flute sound in Pierre-Yves Artaud’s *Present Day Flutes*, 118.](image)

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Another effect produced by blowing air across the embouchure hole is the whistle tone, a sound resembling a faint whistle. The sound is produced using very little air pressure and a controlled embouchure. Whistle tones were believed to have first been notated by Louis Gesenway in a concerto written for William Kincaid in 1946.\(^{59}\) Whistle tones are very delicate and can only be played at an extremely soft dynamic, making them especially effective and most easily heard when the flute is amplified. They have their own harmonic series, and can be produced using any fingering on the flute. They can also be used with the head joint detached from the body of the flute to create glissando effects by shortening or lengthening the tube. Confusion arises with the number of different notations used for whistle tones in the modern flute repertoire and there are several effects that create a whistle-like sound which are not traditional ‘whistle tones’. Whistle tones are often notated with diamond heads, or with a circle above the note, or a combination of both.

Kazuo Fukushima simply uses a circle above the note and writes ‘whistle tone’:\(^{60}\)

![Whistle tone notation](image)

Figure 28: Notation for whistle tone in Kazuo Fukushima’s *Shun San for solo flute* (Tokyo: Murumatsu, 1977), last phrase.

Pierre-Yves Artaud in his *Present Day Flutes* notates whistle tones with a diamond indicating the fundamental note beneath the pitches and W.T. at the start of the phrase:

![Whistle tone notation](image)

Figure 29: Notation for whistle tones in Pierre-Yves Artaud’s *Present Day Flutes*, 121.

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Peter-Lukas Graf uses a notation that is specific and easily recognizable as it describes the effect with a ‘W’ as well as portraying the fingering and the resulting pitch.\textsuperscript{61} 

![Figure 30: Whistle tone notation indicating fingering and resulting pitch in Peter-Lukas Graf’s Check-up: 20 Basic Studies for Flutists (Mainz: Schott, 2002), 13.](image)

Rather than simply providing a circle (which can be confused with harmonics), or diamonds (which could also indicate air sounds), it is important to clarify the effect required by stating ‘whistle tones’ or the letters W.T., unless a completely new and recognisable symbol is devised. It is necessary for the composer to notate the fundamental note as well as the whistle pitch desired, otherwise the flautist must make a decision about which fingering will create the sound that was desired by the composer. When composers require whistle tones to be held over a long note while varying the pitch at irregular intervals, it is standard to notate them as Robert Aitken does in Plainsong:

![Figure 31: Graphic whistle tone notation in Robert Aitken’s Plainsong (Canada: Universal Edition, 1980), 5, last line.](image)

Or as Artaud notates them in Present Day Flutes:

![Figure 32: Graphic whistle tone notation in Pierre-Yves Artaud’s Present Day Flutes, 121.](image)

This method of graphically notating whistle tones gives the performer more freedom in deciding which tones are produced. Whistle tones are also not to be confused with

\textsuperscript{61} Peter-Lukas Graf, Check-up: 20 Basic Studies for Flutists (Mainz: Schott, 2002).
physically whistling without using the tone hole, as one finds in George Crumb’s
_Vox balaenae_.

![Image of sheet music]

Figure 33: Whistling in George Crumb’s _Vox balaenae_: for three masked players: electric flute, electric cello, electric piano (New York: Peters, 1972), 13, third stanza.

_Vox balaenae_ (1971) was based on recordings captured by marine biologist Roger Paine of the humpback whale ‘singing’. The flute part uses a wide variety of effects including harmonic shimmering effects, various forms of singing and playing simultaneously, whistling, glissandi, timbral trills, vocal articulation using whispered consonant air sounds, varying vibrato, flutter tonguing, and altered fingering.

Another form of whistle, which is not used as frequently as the traditional whistle tone, can be created by covering the embouchure hole with the lips and blowing while inserting the tongue across half of the embouchure hole (used by Paolo Perezzani and Salvatore Sciarrino), or by simply whistling into a covered embouchure hole.

![Image of sheet music]

Figure 34: Whistling into covered embouchure hole in Paolo Perezzani’s _L’Ombra dell’Angelo: per flauto_ (Milan: Ricordi, 1987), 6, line 4.

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62 George Crumb, _Vox balaenae_: for three masked players: electric flute, electric cello, electric piano (New York: Peters, 1972).

63 Paolo Perezzani, _L’Ombra dell’Angelo: per flauto_ (Milan: Ricordi, 1987).
This particular whistle effect is peculiar to Salvatore Sciarrino and several Italian composers. It is notated in a very similar manner to overblown harmonics, as the resulting pitches are based on the harmonic series. It would be useful for further information to be added to this notation in order to make it clear that these are not conventional harmonics and that the embouchure hole must be covered, as performers not aware of this technique will not have adequate information from the score to know what is required.

• Vocalisations

Roger Reynolds began writing his solo flute piece *Ambages* while his flautist wife, Karen Reynolds, was attending Marcel Moyse’s masterclass in Switzerland in 1965. The work was premiered during a Rockefeller Foundation residency at Villa Serbelloni in Bellagio, Italy and material from it was later used by the composer in his series of works *Transfigured Wind* (1984-5). The title signifies ‘roundabout and evasive way of speaking’ and several segments of the movement develop rhythmic designs as elaborations stemming from a simple timbre or sustained tone. The piece is based on a tone row and incorporates singing at the same time as playing, key slaps with and without pitch, harmonics, varied vibrato, glissandi. *Ambages* was one of the earliest examples of simultaneously singing and playing in the flute repertoire.\(^{64}\)

![Simultaneous playing and humming in Roger Reynolds' Ambages](new_york:cf_peters,1965), bar 8.

Singing and playing simultaneously is regarded historically as a form of polyphony. John Heiss claims the earliest known example of singing and playing is by jazz musician Sam Most in his recordings with the Herbie Mann-Sam Most Quintet during the 1950s.\(^{65}\) The civil rights movement in the 1950s and 60s brought about a growing awareness and accessibility to jazz music, in addition to an interest in the


music of non-western cultures. Some of these innovative techniques of jazz musicians were added to the classical performer’s palette of new techniques.

When the player sings as the airstream is directed across the lip plate, the tone colour is changed significantly and the sound is distorted. Not only is the tone of the flute distorted, but the voice and any text can become difficult to hear, creating a challenge to achieve real polyphony. There are many variations on this technique and in turn its notation. Crumb uses several different forms of singing and playing the flute in *Vox balaena*. The opening phrase in the flute part requires the flautist to sing and play simultaneously at the same pitch if the singer is female, and if male, an octave below. This technique is notated using two staves. The player is required to sing directly into the closed embouchure hole the pitches marked with the symbol + while rapidly moving the keys to create a shimmering effect. Crumb notates some of the sung parts with a + symbol above the note. This notation is confusing as it is usually used to depict key percussion:

![Figure 36: A + symbol used to depict vocal part in Crumb’s *Vox balaenae*, 7, first stanza.](image)

At times Crumb writes different consonants on the score and the increased air pressure of this sound creates a percussive sound through the air stream.

![Figure 37: Vocalisations in Crumb’s *Vox balaenae*, 9, third stanza.](image)

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66 George Crumb, *Vox balaenae*.
67 George Crumb, *Vox balaenae*. 
Andrew Ford in ‘Female Nude’ from his *Mondriaan Suite* (1994) marks the lower staff with ‘voice’.

This indicates that vowel or consonant sounds are to be produced while singing interspersed throughout the flute line:

Figure 38: Vocal interjections in Andrew Ford’s ‘Female Nude’ from *Mondriaan Suite for solo alto flute* (Sydney: Australian Music Centre, 1994), bar 18.

Ford uses vocalisations plus singing and playing different rhythms and pitches simultaneously. Performing and singing at the same time can be difficult in this piece as the voice part is at concert pitch and the alto flute is in G.

