Performing Contemporary Cello Music: Defining the Interpretative Space

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

This practice research seeks to investigate the question of interpretation and technique in performance of contemporary music as part of an integrated domain that I define as *interpretative space*. Taking as case studies the three compositions for solo cello: *Nomos alpha* by Iannis Xenakis (1966), *Parjanya-Vata* (1981) by James Dillon and *Invisibility* (2009) by Liza Lim, I dedicate a chapter to each work to explore their characteristics from multiple perspectives, including specific techniques, sound and performance, gained from my study and experience of performing and recording these works.

The analysis of *Nomos alpha*'s combinatorial techniques is contextualised by the references to the traditional cello method (40 *Studies Hohe Schule des Violoncello-Spiels*, Op.73 by David Popper), which is re-considered from the viewpoint of transitions within and between the patterns – as a refined approach for integrating elasticity of movements in both hands with musical timing (*rubato*). The contemporary studies (*Pro musica nova: Studien zum Spielen Neuer Musik*, edited by Siegfried Palm, 1985) for mastering extended techniques are also included in discussion in relation to the technical tools in the selected pieces, and for highlighting the continuity in the development of the expressive capacity of the cello.

The interdisciplinary aspect of the three compositions constitutes a substantial part in defining the interpretative space in my research. The richness of extra-musical and multi-cultural references as well as non-classical musical influences, in *Parjanya-Vata* and *Invisibility*, is explored as a compositional philosophy embodied in the works and in relation to the expressive devices employed by Dillon and Lim.

In the course of my practice research I discovered new and re-affirmed and expanded the previously formed ideas linking the multiple threads within a complex domain. I elucidated the elements involved in this process – defining their functions through live performance, recording and research – in developing the concept of the interpretative space as a singular approach to performing contemporary cello music.

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Introduction

> We always think interpretation is total liberty. You take a text and you make it yours. But it's not only that. A text only truly exists if one observes the internal relationships and the external relationships as well, and if one is not entirely prisoner to a digital definition. Pierre Boulez.[1]

My practice research aims to explore the notion of interpretation as an integral domain that encompasses the inter-related strands of artistic expression, technique and performance within the broad associative environment that I define as the interpretative space. The term interpretative space in this thesis is employed for investigating the dynamic interplay of multifarious elements in performance practice: physicality of playing, instrumental technique, intellectual rigour, imagination and intuitive insight. This term has been used in other contexts, for example, in relation to notation and the performer's input in interpretation of contemporary works.[2]

This framework is examined through the process of learning, recording and performing selected compositions for solo cello: *Nomos alpha* by Iannis Xenakis (1966), *Parjanya-Vata* (1981) by James Dillon and *Invisibility* by Lisa Lim (2009) – three contemporary compositions that maximise the expressive resources of the cello.

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[1] Quoted in Hans Ulrich Obrist, *A Brief History of New Music* (Zurich: JRP Ringier, 2011), p. 66.

[2] See, for example, Amanda Bayley, *Investigating the interpretative space between notation and performance*, in: IAMS Symposium, Music: Notation and Sound, 5–10 July 2009, Amsterdam. http://researchspace.bathspa.ac.uk/3673/. Tanja Orning, 'The Polyphonic Performer. A study of performance practice in music for solo cello by Morton Feldman, Helmut Lachenmann, Klaus K. Hübler and Simon Steen-Andersen' (PhD Thesis, Norwegian Academy of Music, 2014), p. 85, https://nmh.brage.unit.no/nmh-xmlui/handle/11250/2626846?fbclid=IwAR3UkXHBSshjUOp-fmvK32QvhJCp6UXXbO_6hTVEzkY_V_-LRTVsSF_nehc, quotes the contemporary singer Tora Augestad: 'In contemporary music the composers are the stars. The performers are far less important. But I think this is about to change. The performer's task is to communicate the composer's intent to the audience. It is precisely because the composer's intention is not always as evident in contemporary music, that the task is so exciting'. Orning comments: 'Augestad pinpoints here one of the attractions of performing new music: the interpretative space created by uncharted territory, gaps, and fissures within the composer's intention'. With regards to the problem of notation and the performer's part in expanding his/her creative space, she states: 'Principally in the twentieth century, the Werktreue ideal came to reflect a positivistic approach to music, becoming an ideology of replication, of the possibility of a transparent rendering of what is notated. Accepting and embracing the ambiguity in a work's notation and performance, on the other hand, opens a creative space for the performer, a space where several areas are yet to be explored'. See also, 'The ethics of performance practice in complex music after 1945,' in Guldbrandsen, Erling E., and Julian Johnson (eds.), *Transformations of Musical Modernism* (Cambridge: Cambridge University Press, 2015), pp. 299–318 (p. 299).

One of the reasons for selecting these compositions is their ingenious utilisation of instrumental virtuosity, which, in the case of *Nomos alpha*, is still perceived by some performers as bordering on the 'impossible'.[3] A distinct expressive quality of each composition and the complementarity of their technical characteristics was also an important consideration in choosing this repertoire for my research. For example, the combinatorial techniques in *Nomos alpha* demand an unprecedented rhythmic and pitch precision and co-ordination of the movements involved in executing rapidly fluctuating sequences of the events; in contrast, *Invisibility*'s organically unfolding textures call for a heightening sense of tactility, adjustability in the muscles of both arms and physicality of playing with two bows. *Parjanya-Vata* requires mastery of the full spectrum of technical and tonal resources for realisation of gradual increase in dynamic and tonal intensity. In addition, these pieces are cogent examples for examining the development of the cello in the second half of the twentieth and the beginning of the twenty-first centuries as a tool for communicating the multi-dimensional qualities of contemporary and new music. In this regard, the works stimulate enquiry beyond their particular characteristics – as part of the broad issues of expression and 'crossing boundaries'. As a performer, I am drawn to intensity, complexity and the interdisciplinarity in music; this interest also played a part in the choice of repertoire for this research. Among the notable characteristics of Xenakis, Dillon and Lim's creative output is the permeability of the boundaries between sound, extra-musical imagery and influence of various disciplines including mathematics, philosophy, anthropology and art. This quality is combined with a