Figure 39: Two staves used to indicate vocal and flute parts in Andrew Ford’s ‘Female Nude’ from *Mondriaan Suite for solo alto flute*, bar 52.

In his solo flute piece *Plainsong* (1977), Robert Aitken explores polyphony through singing and playing (in fifths and octaves in the style of parallel organum) and through multiphonics. The piece was inspired by Gregorian chant and his recent discovery of playing two notes simultaneously on the flute and utilised for a performance of this piece at the opening of IRCAM. It is free in meter (similar to Gregorian chant) and contains unconventional fingerings, extreme dynamic and register range, air sounds, whistle tones, key slaps in combination with tongue stops and tongue rams. Although the notation is explained in a legend, it takes the performer some time to become familiar with the techniques and their symbols,

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which are not uniform with other notation of the time. In this piece he uses hollow note heads with covered by a cross to depict singing while playing.\textsuperscript{70}

![Figure 40: Simultaneous playing and singing in Robert Aitken’s *Plainsong* (Canada: Universal Edition, 1980), 5, line 1.](image)

Kaija Saariaho’s notates words which are to be recited and amplified by the residual sound across the lip plate effectively in *Noa Noa*:\textsuperscript{71}

![Figure 41: Notation for vocalisations with air sounds in Kaija Saariaho’s *Noa Noa: for flute and electronics* (London: Chester Music, 2002), rehearsal number 22.](image)

The most effective form of notating vocalisations whilst playing is by using two staves, clearly marking the voice and the flute parts. If both activities are notated on one staff the most commonly recognized notation is a hollow note head of some form.

*Noa Noa* is an example of an effective use of the flute with voice used as a colouristic effect rather than an attempt at exact polyphony. The flautist is required to vocalise the text but uses the resonance of the flute, so the text is clearly understandable, rather than distorting the sound by producing a tone at the same time. When recording this piece it became apparent to me that the electronics would at times be so loud that the vocal effects in the flute part could not be heard. In the studio I tried to overcome this problem by recording the vocalisations and the air sound on separate tracks to make them more appear more prominent against the electronics. However, after listening to recordings of the piece by Camilla Hoeitinga and Patti Monson, it became evident that it is not possible for the flute part to


penetrate through the sound of the electronics, and that it must be the composer’s intention to place the flute part in the background of the overall balance.

Figure 42: Balance issues with electronics in Kaija Saariaho’s *Noanoa: for flute and electronics*, bar 28.

It is very difficult to learn and internalise this piece without the help of the electronics. The electro-acoustic techniques amplify, modify and exploit the sound of the flute to create a richer sound world in comparison to the acoustic version. Inhalations, key clicks, poetry, exhalations, scales and gestures are all so manipulated, to practice without the pre-recorded sounds leaves little sense of the work. This posed a problem for me in the preparation of the piece. I obtained the latest CD-ROM (it is not sold together with the score) from the publisher, which contains Max patches and samples that are to be installed on a laptop and triggered by the performer using a pedal. The information on the score was correct as of 1998 and the most recent update by the publisher was unable to be used by with the latest Macintosh operating system. My sound engineer obtained further updated samples from the composer’s website, however we discovered when recording that the final two samples would not work. Fortunately we were able record the samples independently from the flute track, however this would not have been successful in a performance situation. I could not have performed the piece without the help of a sound engineer, and problems with the technology meant that the first time I played the flute part with the electronics was the day I recorded the piece. Having listened back to the recording there are a number of places where I should have determined the length of phrases according to the length of the samples, despite this not being indicated in the score. An example of this is the overblown harmonic trill phrase at letter C (see over).
Figure 43: Rhythmic interplay with electronics in Kaija Saariaho’s Noanoa: for flute and electronics, rehearsal figure C.

Using electronics brings about musical and practical challenges. As time passes and technologies become obsolete, it is inevitable that some pieces incorporating electronics will be performed less and less. Despite Saariaho making a regular effort in updating data I still faced difficulties in preparing the piece.

- Multiphonics, harmonics and alternate fingerings

It appears that the possibilities of multiphonics on the flute were not fully researched until the 1960s when polyphony became one of the leading characteristics of the flute repertoire for at least a decade. John Heiss in his article in Perspectives of New Music (1966)\(^2\) claimed that multiphonics were a little known extension, and Bruno Bartolozzi’s groundbreaking book New Sounds for Woodwinds was not published until 1967.\(^3\) It was at this time that flautists and composers started notating the literally thousands of multiphonics possible on the flute, some creating up to five notes at a time. Several articles and books served as a catalyst for creating interest in new flute sounds and many of these techniques reached a greater number of flautist and composer through publication. James Pellerite’s Modern Guide to Fingerings for


\(^{3}\) Bruno Bartolozzi, New Sounds for Woodwind, 2nd ed. (London: Oxford University Press, 1982).
the Flute (1964) which included charts of alternate, multiphonic, and quarter-tone fingerings. Heiss in his 1966, 1968 and 1972 articles detailed his experiments with multiphonics, key slaps, harmonics, quarter-tone trills, vocal sounds while playing, jet whistles and suggested new notation for these techniques. Bartolozzi’s *New Sounds for Woodwinds*, directed at composers and performers, was the first book to explore in detail some of these new techniques. Thomas Howell’s *The Avant-Garde Flute: A Handbook for Composers and Flutists* (1974) was a thorough exploration of possible fingerings for flute. He catalogued close to two thousand multiphonic fingerings and gave instructions on how to produce them. This was an invaluable resource for composers in particular. A year later, Robert Dick’s *The Other Flute* (1975) was published which was a concise and clearly presented source material, useful for both flautists and composers, focused mainly on altered fingerings and multiphonics which were increasingly found in music of this time.

Kazuo Fukushima’s piece *Shun-San*, written in 1969, was one of the first compositions to incorporate the use of timbral fingerings and multiphonics extensively, based on those found in Bartolozzi’s book. In the preface of *Shun-San* Fukushima writes that because of Bartolozzi, “I had a glimpse of the realm of new sounds which the book opened wide before my eyes, revealing a surprisingly rich future in store for us”. The table at the start of the piece explains the way Fukushima notates the fingerings. This system was taken from Bartolozzi’s book and is rarely used now as many composers have adopted easier systems for flautists to read.

![Fingering diagram](image)

Figure 44: Fingering diagram in Kazuo Fukushima’s *Shun San for solo flute* (Tokyo: Murumatsu, 1977), preface.

One of the problems in *Shun-San* and many other pieces based on Bartolozzi’s multiphonics and alternate fingerings is that there are several fingering errors and

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inconsistencies which make some of Shun-San’s multiphonics unplayable. I have suggested some alternative fingerings for these multiphonic trills in blue:

Figure 45: My suggestions for multiphonic trills in Kazuo Fukushima’s Shun San for solo flute, stanza 5.

Sofia Gubaidulina’s Garden of Joy and Sorrows for flute, harp and viola contains very few performance instructions to accompany her score, a dearth that led to much discussion between players during our rehearsals. We resolved several problems of understanding notation by listening the interpretation of other performers, including recordings by the Aureole Trio and the Walden Chamber Players. This piece contains unachievable flute multiphonics based on Bartolozzi fingerings. In preparing the flute part I searched through all of the multiphonics in charts by Robert Dick, Carin Levine and Pierre-Yves Artaud and was unable to find a fingering which would produce the multiphonics found in Figure 46.

As Gubaidulina gives very little information in the score to explain the notation throughout the piece my final decision was to use harmonic fingerings because they have extremely faint overtones of the harmonic series based on D flat and G.

A clearer method of notating fingerings for multiphonics and timbral fingerings is used in Toru Takemitsu’s *Toward the Sea*, for alto flute and guitar (1981).\(^7\) This piece incorporates a wide range of microtonal and timbral subtleties characteristic of the shakuhachi and western avant-garde music, including alternate fingerings, hollow and air sounds, timbral trills, pitch bends, glissando, harmonics, flutter tonguing, percussive attacks and multiphonics. His writing for the flute is always detailed and clear in its notation, multiple layers of information are clearly depicted for the performer which is helpful in preparing the work.

![Figure 47](image1.png)

Figure 47: Timbral fingerings clearly notated in Toru Takemitsu’s *Toward the Sea* (Tokyo: Schott, 1981), 18, line 1.

In *Plainsong* Robert Aitken notates multiphonics with an ‘M’ through the stem of the notes which indicates which fingering to use but lacks information on how many or which pitches are to result:

![Figure 48](image2.png)

Figure 48: Multiphonic notation in Robert Aitken’s *Plainsong*, 2, line 4.

This tells the performer that a multiphonic is required, but gives no information as to which multiple pitches should result. When preparing these multiphonics I used guess work to choose which pitches resulted, until I found a video of Aitken performing his own piece on Youtube and was able to hear that he emphasises the

lower octave notes of the multiphonics so they became more prominent. I found through my own experimentation that the lower octave is particularly strong when using the fingering combination of G3 and the first trill key to produce the A flat. It is of great benefit to flautists for composers to indicate both the fingering as well as the desired pitches of the multiphonic, which is effectively demonstrated in Saariaho’s Noa Noa. The number beneath the staff indicates a fingering from a table in Artaud’s Present Day Flutes. In addition to this it would be less time consuming for the performer to have the fingering printed graphically above the chord instead of having to consult another fingering source.

Figure 49: Notation for multiphonics in Kaija Saariaho’s Noa Noa: for flute and electronics, bar 65.

During the 1960s there was also a noticeable increase in composers’ fascination with timbral changes that incorporated finger modifications to create microtones, and in turn effect tone quality. Fukushima had already used quarter tones and glissandos in his attempts to transcribe shakuhachi effects in Mei in 1962. Shun-San (Hymn to Spring) incorporated several of the techniques and timbres which were integral to traditional shakuhachi and Noh flute music using Bartoluzzi’s fingering system:

Figure 50: Alternate fingerings in Kazuo Fukushima’s Shun San for solo flute (Tokyo: Murumatsu, 1977), opening.

Elizabeth Brown’s Acadia for flute and shakuhachi (1999), which is based on Shika no Tone (The Distant Call of the Deer), also uses extended techniques inspired

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80 Pierre-Yves Artaud, Present Day Flutes, 68.
by traditional shakuhachi technique and the quarter tone inflections of birdsong. Often the qualities of both the flute and shakuhachi merge and the interplay between avant garde flute techniques and traditional shakuhachi techniques becomes imperceptible. Brown uses more recently developed notation of fingerings for quarter tones, timbral trills, sliding glissandos, and breath sounds. A fast succession of fingerings is written out, which is cumbersome to read but appears to be the only method of notation. This level of detailed new fingering requires memorisation to incorporate it into the piece.\(^{81}\)

![Image of music notation](image1.png)

Figure 51: Alternate fingerings in Elizabeth Brown’s *Acadia for flute and shakuhachi* (New York: Quetzal Music, 1999), bar 17.

Paulo Perezzani’s solo flute work *L’Ombra dell’Angelo* (1986) is based on the catalogue of flute sounds Salvatore Sciarrino researched to write his solo flute work *L’opera per flauto*. *L’Ombra dell’Angelo* uses various polyphonic effects based on overblowing the harmonic series. A fundamental note is notated to indicate the fingering and the resulting pitches are indicated by the upper black note heads. This is practical to read as these multiphonics are based on the harmonic series.\(^{82}\)

![Image of music notation](image2.png)

Figure 52: Overblown harmonics in Paolo Perezzani’s *L’Ombra dell’Angelo: per flauto* (Milan: Ricordi, 1987), 6, line 4.

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\(^{82}\) Paolo Perezzani, *L’Ombra dell’Angelo: per flauto* (Milan: Ricordi, 1987).
Crumb’s *Vox balaenae* uses conventional harmonics as a timbral resource to alter both the tone colour and pitch to create a shimmering multiphonic effect:

![Figure 53: Overblown harmonics in George Crumb’s *Vox balaenae*, 14, second stanza.](image)

The most effective method of notating all multiphonics, whether based on the harmonic series or otherwise, is to give information on the score of the fingerings required and the pitches which should result. If a chord is given with a fingering, it is usually not necessary to indicate the multiphonic by a hollow or diamond note head.

- Percussive effects

Brian Ferneyhough’s *Cassandra’s Dream Song* was completed in May 1970, and first performed by Pierre-Yves Artaud at the Royan Festival in France in March 1974. It is an extremely complex and virtuosic work, based on practical knowledge of the flute (Ferneyhough had the instrument at hand while writing the piece) and pushes the performer to the outer limits of technique. It is densely notated and often combines layers of several notated techniques which cause a degree of visual difficulty, in addition to the challenge of reading from non-traditional symbols. Surpassing traditional expectations of rhythm and interpretation, the piece was considered daunting to flautists at the time and took several years to be performed.

The piece is scored on two large sheets, with several short musical sections to be played in order on sheet one, which alternates with sections in any order from sheet two. This is the only element of freedom for the performer Ferneyhough creates within extremely tight constrictions of the notation. The performer is faced with spending many hours sorting through the notation in order to execute various forms and combinations of tongue and lip pizzicato/clicks, key clicks, microtones, flutter tonguing, harmonics, singing, timbral notes, altered air pressure, glissandi, air
sounds, and varying vibrato. Memorisation is the most useful tool in learning the layers of techniques.

The multiple layers of instruction lead to challenges for the flautist. Ferneyhough states in the preface of his score *Cassandra’s Dream Song* that is not meant to be a “blueprint of a perfect performance”. He is aware that he notates a large amount of information that cannot be accurately performed in reality. He writes in his preface to the score:

The choice of notation in this instance was principally dictated by a desire to define the quality of the final sound by relating it consciously to the degree of complexity present in the score … The notation does not represent the result required: it is the attempt to realise the written specifications in practice which is designed to produce the desired (but unnotatable) sound quality … Nevertheless, a valid realisation will only result from a rigorous attempt to produce as many of the textural details as possible: such divergencies and “impurities” as the follow from the natural limitations of the instrument itself may be taken to be the intention of the composer.

Ferneyhough provided a key that addressed his subtle variations and new combinations of key clicks that had been used previously:

- Note produced by percussive key action.
- Tongued note with simultaneous percussive effect.
- "Quasi-pizzicato": sharp (exaggerated) tongue action with no subsequent breath pressure.
- Combination of "pizz. " and percussion effect.

Figure 54: Brian Ferneyhough’s *Cassandra’s Dream Song* (London: Edition Peters, 1975), sheet 1, section 1.

The notation of percussive sounds on the flute is extremely confusing for performers as there are often so many different forms of conflicting notation used by composers. Several slightly varied symbols need to be used to differentiate

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84 Brian Ferneyhough, *Cassandra’s Dream Song*. 
articulation, which can be used in combination with a key click. This can be further confused as the notated fingering can differ from the resulting pitch of the note, thus requiring a symbol that represents both the pitch desired and the fingering. Composers need to be aware that a click on a particular note or fingering may not produce a sound at the same pitch. A key click produced by the fingers alone will produce a sound a semitone higher than the fingering. Artaud’s book, *Present Day Flutes* provides a useful table of fingerings for key percussion.\(^\text{85}\)

The pitch produced from a tongue ram or a stopped tongue note is a major seventh below the fingered note. Tongue rams, also known as tongue thrusts, have also been given a variety of symbols by different composers. They are made by completely covering the embouchure hole with the mouth and thrusting the tongue rapidly to cover the hole while coordinating an increase in the amount of air being blown through the flute. I find that articulating the word “hot” at the same time is useful. The tone that is produced sounds a major seventh below the note that is fingered, but flautist read it at the fingered pitch. There is a difficulty in performing a fast succession of notes interspersed with tongue rams. Although one can always strive to improve the speed of this technique, there is a limit to the speed at which it can be rearticulated because physical distance that the lips have to move to recreate an embouchure. Rests are needed to give time to change the position of the flute to produce tongue rams. However these difficulties in performing techniques can often be easily solved in the recording studio.