[3] Although some of the passages in the work are objectively impossible in a mechanistic sense, the score is realisable through various pathways and methods. Xenakis's spirit of striving to 'overcome physical limitations' (see Bálint András Varga, Conversations with Iannis Xenakis, London: Faber and Faber, 1996, pp. 65–66) might be understood as a call for developing variety of new approaches and practice methods – this has been demonstrated by a number of performers over several decades. See, for example, Roger Woodward, 'Conquering Goliath: Preparing and Performing Xenakis' *Keqrops*, in Sharon Kanach (ed.), *Performing Xenakis* (Hillsdale, New York: Pendragon Press, 2010), pp.129–155; Pavlos Antoniadis, 'Physicality as a Performer-Specific Perspectival Point to I. Xenakis's Piano Work: Case Study Mists', Proceedings of the Xenakis International Symposium, Southbank Centre, London (2011), https://www.gold.ac.uk/media/documents-by-section/departments/music/07.3-Pavlos-Antoniadis.pdf [Accessed 2 February 2015]; Marc Couroux, 'Evryali and the Exploding of the Interface: From Virtuosity to Anti-Virtuosity and Beyond', *Contemporary Music Review*, 21.2–3 (2002), 53–67, among others. As discussed in this thesis, in my own approach to mastering *Nomos alpha* I prioritise the mental clarity of the score and muscle memory focusing on patterns and units assembled within the metrical grid, and animated by subjective associations and imagery.

singular 'rootedness' in their music – a visceral connection to the myth, ritual and energies of 'mycelial meshworks',[4] within and beyond human life.

My central research question is: how, and to what extent, might the notions of technique and interpretation be applied in practice for a successful communication of the conceptual and associative richness of *Nomos alpha*, *Parjanya-Vata* and *Invisibility*. In each work my focus gravitates towards the key performative issues in their distinct interpretative space – a subjective understanding that evolved from my working, recording and live performance experiences.

0.1 Research aims:

1. To explore and define the interpretative space in contemporary music through learning and performing selected works.
2. To re-evaluate the technical and expressive possibilities of the cello and investigate methodology for the development of contemporary cello techniques.
3.To examine the relationship between traditional and extended techniques through re-assessing established technical methods.
4. To extend practical knowledge in the use and further development of extended techniques.
5. To analyse the interpretative space of the chosen works from the perspectives of technique, performance and an interdisciplinary dimension and to formulate a practical approach that might be useful for cellists working on these pieces

0.2 Methodology

My methodology comprises theoretical and practical study of the selected scores, with an emphasis on the experiential dimension – my own process of learning, performing and recording the three compositions. At the beginning of my research, I applied the method of 'looking' through each score with my fingers – playing and feeling the textures and the general shape and pulsation of the pieces. My instinct is to avoid

[4] Liza Lim frequently refers to the 'mycelial' model of exchanges and distribution as part of her compositional philosophy. See, for example, Lim, 'A mycelial model for understanding distributed creativity: collaborative partnership in the making of "Axis Mundi" (2013) for solo bassoon', in CMPCP Performance Studies Network Conference, Cambridge, 4–7 April 2013, University of Huddersfield Repository, http://eprints.hud.ac.uk/id/eprint/17973/1/PSN2013_Lim.pdf and 'Intervention: Knots and other forms of entanglement', in Eric F. Clarke and Mark Doffman (eds.), *Distributed Creativity: Collaboration and Improvisation in Contemporary Music* (New York: Oxford University Press, 2017), pp.207–213.

listening closely to existing recordings of music that I am learning before I grasp, intuitively, the essence of the composer's expression (as an exception, in the case of *Nomos alpha*, it was necessary to hear the sound of the work at the start – to clarify its relation to the notated text). The second stage involved a theoretical study of the composer's aesthetics and philosophy as well as listening to his/her oeuvre in order to form an understanding of the style and compositional method; this part expanded into the interdisciplinary dimension of the broad range of music genres, philosophy and art forms. The period of immersion in the composers' musical philosophy, influences and individual ways of relating to the performers and their instruments combined with technical work, resulted in the initial formation of the interpretative space. My live performances brought new information and insights into the expressive possibilities of sound and physical gestures in communicating the musical ideas in various settings and conditions. For example, in *Nomos alpha*, I experimented with a pre-record, cinematic images, and the use of two cellos and an electric cello (in part, to resolve the problematic *scordatura* requirements);[5] in my performances of *Invisibility*, I learned to trust the fluctuations of sound, 'accidents' and slippages perpetuated by the *guiro* bow – its particular characteristics that shape the temporal flow and pulsations of intensity. Experimenting with electric cello in my first performance of *Parjanya-Vata* confirmed my initial impulse of exploring the gradations of 'graininess' and translucency of sound through the physicality of playing acoustic cello – a preferred medium in Dillon's compositional approach to instrumentation. The detailed analyses of my live performances are omitted from the discussion as my approach to the main question of the thesis was shaped by prioritising global outlook – with the aim of integrating the multiplicity of elements and the dynamics of commonalities and interrelations in each composition and within their broader interpretative space.[6] My strong interest in the techniques and physicality of cello playing has also influenced

[5] These experimentations with the various concepts and formats in live performances of *Nomos alpha* have expanded into several new projects (which are outside the scope of this thesis) – for example, the ongoing project 'Interdisciplinary Approaches to Performing Xenakis' *Nomos alpha*: Andrei Tarkovsky and the Notion of a Zone' that incorporates the cinematic images from Tarkovsky's film *Solaris* (1972) and *Stalker* (1979). For the conceptual framework of this project, see Alfia Nakipbekova 'Performing *Nomos alpha* by Iannis Xenakis: reflections on interpretative space', in A.Nakipbekova (ed.), *Exploring Xenakis: Performance, Practice, Philosophy* (Delaware: Vernon Press, 2019), pp. 89–107. Another direction in my research involves the subject of corporeality in performing contemporary cello music – as part of this research I experiment with performing *Nomos alpha* on the electric cello, incorporating movements from the martial art (Tai Chi Chuan Wudang Style).

[6] In my subjective perception, the three pieces formed a 'trilogy' with its own interpretative space. See Conclusion for my comments on this issue.

the direction and focus of this research, which is reflected in the scope of the traditional and contemporary studies parts of this thesis.

An important aspect of my methodology consisted of recording the compositions and listening closely to existing audio recordings by various performers.[7] Although a comparative analysis of the current interpretations is not included in the thesis, the critical evaluation of the variety of approaches to the compositions contributed to my research. The process of recording the selected repertoire brought fresh insights that enhanced my understanding of the structure, pulse and sound of the pieces – this new level of clarity extended into my live performances.[8] In the course of my research, the live performances and recording formed a 'mycelial' system of non-linear processes and dynamic exchanges complementing and influencing each other. The studio recording sessions were incorporated into the research timeline as part of the organic development and as a chosen strategy in my global approach; the three main works were interspersed with recording Popper's Etudes at various stages, in a non-chronological order. As my research progressed, I followed intuitively the line of formation of the interpretative space within the compositions that was generating its own momentum revealing a meshwork of relations and events. I chose a non-linear approach that allowed a degree of spontaneity in decisions with regards to the schedule of recordings and performances (for example, recording the piece before performing or after several performances), and the pieces that I studied at any particular time period (my preferred method is to study works with contrasting styles in order to analyse my responses in adjusting and expanding technical and expressive parameters). As with live performances, a critical evaluation and practical aspects of each recording are not included in the discussion; however, the general comments with regard to recording component that are pertinent to the theme of the thesis are as follows:

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[7] See Bibliography for the list of recordings that I studied by close listening. For the recording notes see Appendix.

[8] This part of my research instigated a number of questions regarding listening and subjective perceptions of one's own recorded material and the recordings of other performers, and the importance of differentiated listening as a 'dynamic component' in the process of developing interpretation. Discussing the problem of listening in relation to live performances, Anthony Gritten, 'Does the Performer have to Listen?', *Music&Practice*, 6, 2020, https://www.musicandpractice.org/volume-6/does-the-performer-have-to-listen/, points to the active nature of concentrated listening: 'listeners simply listen, while performers additionally harness their listening as a dynamic component of their concentration and apply it directly to their performative actions'. For extensive discussion on the subject of musical listening, see Erik Christensen, *The Musical Timespace; A Theory of Music Listening* (Aalborg: Aalborg Universitetsforlag, 1996).

1. Although for my own research purposes, I recorded some of the repertoire as live performances, the final versions that are included with the thesis are studio recordings that represent examples of my artistic realisation of the interpretative space both of the central repertoire (*Nomos alpha* by Iannis Xenakis, *Parjanya-Vata* by James Dillon and *Invisibility* by Liza Lim) and supporting works (selected Etudes op.73 by David Popper).

2. With exception of *Nomos alpha*, the pieces share a similarity in their performative characteristics – live performances and recordings can be experienced as parts of the same process (with some variations in intensity and fluctuations in dynamics and tempi).[9] In recording *Nomos alpha*, however, I came to understand the singularity of the composition that determined characteristics of sound and pulse in live and recorded versions and the cellist's live and recording experiences. This is partly due to the unique *scordatura* framework that disrupts continuity and affects the transitions between the sections in live performances. In contrast to the *scordatura* in *Invisibility* (that is set for the duration of the work), in *Nomos alpha* Xenakis employs this device for modifying and expanding the registers, opening a space for expressing interpretative approaches on the temporal, physical and visual planes of live performance. In recording, these procedures (in the transitions between the sections marked by the de-tuning of the C-string) are concealed – this influences the listener's perception of the composition's overall structure. Therefore, I approached recording *Nomos alpha* as a distinct self-contained project focusing on precision in executing the composer's instructions regarding tempi, dynamics and pulse (rhythmical clarity in juxtaposition and flow of the events).[10]

As the starting point in my project, *Nomos alpha* occupied my attention for the entire

[9] Recording *Invisibility* highlighted some issues in transmitting the elusive sonorities of the *shimmer* effects, ruptures and 'noises' created by unpredictable and unplanned 'slippages' of the guiro bow (see Overview of Chapter 3).

[10] This focus on precision of indicated tempo and clarity of structure determined my decision to record the two lines of the scalic progression of the final section (bb. 362–383) separately, which creates an effect of the pre-recorded line in live performance. For discussion of the approaches to the 'unplayable' final part of *Nomos alpha*, see Part 1.4.2 'Overview of Extended Techniques and Comments on Practice'.

timeline of the research in parallel with and as a background to the other works; in the course of six years it was performed live extensively and video recordings were made on some of these occasions. The audio recording was completed at the early stage of the project and re-recorded later, in December 2018.[11]

My study, practice and performances of *Invisibility* stimulated my interest in philosophical anthropology and, particularly, in the work of the British anthropologist Tim Ingold (b.1948). Ingold emphasises 'the importance of distinguishing the network as a set of interconnected points from the meshwork as an interweaving of lines'. The notion of interpretative space might be understood in the light of his idea of 'unbounded entanglement of lines', by thinking of the composition as an 'organism':

> Every such line describes a flow of material substance in a space that is topologically fluid. I conclude that the organism (animal or human) should be understood not as a bounded entity surrounded by an environment but as an unbounded entanglement of lines in fluid space.[12]

Orning articulates the parameters of 'interpretive space':

> Performance practice may be imagined as an interpretive space made up of the performer, her body, her instrument, practice, experiment, the composer and score, tradition and context, and any number of other elements that come in and out of play and any given moment.[13]

To extend this definition, I regard the performance practice as a *process* and view the dynamic interplay of the elements in their fluctuating environment as agencies in 'fluid' dialogical interactions. From the perspective of the Russian philosopher and linguist Mikhail Bakhtin's (1895–1975) theory of polyphonic novel, in the domain of

[11] In this version I took into account Makis Solomos's research into possible errors in the score. See Solomos,'Nomos alpha. Remarks on Performance', in Alfia Nakipbekova (ed.), *Exploring Xenakis: Performance, Practice, Philosophy*, pp.109–125 (pp.122–124). I comment on this issue in Part 1.2 'Notation and Structure'.
[12] Tim Ingold, *Being Alive* (Abingdon, Oxon: Routledge, 2011), p.222.
[12] Orning, *The Polyphonic Performer*, p.310.

the musical composition's interpretative space, all the elements are engaged in a dialogical process intertwined on every level and in every aspect of practice, recording and performance. Andrew Robinson points to the universal nature of such interactive processes: 'we are always in dialogue, not only with other people, but also with everything in the world. Everything 'addresses' us in a certain sense'.[14]

In the course of my practice research, I became aware of how the three case studies are linked by the idea and practical application of *patterns* as a structural aspect and as part of my technical approach. My recorded works include examples of technical studies from the methods of two important cellists – David Popper (1843–1913) and Siegfried Palm (1927–2005). This is related to the main works in two ways – firstly, as supporting material in this focus on patterns and transitions. Secondly, by juxtaposing the compositions with the 'technical' material, I seek to communicate the artistic validity of an integral approach to the dichotomy of 'interpretation' and 'technique'. I also aim to integrate the 'traditional' and 'contemporary' methods in exploring the path to renewal of the cello in the broader context of the dynamic interaction between experimentation and tradition in the twenty-first century composition and performance.