![Figure 55: Tongue rams in Andrew Ford’s ‘Female Nude’ from *Mondriaan Suite for solo alto flute*. (Sydney: Australian Music Centre, 1994) bar 41.](image)

Harvey Sollberger’s *Quodlibetudes* quotes landmark pieces from the flute repertoire (from Berio’s *Sequenza* to CPE Bach’s solo *Sonata*), each exploring a particular aspect of extended technique. It is an effective recital piece as well as a useful teaching resource. Since each section is short, the individual etudes lend

themselves well to be studied individually over time and then later performed as a whole. Sollberger states:

All too often students have avoided or tiptoed around important contemporary works because of technical and conceptual demands which seemed overwhelming. A common complaint has been, “I don’t know where or how to begin”. Implicit in such a remark is the assumption that the reward for the work expended seems nebulous, uncertain, and far-off. By presenting its material in “bite-size” chunks, *Quodlibetudes* addresses this problem.”

The work contains a large number of currently known techniques, including spatial notation, pitched whispers and vocal sounds, multiphonics, quarter-tones, harmonics, glissando and pitch bends, key clicks, toneless attacks, aeolian sounds, whistle tones, micro tonal/timbral trills, and manipulated vibrato. Sollberger indicates tongued percussive ‘ticking’ with triangular note heads:

![Figure 57](image)

Figure 57: Harvey Sollberger’s *Quodlibetudes*, 2, bar 2.

Key clicks (indicated by an x note head and a diamond note head to indicate the pitch of the key clicked) are combined with + to denote an embouchure hole stopped by the tongue and a small circle to indicate an open embouchure hole.

![Figure 58](image)

Figure 58: Harvey Sollberger’s *Quodlibetudes*, 5, bars 17-19.

Tongue clicks (produced by audibly clicking the tongue against the palette of the mouth) can change pitch by altering the cavity shape of the mouth and are notated as follows (see over):

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Sollberger’s notation for articulation and percussive effects is not always traditional, but because of the subtle variation of effects he requires in each etude, he has to find new alternatives to specify the differences in these techniques. This is a useful exercise for flautists to become flexible in adapting to new interpretations of notation which is sometimes inevitable.

Having considered the variety of notation for key percussion, I have compiled the following table with the most commonly used symbols and my suggestions for a standardised notation on the right:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Technique</th>
<th>Suggested symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Key click with no sound produced by air</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Key click with flute tone</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Pizzicato (symbol needs to specify whether it is produced by tongue – T.P. or lips – L.P.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pizzicato with key click</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Stopped tongue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tongue ram (pitched note could be indicated beneath symbol)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 59: Harvey Sollberger’s *Quodlibetudes*, 5, bar 4.

Figure 56: My suggestions for key percussion notation.
• Glissando

Daniel Börzt’s *Tinted paintings* (2001) utilises tone-coloring through pitch bends, rapid tremolos and timbral trills, key clicks, manipulated vibrato and breakneck scales. Glissando can be produced by sliding the fingers across the keys or by changing the amount of embouchure hole that is covered. One of the difficulties in using alternate fingerings is that it is not possible to achieve a full glissando between all intervals on the footjoint of the flute and between the first and second octaves. A compromise must be made by only bending the pitch for part of the interval using the embouchure.⁸⁷

![Figure 60: Daniel Börzt’s *Tinted paintings for flute* (Stockholm: Gehrmans Musikförlag, 2001), bar 78.](image)

Wil Offerman’s *Tsuru-no-Sugomori* (Nesting of Cranes) for solo flute (1999) is a literal transcription based on an interpretation by the shakuhachi master Katsuya Yokoyama. He translates traditional Japanese shakuhachi techniques by notating them with western avant garde extended techniques. The techniques used, such as flutter tonguing, different forms of pitch bending, breath sounds and key clicks evoke the vocalisations between adult cranes and their young. He indicates breath attack with his own notation, includes many microtonal fingerings (although not in fast succession like Elizabeth Brown), mimics finger vibrato by shaking the flute left to right moving the embouchure and includes timbral trills recreating the sound of the shakuhachi on the modern flute. Offermans uses shakuhachi terms to describe the method by which the flute player produces pitch bends. Rather than using the most common methods of finger portemento over the keys or moving the head, Offermans in his foreword brings specific directions to the pitch bends:

  Tateyuri: shaking the head as if saying “yes”
  Creating a similar effect to “tateyuri” by rolling the flute by using the elbows
  Creating a similar effect to “tateyuri” by rolling the wrists

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Shaking the flute left and right to create a rougher sounding vibrato notated by arrows (see over).88

Figure 61: Shaking the flute from left to right in Wil Offermans’ Tsuru-no-Sugomori: A Traditional Japanese Shakuhachi Piece (Frankfurt: Zimmerman,1999), 9, line 4.

Offermans also describes moving the jaw and lips forward and backwards but keeping the head in the same position to create effects, as well as bending the pitch and changing the dynamic by moving the head upwards (‘kari’) and downwards (‘meri’) based on shakuhachi techniques.

Figure 62: Wil Offermans’ Tsuru-no-Sugomori: A Traditional Japanese Shakuhachi Piece (Frankfurt: Zimmerman,1999), 7.

Another form of glissando is the jet whistle introduced by Heitor Villas-Lobos in his Assobio a jato (1953). His notation is still the most commonly used for jet whistles, as seen in Ian Clarke’s music:

Figure 63: Ian Clarke’s Zoom Tube (Surrey: IC Music/Just Flutes Edition, 2004), bars 94-5.

Clarke, a flautist and composer, uses a particularly unusual type of glissando creating resultant tones in his piece Zoom Tube (2000). This piece is a rhythmic blues solo for flute, and uses a large number of extended techniques, including air sounds, glissando, vocal sounds and articulation, singing and playing, microtones, multiphonics, and jet whistles. Clarke uses a form of singing while playing which

creates an overtone making a third pitch. This is produced by playing a single pitch on the instrument and using the voice to ascend or descend, resulting in a difference tone or resultant tone glissando. This creates two simultaneous glissandi, one ascending the other descending.\textsuperscript{89}

Figure 64: Ian Clarke’s \textit{Zoom Tube}, bars 31-3.

A survey of the repertoire and consideration of the technical problems through my personal engagement with rehearsal, performance and recording has led to my reflections on the significant challenges that extended techniques create. Not only is it necessary to overcome the problems of mastering a range of difficult techniques but it is crucial for flautists is to acquire a awareness of the variety of notations used to denote these techniques. Without a standardised notation in existence the performer must be able to recognise the multitude of terms used to describe their effects, and the misuse of notation and these terms.

This chapter has outlined the variety of notation, techniques and terminology in order to clarify confusion and suggest alternatives, giving some insight to flautists on the musical works I have recorded. I have pinpointed issues of significance, offering reflections from my observations when confronting specific works in rehearsal and performance. However, questions remain for further exploration into finding an efficient method of learning repertoire with extended techniques, despite the lack of a standardized notation.

CHAPTER FOUR

The current chapter discusses Kazuo Fukushima’s *Shun San* (1968), Paolo Perezzani’s *L’Ombra dell’Angelo* (1986) and Brian Ferneyhough’s *Cassandra’s Dreamsong* (1971) and is based on my research and reflection through the process of performance. The repertoire in this chapter was selected for its advanced level of difficulty in producing extended techniques. This chapter explores the issues of the practical application of interpreting notation, the transference of non-western flute techniques, and the impact of notational challenges as a structural element of composition through performance analyses of three works for solo flute.