0.3 Overview of the Chapters

In Chapter 1, I examine *Nomos alpha* from various perspectives that include a discussion of Xenakis's ethical position and his views on performance, followed by an exploration of the compositional parameters of the piece – the structure, notation, technique and sound. Solomos asserts the composition's unique place in Xenakis's oeuvre as one of the 'most formalised' works that represents the composer's development of his theory of 'outside-time structures'; this is reflected in the piece's architecture and sound 'calculated down to the last detail'. Solomos notes that the piece demands a kind of virtuosity from the performer that functions as an artistic tool in establishing a 'particular relationship between the musician on stage and his/her audience'.[15] In my experience of working on the piece, I came to realise that the

[14] Andrew Robinson, 'In Theory Bakhtin: Dialogism, Polyphony and Heteroglossia', *Ceasefire*, 29 July 2011. https://ceasefiremagazine.co.uk/in-theory-bakhtin-1/ [Accessed 17 July 2020]. My study of Bakhtin's concepts of *dialogism*, *polyphonic novel*, the *carnavalesque* and *unfinalisability* has expanded my understanding and practical approach to performance and performativity; this was particularly productive in my exploration of Lim's compositional philosophy generally and in my research on defining the interpretative space of *Invisibility*.

[15] Makis Solomos,'Nomos alpha. Remarks on Performance', p.109. In my experience, this 'particular

performer of *Nomos alpha* must find his/her own way of attaining this quality of virtuosity for communicating Xenakis's musical singularity to the listener. This understanding of the relationship between the instrumental technique, theoretical concepts and expressive ferocity at the heart of *Nomos alpha* formed the central question in my research directing my attention towards the nature of the technical apparatus involved in performing the composition.

By focusing on *Nomos alpha*'s perceived 'unplayability' (the 'utopian' nature of the instrumentalism devised by Xenakis), I broadened my enquiry into the subject of the cellist's traditional technical apparatus – my personal discovery is that *Nomos alpha* does not reject conventional ways of playing but absorbs them. In this regard, the process of mastering *Nomos alpha* has refreshed my own perceptions of the physicality of playing through re-evaluating the basis of classical cello technique. From the broad gamut of the cello schools and technical material, David Popper's method crystallised in his volume of the 40 Etudes *Hohe Schule des Violoncello-Spiels*, Op.73 (1901–1905), is an appropriate repertoire in my research for a number of reasons: my own early experiences in developing the relationship with the instrument and my pedagogical practice that confirms the effectiveness and universal appropriateness of the method to stylistically diverse cello repertoire – by virtue of the composer's adroitness in constructing interlaced systems of patterns. Most importantly, the set provides an example of virtuosic pieces in which the technical issues can be resolved through the use of expressive devices, i.e. *rubato*. By approaching the concepts of 'technique' and 'expression' as parts of an integral system, I also explore their function by analysing to what extent the physicality of playing *Nomos alpha* is supported and animated by the *memory* of my previously learned muscle responses within a conventional technical framework.

My playing style is characterised by attention to the 'in-between spaces' in technique (connecting the notes, position changes and *portamenti*) and musical shapes (a sense of temporality in the 'fluid' architecture of performance). Experimenting with a variety of approaches to learning *Nomos alpha*, I found this particular tendency was helpful in the arduous process of internalising the 'unplayable' sections of the

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relationship' issues from the intensity of the cellist's personal journey of facing and resolving the technical and performative questions posed by Xenakis in *Nomos alpha*, and a particular physicality in relationship with the instrument that can uniquely be experienced through 'living' with this composition for an extended period of time.

score by expanding the spaces where the momentary release in the hands could occur. This focus led to re-thinking the technical approaches to Xenakis's piece via an unlikely juxtaposition with the salon pieces composed at the beginning of the twentieth century. *Nomos alpha*'s rigorous structure demands clarity in executing the events, involving technical agility for fast and efficient movements on macro- and micro- levels. In my recording of Popper's Etudes I aimed to investigate these spaces expressed through the use of *rubato* – an elastic timing in shaping musical flow that, at the same time, has a potential to 'organise' the structure. Although *rubato* in Popper's pieces is perceived as part of the style of his time and as a feature in 'period' performance,[16] the quality of connections as effort-less physical action can be re-examined and applied in approaching contemporary and new music repertoire, and generally, in playing as a tool to integrate expression and technique.

To highlight the continuity in the development of the cello, a group of contemporary studies from *Pro musica nova: Studien zum Spielen Neuer Musik* (1985) compiled and edited by Siegfried Palm, is also discussed in relation to *Nomos alpha*'s combinatorial techniques. Palm's collection is pertinent to my enquiry as a case of virtuosic concert pieces devised for pedagogical purposes (the mastery of extended techniques) at the stage in the development of the cello when the instrument was rapidly expanding its expressive power. The focus on the techniques in *Nomos alpha* is contextualised by an overview of the development of extended techniques and their properties and expressive functions, which reflects one of the objectives of my research – investigation of the principles and pathways to contemporary cello repertoire.

Chapter 2 explores the two broad areas in relation to the interpretation and performance of *Parjanya-Vata* by James Dillon: the associative domain generated through exploration of the composer's literary, mythological and philosophical

[16] The subject of *rubato* is discussed extensively in Richard Hudson, *Stolen Time. The History of Tempo Rubato* (Oxford: Clarendon Press, 1994) and numerous articles. See for example, Sandra P. Rosenblum, 'The Uses of Rubato in Music, Eighteenth to Twentieth Centuries', *Performance Practice Review*, 7.1, Article 3 (1994), 33–53, https://scholarship.claremont.edu/cgi/viewcontent.cgi?article=1123&context=ppr [Accessed 4 July 2018]; see also Renee Timmers, Richard Ashley, Peter Desain & Hank Heijink, 'The Influence of Musical Context on Tempo Rubato', *Journal of New Music Research*, 29.2 (2000),131–158, https://doi.org/10.1076/jnmr.29.2.131.3095 [Accessed 6 March 2018].

references, and his various musical influences. Dillon's strong views on the spirit of performance – generally, and in relation to his music – are important elements in defining the work's interpretative space. In parallel with working on *Parjanya-Vata*'s particular technical difficulties, my study of the extensive range of references in Dillon's music evoked rich extra-musical imagery and allusions to the non-classical musical traditions and sound. I discuss these references and traditions in relation to interpretation and performance as an impetus and indirect influence in approaching the piece. In his short introduction to the score, the composer depicts the Hindu deities as personifications of the elemental forces, outlining the global development of the piece. This extra-musical dimension appears to adjure theatricality with excesses of contrasts in sonorities and pace; however, in his interviews the composer expresses his preference for 'authenticity' and intellectual rigour in performance – this view resonates with my own subjective 'feel' of *Parjanya-Vata*'s structure, textures and physicality of playing. My enquiry into particularities of the techniques employed in the work comprises an important part of the chapter – this includes rhythm, *glissandi*, left-hand 'leaps' across the fingerboard and transitions between the sections – to address the practical issues of playing by harmonising the intellectual clarity with virtuosic flair. I interpret Dillon's notion of 'authenticity' in performance as an articulation of his desire for unaffected style that embodies the performer's total immersion in the composition's associative realm – living through the experience of playing simultaneously with abandon and restrain.