The first work, *Shun San* (Hymn to Spring, 1969) by Kazuo Fukushima, was one of the first compositions to incorporate the use of timbral fingerings extensively. Bartolozzi’s *New Sounds for Woodwinds* (1967) instigated the drive towards using new techniques of performance, particularly the new polyphonic possibilities he presented. The brief preface written by Fukushima on the score gives us some background information about the piece. The composer states:

> It had been vaguely felt that there were possibilities of new sounds to be created by techniques not ordinarily employed on the flute, especially by way of fingerings that might capture tones like double stopping and quarter tones and peculiar tone colours.  

The key at the start of the piece explains the way Fukushima notates fingerings. Fingerings, air pressure indications and multiphonics are derived from Bartolozzi’s book. This system poses problems as it contains several fingerings that cannot be used universally. There are several errors in the system Bartolozzi devised for determining which fingerings create the individual pitches of multiphonics and this led me to experiment with several alternatives, some of which I have mentioned in Chapter Three.

*New Sounds for Woodwinds* gave Fukushima the ability to notate the sounds he envisioned, but it was his experience of the shakuhachi from his musicological research that was central to the piece. Many of the techniques he used were derived from the influence of Shakuhachi traditions, including the use of sharp attacks of air,

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shrill high notes indicating dramatic high points, tremolos, glissandos, ornamental gestures and the tonal qualities of the bamboo flute. Fukushima described these sounds as

streams of sound-like belts of uneven denseness; subtle intervals like quarter tones resulting from a new fingering; sound groups that hustle and undulate; timbre markedly different from others; broken sounds; difference tones that come wafted from impossible directions; pedal key effects of softly rustling winds; pattering effects an octave lower than the overtones of the pedal key to which they are apparently in contrast, as short and whimsical as the far-away songs of the Himalayan cuckoo.\(^91\)

Shakuhachi techniques such as *meri-kari* (pitch altering) *solane* (tonal shading) and *nayashi* (pitch-bending ornamentation) are all used throughout the piece.

![Pitch bending and tonal shading used in Kazuo Fukushima’s *Shun San for solo flute*, 1, last line.](image1)

The majority of the piece uses altered fingerings to resemble the sound of these flutes which creates several interpretive issues for the performer. The fingerings found in Figure 66 can achieve a distinctive colour if the embouchure is also adjusted by air direction and pressure. I experimented with the sound by changing the air direction in the following manner:

![Direction of embouchure adjustment in Kazuo Fukushima’s *Shun San for solo flute*, 1, second line.](image2)

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Fukushima acknowledges a close resemblance between what is known as *hishigi* on the Noh flute and high B, C & D on the modern flute. These are the highest and most penetrating notes on the instrument and the gesture indicates the beginning, end, or dramatic high points of the plays in which they are performed.7

Shakuhachi ornamentation such as *karakara*, *tamane* and *sutebyoshi* are the inspiration for the use of timbral trills and key ‘patterning’ effects in the piece.

Bartolozzi uses the term ‘sound amalgam’ to describe linking single sounds to multiple sounds in a legato manner without altering the fingering of the initial sound. In *Shun San* Fukushima has indicated some of these modifications of air pressure in the score, however there is limited space on the score to give detailed information on how to achieve the sounds created by shakuhachi techniques. In addition to this the production of the techniques on the flute at times does not necessarily correlate with their production on the shakuhachi. Offermans and Brown, who have since incorporated shakuhachi techniques into several of their scores, use their own unique forms of notation. All of these composers have attempted to create a notation which contains adequate information to indicate the production and the result of these effects. Other performance issues arise in *Shun San* because the work does not use the conventional notation of rhythm or tempo markings. The composer
uses proportional notation to portray the timelessness inherent in shakuhachi music but gives no further instructions on its interpretation. The note lengths and rhythm are proportional and indicated by the length, shape and width of a black line. Rests are indicated by an empty space, which leaves the decision as to their length to the performer.

When discussing his solo flute piece Mei, Fukushima said that the length of the silence or space should be determined by the performer’s instinct.

Once you have internalized the music, please do not think about … counting beats as if you are looking at a diagram … The performance should be unique every time, with the performer’s own intensity, because performers and listeners are interacting at the moment … If every performance is the same, the music becomes boring.  

He compares a performance with the Japanese tea ceremony … meaning that when you attend, whether as guest or server, you must faithfully perform your role as if it were the last opportunity of your life. You act as if it were your only opportunity. You should make your performance different each time, and seize the moment to play at your best.  

Fukushima’s large graphic score gives a sense of spaciousness, with long phrases and spaces for rests, which gave me a sense that I was allowed a degree of freedom to make a number of expressive decisions. When some contemporary works are constructed with elements of freedom, the slightest change to measurable elements can redesign the structure of the work. In cases where the composer explicitly controls all aspects of a work, the performer can be denied any possibility of interpretation. The imprecision of humans has therefore inspired a number of composers to write for electronic media to achieve accuracy in their music. However in Ferneyhough’s Cassandra’s Dream Song, the composer believes

The notation does not represent the result required: it is the attempt to realize the written specifications in practice which is designed to produce the desired (but unnotatable) sound quality … Nevertheless, a valid realization will only result from a rigorous attempt to produce as many of the textural details as possible: such divergencies and “impurities” as the follow from the natural limitations of the instrument itself may be taken to be the intention of the composer ... the audible (and visual) degree of difficulty is to be drawn as an integral structural element into the fabric of the composition itself.

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93 Mihoko Watanabe, “The Essence of Mei”: 18
94 Brian Ferneyhough, Cassandra’s Dream Song, preface.
Ferneyhough believes that the challenge for the flautist is to negotiate the dense set of instructions and execution of several layers of nuance, dynamics, complex rhythms and multiple extended techniques, all to be performed simultaneously. Focusing on new technical capabilities of the flute, the piece is unremittingly virtuosic. Assimilating all of these precisely notated demands at one time pushes the performer to new limits. The difficulty of executing these instructions, as well as the freedom given to the performer to choose the order of several segments led Ferneyhough to discover:

that there was an entire dimension of potential expression buried in the attitude of the performer to the music text. I thus determined to see how far this … could be systematically exploited … how far the results could be incorporated into the very fabric of the composition.\footnote{James Boros and Richard Toop, eds. \textit{The Collected Writings of Brian Ferneyhough} (Amsterdam: Harwood Academic Publishers, 1995), 318.}

Scored on two large sheets, the piece contains several short musical sections that the flautist plays in order on sheet one, and intersperses sections (in any order) from sheet two. Within extremely tight constrictions of the notation, Ferneyhough allows the performer an element of freedom and involvement in the work’s structuring. In deciding the order of these sections the player can choose a certain degree of conflict or agreement between the segments, which has implications for the expressive and structural direction of the piece. I tried to make decisions based on the expressive content of each segment and the implication of the interaction of these segments. I based my decision on creating a dramatic contrast between sections (whether it was character, or the contrast between sections with traditional and non-traditional sounds) and tried to create an overall structural arc. Each choice will bring a different musical direction to the piece, with some performers even leaving the choice of the structure until the moment of performance.