In Chapter 3, I discuss the multifarious characteristics pertaining to interpretation of Lim's *Invisibility* – a composition that has been regularly performed in the past decade. The work's interpretative space encompasses a rich spectrum of threads and extra-musical associations with the Australian Aboriginal Yolngu art and ritual, and includes the innovative use of the two bows – the traditional and a 'prepared' one. The traditional bow techniques are enriched by circular and diagonal strokes; the abundant possibilities for experimenting with sound, 'noises' and the bow 'choreography' are obtained though dialogical tension with the *guiro* bow (an additional expressive tool created by closely winding the bow hair around the stick). Playing simultaneously with two bows refreshed the established sense of relationship, in balance and co-ordination, between the left and right perimeters of the body. The collaborative aspect of Lim's compositional approach is also included in the

discussion as an important part of *Invisibility*'s organic terrain of the intertwined conditions and relations – the composer's creative bond with the performers.

In my live performance of the piece, I experience a unique tactility in the fabric of the sonorities and shimmering textures produced by the irregularities in two bows' motion and the guiro bow's innate tendency to engender perambulant ruptures. The relationship between the two 'living entities' is brought to conclusion in the final part where the bows 'embrace' in an ecstatic moment of fusion. In my recording of *Invisibility* I attempted to capture the 'uncapturable' – the elusive quality of 'shimmer' and spontaneously arising sonorities and 'noises' – in my intent to transmit the idea of 'invisible' forces beyond the shifting appearances and signs through the agency of 'indirect gaze'. The issuing paradox of recording *Invisibility* to create a 'fixed' document in contrast to live performance experiences, where the chance and 'slippages' are part of the concept and organic tissue within the interpretative space, pointed to new territory for my future research of the question of the interpretative space communicated through the medium of audio recording.

Chapter 1

Nomos alpha by Iannis Xenakis

Nomos alpha is a distinctive composition that stimulates the re-examination of cello technique in a traditional and contemporary sense. My experience of practising, performing and recording this work expanded my understanding of the principles of technical foundation and increased my awareness of new possibilities in the range of sonorities associated with a physical approach to the instrument. It also confirmed that, in order to communicate the complex sound architecture of *Nomos alpha*, the unconventional techniques employed by Xenakis must be viewed as a part of the global perspective of the traditions of cello playing established in the last two centuries. As a performer grounded in these traditions, I consider the so-called extended techniques to be a natural phase in the development of the cello – an instrument with an immense potential for expressive power that has attracted the attention of numerous composers in the second half of the twentieth century.

In this chapter I will discuss *Nomos alpha* from various perspectives, including the composition's technical characteristics and the interrelated issues pertaining to interpretation, practice and performance. The focus of the first part is a general overview of the technical parameters of the composition. In the second and third sections of the chapter I will discuss some issues related to notation, structure and the global approach to exploring the interpretative space of *Nomos alpha*. The following part offers a general analysis of extended techniques – their particular characteristics and difficulties that are unique to the composition. The subsequent sections comprising '*Nomos alpha* and Contemporary Studies' and '*Nomos alpha* and Traditional Studies', elaborate on the practical methods for establishing the technical framework of the piece. Within the broad area of technique, I will discuss the contemporary studies for mastering extended techniques compiled by Siegfried Palm and the traditional method exemplified by the set of 40 Etudes Op.73 by David Popper in relation to the extended techniques in *Nomos alpha*. The multi-faceted method for mastering the combinatorial techniques and detailed technical annotations to the score will provide a practical 'map' for the cellists working on the piece.

1.1 Overview of the Technical Aspect of *Nomos alpha*

The process of mastering innovative techniques in pieces such as *Nomos alpha* leads to the development of new instrumental conventions and playing styles that involve the combined powers of intellectual understanding, intuition, imagination and tactile sense. In relation to Xenakis's compositions, the notion of technique encompasses both a purely instrumental mastery and the composer's aesthetical and ethical position. As an engineer, mathematician and an architect Xenakis was grounded in the knowledge of practicalities and functionality of structures. The composer's attitude to technique as a developmental tool was based on the pragmatism of an engineer – he conveys the message that the performer can calculate and work out, for him/herself, a particular approach to the technical tasks as an architect or a scientist might.[17] In addition, he often discusses his music in terms of material laws working in nature and the universe. He believes that instrumental technique will progressively develop naturally to match the forward looking ideas expressed in his works, providing that the player assiduously trains him/herself to bring performances as close to perfection as possible, and beyond, to a level which is currently considered 'impossible'. This will occur through the interpreter's power of intent, which will unite the mind and the body in a gesture of supreme human effort.[18] Although *Nomos alpha* is conceived and composed on the basis of mathematical calculations, the actual performance of the

[17] Nouritza Matossian, *Xenakis* (Lefkosia: Moufflon Publications, 2005), p. 61, narrates Xenakis's working methods at the time of composing *Anastenaria* (1952–1953): '[H]e kept notes of his ideas and sketches for works, a habit he continued all his life. He wrote up schemes, theories, theoretical arguments, considered and finally noted reasons for accepting or rejecting them'. Bálint András Varga, in *Conversations with Iannis Xenakis* (London: Faber and Faber, 1996), p. 65, describes the compositional 'gadget' made by Xenakis to calculate the positions on the fingerboards of the violin, viola and cello: 'a stick looking like a metre-rod but longer and thicker than that. On three sides of the rod were drawn the fingerboards for three string instruments'. See also Sharon Kanach, 'Xenakis's Hand, or The Visualization of the Creative Process', *Perspectives of New Music*, 40.1 (2002), 190–197 (pp.192–193).

[18] Conductor Arturo Tamayo, 'Notes on the Interpretation of Iannis Xenakis' *Jonchaies*', in Sharon Kanach (ed.), *Performing Xenakis* (Hillsdale, New York: Pendragon Press, 2010), pp. 353–366 (p. 366), speaking of his experience of working on *Jonchaies* (1977) remarks: 'I am not certain that all of the calculations he [Xenakis] used, which he never mentioned again once a work was finished, were indeed the matrix of his composition or whether he used them to channel and control his insuppressible musical fantasy'. This observation contributed to my understanding in search for the path towards connecting to *Nomos alpha* in a most 'natural', animated way.

work rests on intense physicality.[19] However, in my view, the instrumental 'athleticism' must be thoroughly grounded in standard techniques so that the performer can extend (rather than substitute the lack of training in established traditions of cello playing) his/her virtuosity further towards the evolving territory of new instrumental mastery, which will allow the demands of Xenakis's writing to be met.