Problems in combining the layers of instruction forced me to make decisions. Contradictions occur when asked to play a crescendo on weak harmonics. Harmonics have limited scope for a variety in dynamics so I choose to be accurate with the pitch of the harmonics and begin at a louder dynamic before the crescendo (see over).
It is also not possible to produce great variety in dynamics or a fortissimo sound using key clicks. In a concert performance the player can emphasise the physical gesture of the dynamic in an attempt physically show the gesture:

Segment D (Figure 71) demands directions for vibrato, and extreme dynamic changes with dense notation which creates difficulties. A tongue pizzicato is written in the high register which does not speak clearly. I tried to subtly add more of the pitched sound to this tongue pizzicato in order to make it more audible. This may have been more effective if I had use a harsher percussive sound or if I had been closer to the microphone when recording. A descending glissando is required at the same time as a crescendo in this passage. This is the opposite of what naturally occurs on the flute; crescendos tend to become sharper in pitch when using more volume. As a compromise I rolled the headjoint towards me to create a glissando and used less air than I usually would to create the crescendo (see over).
Figure 71: Glissando in Brian Ferneyhough’s *Cassandra's Dream Song*, segment D.

As to the question of how to differentiate between the fermatas and the rests in Figure 72, Ferneyhough suggests to:

> calculate rests not so much by their actual written durations as by the degree of accumulated energetic impetus with which he approaches them, with the consequence that their clock-time duration can fluctuate wildly from performance to performance.\(^{96}\)

Figure 72: Fermatas in Brian Ferneyhough’s *Cassandra's Dream Song*, Segment C.

In these instances the composer is more interested in the result of the attempt or gesture of performing his instructions on the page.

Paolo Perezzani’s work for solo flute, *L’Ombra dell’Angelo* (The Angel’s Shadow), is based on the poetry of Rainer Maria Rilke. It was written in 1985, after a period when Perezzani researched the possibility of using the harmonic series on the flute by using traditional fingerings and the manipulation of pitches using embouchure exclusively. This, in combination with a variety of articulations, creates a unique effect producing at times a combination of several notes simultaneously. Perezzani recalls the period when he wrote the piece:

> I am not a flautist but I remember that when I wrote *L’ombra dell’Angelo* I had in my house, for one year, a flute. And I explored it. I studied also the “The Other Flute” of Robert Dick and, naturally I had listened and studied a lot of compositions for flute (Boulez, Maderna, Sciarrino, etc). I worked with many

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of flautists: young students (who liked to explore their instrument) and big
name flautists like Roberto Fabbriciani.\textsuperscript{97}

He points out in the foreword to his piece:

The \textit{L'Ombra dell'Angelo} however is not a sound experiment (it’s up to my
note books to gather these studies). In my work, the results of this research is
used in a context and in accordance with the concept of composition.\textsuperscript{98}

Perezzani explains his notation in a brief key at the start of the piece explaining with
four symbols all the effects required in throughout the piece.

\begin{center}
\textbf{SYMBOLS AND REMARKS}
\end{center}

\begin{itemize}
\setlength\itemsep{0em}
\item[$\bullet$] = diad consisting of natural harmonics, obtained by
varying the position of the embouchure. The diamond-shaped note indicates the fundamental tone;
the fingering is the traditional one
\item[$\diamond$] = quick ascent (or descent) of a tremolo between two
parallel diads consisting of natural harmonics; made
by doing a tremolo on two different fundamental
tones. The duration of the tremolo is indicated by the
rhythmic value on which the figure is built
\item[$\blacktriangle$] = fast and very staccato sequence of diads on natural
harmonics based on the same fundamental tone. The
duration of the figure is indicated by the rhythmic val-
ue on which it is built
\item[$\blacklozenge$] = cover the entire embouchure with the lips, inserting
the tongue in the hole (about two-thirds of the way);
the upper note indicates the light whistle that re-
sults.
\end{itemize}

\textit{The sharps and flats affect only the notes immediately following them.}
\textit{Accidentals are omitted only when the notes affected by them are to be
immediately repeated.}

Figure 73: Key in Paolo Perezzani’s \textit{L'Ombra dell'Angelo: per flauto} (Milan: Ricordi,
1987).

\textsuperscript{97} Paolo Perezzani, email correspondence with Kathryn Moorhead (15 February 2010).
\textsuperscript{98} Paolo Perezzani, \textit{L'Ombra dell'Angelo: per flauto} (Milan: Ricordi, 1987).
The first three techniques displayed in the key of the piece are effectively notated with symbols that are clearly recognisable to the flautist in indicating the fundamental note and fingering, as well as the desired two notes it will produce. The variation in the notation defines whether the passage is to be played as a tremelo or a staccato sequence of harmonic multiphonics. These symbols are effective in being instantly identifiable in giving an action and effect. The fourth symbol however presents problems as it describes a technique that remains on the fringe of awareness for most flautists and is not yet part of the flute vocabulary in English. This technique is a particular whistle sound (as opposed to ‘whistle tones’) produced with the flute mouthpiece covered, found largely in the music of Salvatore Sciarrino and his students in Italy. As a student of Sciarrino’s, Perezzani was familiar with the sound world and highly original extended techniques found in his teacher’s work *L’Opera per flauto* which contains the movement *Fra i Testi Dedicati alle Nubi* that incorporates these whistle sounds. I took *L’Ombra dell’Angelo* to flautist Roberto Fabbriciani who had worked with the composer and premiered the work, to discover I was producing the whistle sounds incorrectly. I was using my lips to whistle directly into the embouchure hole, which meant my lips rather than the airstream and fingers were creating the pitch of the sound. I thought the composer would have wanted a more clearly audible sound similar to the effect created by conventional whistle. However Fabriccianci explained that Perezzani was using a different effect that I had not encountered before which is found in the works of Sciarrino. These whistles are produced by covering the entire embouchure plate with the lips, and by placing the tongue two-thirds of the way into the embouchure hole using a light air stream. They are particularly fragile to produce and require time within the piece to prepare the embouchure. The pitch produced is a minor seventh below the fingered pitch. This technique took some time to learn as the direction of the air and the shape of the embouchure is foreign to traditional flute playing or any other techniques I have used. The air stream needs to be directed over the tongue to strike the upper part of the embouchure hole and the pitch can be altered by changing the air pressure.

The notation for this presents problems for flautists who are not familiar with Sciarrino’s music, and the unfamiliarity of the technique by many flautists requires great clarity on the score or a reference to another source. The notation Perezzani uses is easily confused with the other symbols in the piece (particularly harmonic
multiphonics) and because it uses black note heads to indicate its distinction from the previous effects, it cannot specify the rhythmic duration of the notes.

![Figure 74: Notation of multiphonics and whistle sounds in Paolo Perezzani’s L’Ombra dell’Angelo: per flauto, 4.](image)

I found the rhythm challenging throughout the piece, as Perezzani uses downwards note stems to depict the note value and upward stems to depict the specific notes of the trills to be subdivided into this duration. Since this is difficult to read and respond to immediately, I found it helpful to write further details of the subdivisions above the staff. However from the second page of the piece onwards I found the technical demands of producing such fast overblown harmonics so difficult that it was impossible to always be rhythmically accurate. I came to the conclusion that the gestures of this energetic momentum ultimately add to the explosive atmosphere in these sections.

In the preparation of this piece it was necessary to take several of the techniques out of their context to establish how to produce them best. I discovered that the clarity of many overblown harmonics were dependant on whether the E flat key was depressed or not, and I experimented to establish when this was needed. The final page of the piece contains trills which have several alternative fingering possibilities to what is notated on the page. Since the final page is marked “calmissimo” I experimented with all the possible timbral trill fingerings to find which created the best ‘legato’ effect to suit the mood of this section of the piece. Rather than use fingerings based on the fundamental note of the harmonic, I found it more effective to trill only one finger at a time to produce the required pitches when possible. For example I only trilled the second finger of the right hand for the trill from C to F and the second finger of the right hand for the trill from F sharp to B (see over).
I used the following fingerings for the trills based on the following pitches:

Another major obstacle in this piece was the stamina required to produce the overblown harmonics. The amount of air required and exertion from muscle support was unlike anything I had experienced when playing traditional repertoire. At first this would cause light-headedness and embouchure fatigue after only a few lines of practice. I found the only effective way to practise the piece was over a period of thirty minutes a day with several short intervals of rest. I practiced the individual techniques alone and slowly incorporated them into their phrase, gradually building up stamina until I could divide the piece into larger sections according to the expression marks made by the composer. In the last month before recording the piece I gradually built up stamina so I could practice difficult parts of the piece in sections and perform the piece as a whole. When programming this piece for a live concert I would need to take into consideration the physical demands of all pieces in order to balance the program and the demands on my preparation and embouchure.