Xenakis's core compositional concepts are coloured by his ethical convictions. For him, music and musical research play a vital role in the development of human creative faculties: 'If one allows these faculties the opportunity to develop, the whole of society is affected, and this will give to humanity an even richer knowledge, and therefore an ever greater mastery'.[20] He repeatedly confirms this view on the issue of the extreme technical difficulties of his works as an activity that has its significance beyond pure music-making:

> I think that playing instrument [sic] is like playing sports. There is a probability of going beyond human limits [...] Being forced to the extreme, it is as if he is transformed by the effort that he is producing [...] And it is for this reason, doing easy things has no interest; that's finished and belongs to the past. Going further beyond the difficulties, that's the essence of our existence.[21]

The conductor Michel Tabachnik, who worked with Xenakis extensively in several performances of his orchestral compositions, highlights the importance of 'ethical engagement' and the 'conscientious' approach of each musician in the orchestra:

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[19] In his discussions with Varga, *Conversations*, p. 65, Xenakis affirms: 'I do take into account the physical limitations of the performer [...] But I also take into account the fact that what is limitation today may not be so tomorrow'. As analysed by numerous performers, the intense physicality of Xenakis's solo works demands imaginative strategies 'to survive' in practice and performances. For example, Margarethe Maierhofer-Lischka, 'Approaching the Liminal in the Performance of Iannis Xenakis' Instrumental Solo Works', *ÍMPAR Online Journal for Artistic Research*, 1. 2 (2017), p. 45–53 https://proa.ua.pt/index.php/impar/article/view/1153/946 [Accessed 12 June 2019], suggests using an interdisciplinary approach for mastering *Theraps* for solo double bass (1975–76): 'As a methodology, I am applying Turner's theory of liminality which offers a model to describe performance situations as acts of crossing a threshold', and the Asian martial arts' principles: 'Reaching up to the highest registers needed a full body approach to search for the right position of instrument and body, to keep a stable center while doing big movements with both arms. Using the principle of rooting movements in one's feet and body center that is applied in most Asian martial arts, I developed a set of exercises to focus on using the moving energy of my bodyweight instead of applying muscular force for each action'.

[20] Mario Bois, *Iannis Xenakis, the Man and His Music: A Conversation with the Composer and a Description of His Works* (Westport, Conn: Greenwood Press, 1980, c1967), p.14.

[21] Quoted in Wilfrido Terrazas, 'Xenakis' Wind Glissandi Writing', in *Performing Xenakis*, pp.25–52 (p. 45).

> The musicians must see themselves as the vehicle, the means of transmitting an extremely sophisticated and original thought. [...] Without the conscientious, professional, ethical engagement of each musician to play what is written, Xenakis' music will no longer be Xenakis' music.[22]

The performer's unique artistic and profoundly personal experience can be fully understood only by those involved with Xenakis's music, who have undergone such training. Barry Guy, one of the prominent proponents of Xenakis's music and a dedicatee of *Theraps* (1975–76), remarks that 'pushing to the ultimate limit of Xenakis's demand for savageness and finesse provokes a serious and interesting physical problem concerning muscular readjustment – such extremes are rarely encountered'.[23] Xenakis exudes confidence in the enormous potential of performers in his interviews and through his uncompromisingly 'difficult' writing; *Nomos alpha* is an ultimate example of this belief:

> In order for the artist to master the technical requirements he has to master himself. Technique is not only a question of muscles, but also of nerves [...]. In music the human body and the human brain can unite in a fantastic, immense harmony. No other art demands or makes possible this totality. The artist can live during performance in an absolute way. He can be forceful and subtle, very complex or very simple [...]. Why shouldn't I give him the joy of triumph – triumph that he can surpass his own capabilities? [24]

Xenakis has been consistent in his commitment to composing for strings throughout his life; indeed, his catalogue includes 89 compositions that involve strings. In his conversations with Varga, he asserts his natural affinity with the string instruments and a 'flair' for writing for them.[25] He also conveys his personal attachment to the cello – the instrument that his mother loved. However, he regards the cello as a singularly adaptable apparatus for transmitting his compositional ideas discounting

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[22] Michel Tabachnik, 'Conducting (and Playing) Xenakis' Orchestral Music', ibid., pp. 349–352 (pp.349–350).
[23] Barry Guy, 'Programme Notes to *Theraps*', in Iannis Xenakis, *Theraps* [Score], quoted in Wilfrido Terrazas, 'Xenakis' wind Glissandi Writing', in Kanach (ed.), *Performing Xenakis*, p. 45.
[24] Varga, *Conversations*, p. 66.
[25] Xenakis acknowledges his affinity with strings instruments in Varga, *Conversations* p. 66: 'I like the organ, but I have a particular flair for string instruments'. James Harley, 'The String Quartets of Iannis Xenakis', *Tempo*, New Series, 203 (1998), p. 2, asserts: 'One could even go as far as to state that Xenakis's compositional style can be largely defined in terms of his deployment of, and attention to, sonorities created with the strings'.

the established notion of the 'cello sound'.[26] At the same time, the composer affirms his preference for using conventional string instruments – rather than exotic or prepared ones for creating his particular sound world.[27] Xenakis states that his choice of instruments does not fundamentally influence the music – his penchant for the string family appears to be linked to the possibilities for the sound he is searching.[28] The desired sonorities encompass the fluidity of connections between the notes (*legato*, *glissandi*), the variety of tone and texture (*vibrato*/non-*vibrato*, *sul ponticello*, *pizzicato*, various percussive effects) and his experimentation with pitches (quartertones and microtones) offered by the instruments of the string family. This aspect also relates to Xenakis's global compositional philosophy of prioritising the sound – in his writings he clearly rejects the notion of music as a language for communicating 'emotions' or conceptual paradigms:

> Music is not a language. Every musical piece is like a highly complex rock with ridges and designs engraved within and without, that can be interpreted in a thousand ways without a single one being the best or the most true.[29]

The composer identifies his aesthetical position with the Czech-born French writer Milan Kundera's aversion to sentimentality:

> The force of a work is in its truth. And truth is that which can exist without crutches. Those crutches which are often sentimentality, sensitivity, "emotional filth", as Kundera says. Sentiments, understood in this sense, are the alibi of cruelty, of barbarity, of blackmail.[30]

In conversation with Morton Feldman, Xenakis expresses his preference for a 'naive' approach to music and a 'direct' listening style: 'whenever I listen to music I don't

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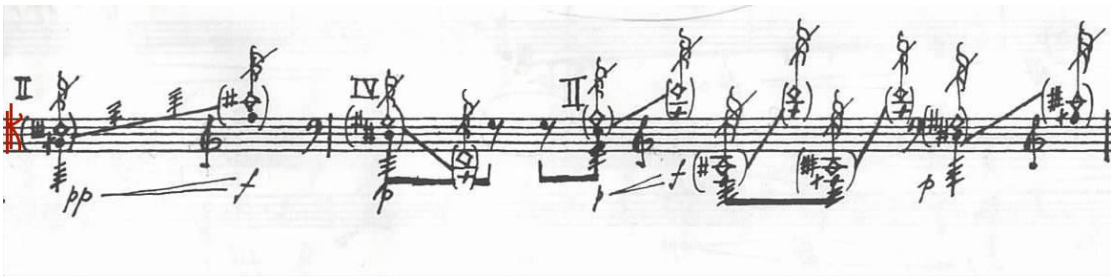
[26] Varga, *Conversations*, p. 66, recounts the conversation with Xenakis related to this notion, when the composer debates his newly invented sound on the cello with pianist György Sebők and cellist Janos Starker. From Starker's perspective, this sound, considered 'beautiful' by Xenakis, is 'not music'.
[27] The example of Xenakis's writing for traditional Japanese instruments is *Nyuyo*, composed in 1985. See James Harley, *Xenakis: His Life in Music* (New York: Routledge, 2004), pp. 162–163. In *Terretektorh* Xenakis augments the overall sonority with 'elementary instruments' (whips, whistles, maracas and wood-blocks), which contribute to 'the galaxy of sounds sprinkled in space'. See Bois, *Iannis Xenakis, the Man and His Music*, p. 20.
[28] See Varga, *Conversations*, p.67.
[29] Iannis Xenakis, Roberta Brown and John Rahn, 'Xenakis on Xenakis', *Perspectives of New Music*, 25.1/2 (1987), 16–63 (p.32).
[30] Ibid., p.48.

want to consider any ideology whatsoever beforehand. [...] When you write music, you should have the same naive approach to music as the listener often has.'[31] From my experience in the various stages of working on *Nomos alpha*, I found that a direct, visceral approach combined with intuition and rational assessment, is very productive in learning and performing the piece. This kind of heightened state of mental awareness and physical preparedness can be attained through the process of consistent and honest exertion. The 'honesty' in this sense implies an attitude of genuine striving to achieve technical precision by boldly embracing the sections in the score that are objectively unplayable in the prescribed tempi (Ex. 1.1, minim=75).

Ex. 1.1 *Nomos alpha*, bb. 218–219 (see Sound File A1NomosAlpha: 5′53″)



This attitude may lead to some unexpected solutions to the problematic passages, and, consequently, the expansion of the cellist's technical capacity. As a performer who has lived with this composition for over five years – practising, analysing, recording and performing – I have noticed that speed, agility and the quality of the connections between the events in live performances have been raised to a new level of what is 'possible'.[32] One of the singular features of *Nomos alpha* is its vastly expanded pitch range in both registers – from the lowest to the highest; Xenakis employs *scordatura*

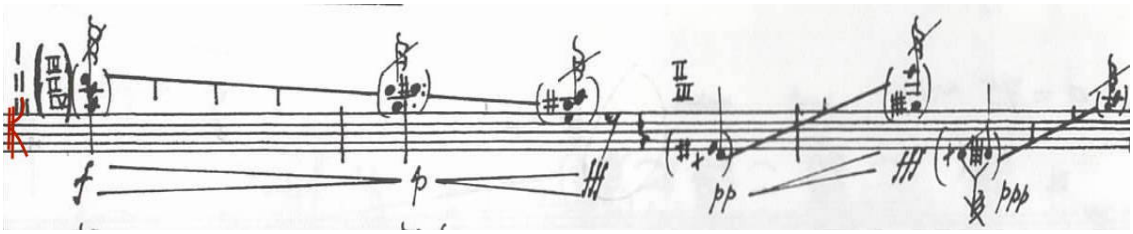
[31] Vincent Gasseling and Michael Nieuwenhuizen (eds.), *Morton Feldman and Iannis Xenakis In conversation*, July 4, 1986, at De Kloveniersdoelen, Middelburg, Netherlands. http://ada.evergreen.edu/~arunc/texts/music/xenakisFeldman.pdf [Accessed 10 March 2017].

[32] Violinist Irving Arditti, 'Reflections on Performing the String Music of Iannis Xenakis', *Contemporary Music Review*, 21.2/3 (2002), 85–89 (pp. 85–86), recounts his experience of expanding his technical terrain: 'I had been pondering the very fast glissandi (covering more than three octaves), and I told him [Xenakis] that this was impossible to play. His reply was that I might find it so now, but that in the future I would find a way to do it. Well, *Mikka* never got easier, but my understanding of the way to perform Xenakis' music transcended the normal confines of traditional string playing. I was eventually able to understand and give an impression of what he intended'. Similarly, with regard to the technical challenges in performing Brian Ferneyhogh's music, James Boros, *Brian Ferneyhough: Collective Writings* (London and New York: Routledge, 1995), p. 370, comments: 'A number of performers have described experiences, whereby, after having spent a period of time working on your music, getting beyond what were initially perceived as obstacles to comprehension, many problems seemed to have solved themselves'.

(de-tuning the C string an octave lower) and an array of artificial harmonics in the extreme positions on the A string. Another aspect of his exploration of the cello's expressive possibilities is the rich gamut of percussive effects realised through the combinatorial techniques in *Nomos alpha*.[33]