This chapter has considered several difficulties in three significant works from the solo repertoire. The process of rehearsal, performance and recording has led to reflections on important challenges in my attempt to clarify confusion and suggest alternatives, giving some insight to flautists on the works I have recorded. The
journey of understanding the process of performance has informed my research and raised questions to further explore methods of effectively learning repertoire using extended techniques.
CHAPTER FIVE

This chapter considers strategies for approaching the difficulties found in new repertoire for the flute. As works become better known and enter the mainstream repertoire the most effective notation and techniques tend to be adopted by composers. A principal set of beliefs will gradually develop over time and be assumed by both composers and performers, evolving into a standardised notation. However, in the current absence of such a standardised notation, it is necessary for flautists to be familiar with the variety of techniques and notation that exist. I have suggested methods for analysing contemporary idioms, resolving some of their difficulties and incorporating them convincingly into performance. In addition to this I have also included a graded list of pieces and studies designed to introduce extended techniques to students at various levels of familiarity, as many flautists encounter this repertoire at different stages of their development. This chapter also offers exercises I have developed while preparing the repertoire which was recorded onto CD, in an attempt to isolate and incorporate difficult techniques into the final performance.

When approaching a new piece of music containing extended techniques it is crucial to recognise areas of difficulty, analyse how to resolve them and organise practice accordingly. I find it is useful to categorise my preparation into four areas:

1. Researching the composer and any established knowledge about the piece.
2. Analysing the score away from the instrument to resolve any difficulties in notation or complexity.
3. Isolating and learning to produce difficult extended techniques.
4. Incorporating techniques into the piece as a whole and building endurance for performance.

Before beginning work on a piece it is beneficial to explore the composer’s body of work in order to become familiar with his or her compositional style, and to become accustomed with the type of techniques and sounds explored throughout the works (including the use of techniques on other instruments). This can be done through reading literature by and about composers, through direct discussion with composer or through contact with performers who have had a direct connection to the work. Listening to recordings, as well as reading any literature written about the
piece, is useful to discover any established knowledge or performance traditions about a piece. Berio’s *Sequenza* has developed a degree of performance tradition over the past decades which can be heard in a number of recordings of the piece, in addition to the clarification made by the second edition, which resolved some of the notational and rhythmic problems. Even if a player chooses to learn the piece from the first edition it is particularly useful to be aware of the second edition and consult it in the early stages of learning the piece. Listening to recordings of works is an invaluable resource to determine how other performers have interpreted the score.

Preparing the score away from the instrument is an important element in solving any difficulties in notation or complexity. When faced with the score for the first time it is necessary to analyse the physical and musical difficulties required in the piece, and to begin planning the preliminary work needed to be done without the flute. Major difficulties that commonly arise can be because of the extreme visual complexity in new scores, deciphering instructions, notation and the production of techniques. Preliminary work spent on translating problems away from the instrument allows the player time to adjust to new notations, rhythms and to experiment with new techniques. At this stage the performer needs to become familiar with the notation and production of the extended techniques in order to gradually incorporate them into the piece. It is imperative that the player has access to extended technique catalogues in order to consult notations and fingerings; the most comprehensive being Artaud’s *Present Day Flutes*, and Levine’s *The Techniques of Flute Playing*. At this point it is constructive to categorise areas of difficulty and decide if the problems can be solved with or without the flute. Problems might include complex rhythms, extreme density of notes, fast register or changes of dynamic, difficulty in reading notation, the production of multiple techniques at one time or developing stamina when using the high register. When approaching Ferneyhough’s *Cassandra’s Dreamsong*, for example the first tasks I undertook away from the flute were to:

- enlarge the score with a photocopier in order to see the composers fingerings clearly and for ease of reading.
- cut out the segments so they could be performed in any order and I could experiment with the order to determine the structure.
- compile a list of every technique required in the piece including combinations of techniques to be performed simultaneously.
- list the specific techniques required at the beginning of each segment.
• write further information on the score to clarify fingerings or detail the characteristics of the production of particular techniques.
• differentiate key clicks, key clicks with pitch, key clicks with pizzicato, pizzicato alone etc, by colour coding them on the score.
• colour code the dynamics in opposing colours to the key percussion.
• re-write the tongue pizzicato passages into groups of four so they were readable (Section 5) as the notation made it difficult to see which line of the staff they are on.
• decipher the rhythm without the difficulty of performing techniques at the same time.
• test whether the fingerings were correct and consult fingering charts if alternatives were required (particularly for the pitch of the covered key slaps and the timbral fingerings).

In the early stages of learning a piece it is necessary to look up fingerings if not prescribed. It is of worthwhile to research whether the composer’s fingerings are to be strictly adhered to. If fingerings have been suggested by the composer, it is useful to know several alternatives for fingerings of the same note and test whether these fingerings are playable at the final speed required (for example the quarter tone scale using alternative fingerings used in Clarke’s *Zoom Tube*). Just as flautists choose alternate fingerings for notes in the fourth octave which present intonation problems, I believe it is appropriate to choose alternate fingerling for extended techniques if they are more effective in creating the end result a composer wishes for. When making decisions about the most appropriate fingering for an extended technique, it is helpful to consider the speed of the gesture, its relationship to surrounding notes, dynamics and tone colour. Where possible it is useful to know whether the composer is open to the performer using alternative ways of producing to his extended techniques. I discovered from flautist Roberto Fabbriciani that the composer Paolo Perezzani was interested in creating a haunting atmosphere by using timbral trills in the final pages of *L’Ombra dell’Angelo*. Although he specified some of the fingerings, Fabbriciani believed the composer thought it was ultimately up to the flautist to choose the best fingerings for these trills.99 There are a number of different fingerings which can be used for these trills and I ultimately chose

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99 Roberto Fabbriciani, Lesson with Kathryn Moorhead on Perezzani’s *L’Ombra dell’Angelo* (15 January, 2010).
fingerings which sounded the least cumbersome to create a seamless effect, in addition to altering the microtonal pitch slightly to create an evocative colour.

Another common problem, which can sometimes be solved away from the instrument, is complex rhythms. In order to internalise rhythms without the instrument it can be useful to write out subdivisions, or to rewrite a section if there is an easier alternative (for example subdividing the rhythm into millimetres in Berio’s graphic score of the *Sequenza* or re-grouping rhythms into four so that they are visually easier to read in Ford’s *Mondriaan Suite*.) Creating a click track can be of use when practicing metric modulations. When learning a piece with recurring tempos, which are interspersed with sections of different speeds, I find it useful to memorise the tempo by practicing the sections with common metronome markings together (as in Bortz’s *Tinted Paintings*).

Once all of the preparatory work is done on the score the most efficient use of time is to first isolate the areas requiring the most difficult extended techniques. I found the most productive way of learning difficult techniques was to remove them from the context from the piece and practise them in segments, at first leaving rhythm and speed aside. When preparing my repertoire for recording I compiled a list of difficult techniques from each of the pieces which I addressed by creating short daily exercises. I began by focusing on these techniques out of the context of the piece, rather than practicing the piece in its entirety in the early stages.

In order to train my embouchure to be flexible to produce quarter tones I used the following exercise (see over):

Using the air direction and embouchure to bend the note.

![Exercise](image)

and ascend to C1

Figure 77: My suggestions for quarter tone embouchure exercises.

When learning Ian Clarke’s *Zoom Tube* I found it useful to practice complete quarter
tone scales, and establish which alternate fingerings were most effective to produce a legato line:

![Figure 7: My suggestions for quarter tone scale exercises based upon Ian Clarke’s Zoom Tube.](image)

The following exercise is based on Perezzani’s harmonic trills from *L’Ombra dell’Angelo* and is useful for embouchure flexibility as well as integrating the trills into the piece (see over).

![Figure 79: My suggestions for harmonic trill exercises based on Perezzani’s L’Ombra dell’Angelo.](image)
I used the following sequence to practise soft legato changes between harmonic fingerings in Perezzani’s *L’Ombra dell’Angelo*:

![Figure 80: My suggestions for practicing soft legato changes between harmonic fingerings in Perezzani’s *L’Ombra dell’Angelo*.](image)

Isolating the ‘Sciarrino whistles’ was necessary to develop the ability to find the correct air direction in Perezzani’s *L’Ombra dell’Angelo* (see over):
Figure 81: My suggestions for practicing ‘Sciarrino whistles’ based on Perezzani’s *L’Ombra dell’Angelo*.

I found practicing sequences of jet whistles beneficial in developing stamina and for performing in Clarke’s *Zoom Tube* and Villa-Lobos’ *Assobio a jato* (see over).
I used the following exercise by Robert Dick to practise the multiphonics in Robert Aitken’s *Plainsong*:

![Jazz Thu 84](image)

**Figure 83:** My suggestions for practicing multiphonics in Robert Aitken’s *Plainsong*.

John Van Buren’s key slaps from the opening of *Incandescence* were ideal for practicing several different sorts of key percussion:

1. Key slaps with tongue stops/closed embouchure hole

![Jazz Thu 84](image)

2. Key slaps with sound

![Jazz Thu 84](image)

3. Key slaps with lip pizzicato

![Jazz Thu 84](image)

4. Key slaps with tongue pizzicato

![Jazz Thu 84](image)

**Figure 84:** My suggestions for practicing key percussion, based on John Van Buren’s *Incandescence*.

One of the difficulties in producing tongue rams is the speed at which the flautist needs to change the mouth position. I created the following exercise based on material from Andrew Ford’s *Mondriaan Suite* (see over):
I found the following exercise useful for warming up for pieces which require singing and playing simultaneously:

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Singing and playing. Ascend chromatically.
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A further difficulty in preparing new music can be building endurance. Such passages included those which require extreme dynamics, fourth octave playing, a high degree of embouchure strength, the use excessive abdominal support and extreme breath control. Practising fourth octave sections at a comfortable dynamic while attempting to put as little strain on the embouchure is beneficial. Extreme sections requiring stamina are best practiced briefly during a session, interspersed with periods of rest, and at times difficult fingering passages can be learnt without blowing in the instrument. It is important to establish limitations to avoid injury and gradually build up physical conditioning. I faced these difficulties during the early stages of learning Perezzani’s *L’Ombra dell’Angelo*, when I found I could not play more than one page a day without tiring my embouchure, which would create problems when needing to use a conventional flute sound. It took months of gradually building physical stamina until I could play the piece in its entirety. In the weeks leading up to recording, I found it only possible to play the piece in its entirety once a day, in order for it to have no detrimental effect on my embouchure.
What follows is a graded list of pieces and studies in order for flautists to better equip themselves for the technical challenges presented by the contemporary flute repertoire. The pieces are organized incrementally in terms of the difficulties posed by the extended techniques included in them.

LEVEL 1: EASY
_____.. *Extended techniques - Solos for Fun! for flute(s) and piano* (Charlotte, NC: ALRY Publications, 2006).
Offermans, Wil. *For the Young Flutist* (Frankfurt am Main: Musikverlag Zimmermann, 1995).
_____.. *For the Contemporary Flutist* (Frankfurt am Main: Musikverlag Zimmermann, 1992).

LEVEL 2: INTERMEDIATE
_____.. *Fish are Jumping* (New York: Multiple Breath Company, 1999).
Stockhausen, Karl-Heinz. *In Freundschaft* (Stockhausen Verlag, 1977).
_____. *Sori* (Berlin: Bote and Bock, 1988).

**LEVEL 3: MODERATELY DIFFICULT**


**Level 4: ADVANCED**

_____. *(t)air(e)* (California: Ars Viva Verlag, 1983).
Ichiyanagi, Toshi. *In A Living Memory* (Tokyo: Schott, 2000).
CONCLUSION

In embarking on this project my aim has been to shed some light on the advent of extended techniques on the flute, and to explore the purpose and function of notation as composers and flautists attempt to standardise it. In addition to this I have tried to find approaches through the process of recording this repertoire to develop the unique set of skills required to perform new music. It has become obvious to me that the problems of establishing a standardised notation are yet to be resolved. Attempts in recent years have been made by music publishers to create some uniformity based on the works of composers published by them, however this has not been universally accepted. Notation guides directed at composers by Gardner Read, Erhard Karkoschka and Kurt Stone attempt to standardise many of the diverse notation of contemporary techniques, but there remains a lack of consistency in effective graphic descriptions in the contemporary repertoire. It becomes apparent that because of the notational problems encountered in the contemporary flute repertoire, in addition to the demand to develop new skills to produce extended techniques, it is necessary for the flautist to develop a method for quickly analysing contemporary idioms. It is hoped that the discussion and recording of the difficulties in producing extended techniques within the context of the repertoire will contribute to making these works more accessible to players, and in turn performances of these works will result in exposing audiences, listeners and performers alike, to the extraordinary diversity and creativity of new music.
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B: Discography


C: Musical Scores


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APPENDIX : CD RECORDINGS

Track List

DISC 1

Track 1: L’Après-midi d’une faune (1892) by Claude Debussy.
Arranged by for flute and piano by Karl Lenski. Performed with Leigh Harrold.

Track 2: “Der kranke Mond” from Pierrot Lunaire (1912) by Arnold Schoenberg.
Performed with Merlyn Quaife.

Track 3: Syrinx: for solo flute (1912) by Claude Debussy.

Track 4: Capriccio XVII “Sogno futuristico” dal “Non plus ultra del flautista” op.34 for solo flute by Leonardo de Lorenzo (1923).

Track 5: Mobiles I for Solo flute (1932) by Henry Brant.

Track 6: Density 21.5 (1936) by Edgar Varèse.

Track 7: Cinq incantations: pour flûte seule (1936) Movement 1, by André Jolivet.

Track 8: Excerpt (bars 1-95) from Sonatine: flute & piano (1946) by Pierre Boulez.
Performed with Leigh Harrold.

Track 9: Assobio a jato (1950) by Heitor Villa Lobos.
Performed live in concert with Josephine Vains (cello)

Track 10: Le merle noir: pour flûte et piano (1951) by Oliver Messiaen.
Performed with Leigh Harrold (piano).

Track 11: Sequenza per flauto solo (1958) by Luciano Berio.

DISC 2

Track 1: Flute piece in nine phases (1959) by Ernst Krenek.

Track 2: Ambages: for flute (1965) by Roger Reynolds.

Track 3: Shun San for solo flute (1968) by Kazuo Fukushima.

Track 4: Vox balaenae: for three masked players: electric flute, electric cello, electric piano (1971) by George Crumb.
Performed with Leigh Harrold (piano) and Josephine Vains (cello).

Track 5: Cassandra’s Dream Song (1971) by Brian Ferneyhough.

DISC 3

Track 1: *The Little Predicament* (1979) by György Kurtág. Performed with Ken Murray (guitar) and John Gluyas (trombone).


Track 7: *L’Ombra dell’Angelo: per flauto* (1986) by Paolo Perezzani.

DISC 4

Track 1: *Quodlibetudes* (1988) by Harvey Sollberger.


Track 6: *Zoom Tube* (2001) by Ian Clarke.