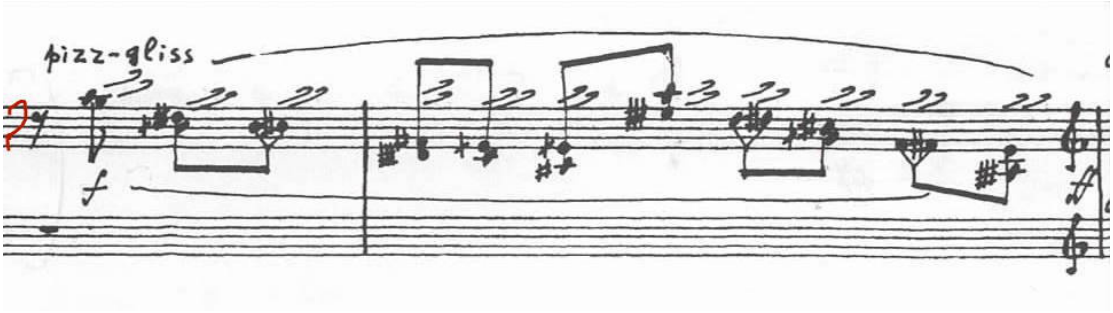
The level of instrumental mastery is apparent in the way the performer executes the transitions in a composition on multiple levels: the structural – on the micro and macro scale, and technical – the micro and macro movements connecting (and disconnecting) the sounds, phrases and passages, both in the left and the bow hand. Focusing on transitions within the structure of the composition (between the two Levels) and between the techniques highlights the technical issues that need to be resolved. *Glissandi*, the signature expressive device employed by Xenakis in *Nomos alpha*, embodies the notion of transition encompassing multiple facets such as speed, extensity and acclivity in conjunction with variety of timbres and textures (*pizzicato*, *sul ponticello*, *tremolo*, *saltando* and the ample range of dynamics and degrees of *sforzandi*). The indicated pitches of the starting and arrival points of *glissandi* indicate the parameters of the sound as an enlarged sound-event – the *glissando* that traverses the distance between the two points (pitches) sustains a continuity within itself (oscillating sound entity). The densities within the *glissandi*-entities vary: from extremely sparse, on the border of silence, to extremely compressed (Ex. 1.2). In bars 81–82 (Ex.1.3) the 'compression' is reinforced by the *pizzicato* texture.

Ex. 1.2 *Nomos alpha*, bb. 159–161 (see Sound File A1NomosAlpha: 4′19″)



[33] Listening and studying *Terretektorh* (1965–1966) composed at the same period as *Nomos alpha*, expanded my understanding of the Xenakian sound. In *Terretektorh* written for 88 players divided into eight groups, the performers are required to play additional percussive instruments: maracas, siren-whistles, wood-blocks and whips. Although the compositional concept in this work differs from that of *Nomos alpha*, the richness of the percussive textures stimulates imagination in approaching the percussive techniques of the solo cello composition – adding a multidimensional perspective to the interpretative space.

Ex. 1.3 *Nomos alpha*, bb. 81–82 (see Sound File A1NomosAlpha: 2′08″)

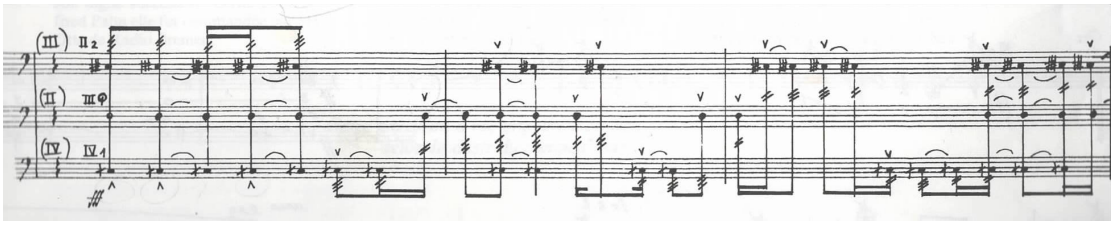


Nomos alpha requires the kind of highly developed left-hand control that, in many ways, contradicts and deviates from the traditional understanding of 'security' on the fingerboard in negotiating position changes and shaping a melodic curve. The *glissando* motion embedded in the textures conditions the left hand to sustain the continuous oscillation of various degrees and characteristics. In contrast to traditionally cultivated stability in the left hand's ingrained sense of the fingerboard, the *glissandi* multi-directional shifts re-organise and markedly expand this relationship – this strengthens the technical apparatus that supports the physical connection with the instrument. The dichotomy of the states of stability/instability is expressed through juxtaposition of the rigorous structure with ambiguity of the tonal characteristics dominated by the *glissandi*, quartertones and *scordatura*. Xenakis introduces an unprecedented *scordatura* that reinforces the sense of instability and questions the 'authority' of the traditional cello tuning by drastic alterations in the course of performance, which, at times, is experienced as a violent action towards the instrumental set-up (in particular, if performing on an older, delicately responsive cello).[34] Although this feature adds to the numerous difficulties in practising and performing the piece, it also highlights the extent of the instrumental rigour that propels the art of cello to new territories – almost on the level of a scientific inquiry – in search for solutions to the 'impossible' tasks set by the composer. Below are two of the many examples of particular techniques that, with practice, will begin to develop towards new norms of precision. In bars 66–68 (Ex.1.4), the articulation of the rhythmical figures in the tempo indicated (minim = 84) presents a considerable challenge. At first, it seemed impossible to differentiate between the patterns of

[34] Experimenting with using a robust factory cello in one of my performances confirmed my belief in the importance of the *tone* quality in *Nomos alpha* – although it is not meant to be 'beautiful' in a conventional sense, it must project a lustrous 'glow' resonating with clarity and variety of timbres.

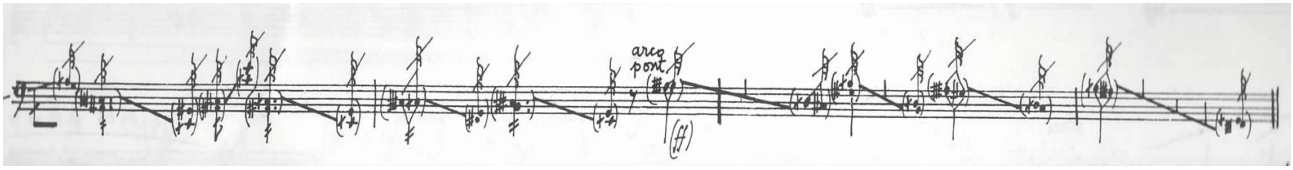
crochets, quavers and syncopated semiquavers. Eventually, the right arm adjusted to the speed; the *tremolo* attained the quality of a fine 'grain', moving across the three strings rapidly, at the same time 'leaning' on and accentuating the low C ¼ sharp.

Ex. 1.4 *Nomos alpha*, bb. 66–68 (see Sound File A1NomosAlpha: 1′43″)



In bars 138–141 (Ex. 1.5) the rapid downward *glissandi*, beginning with *pizzicato* tremolo, are followed by four *glissandi arco sul ponticello*. The difficulty here is a rhythmically precise transition between the two *glissandi* 'characters' demanding no loss of momentum, clarity and a persistent high dynamic level *ff*. Even more importantly, the change in the rhythmical pulsation must be articulated in order to emphasise the elongated downward motion – first, in two beats (across the bar line), and the last *glissando* – in four beats. This will imbue the section with dance-like cadences.[35]

Ex. 1.5 *Nomos alpha*, bb. 138–141 (see Sound File A1NomosAlpha: 3′42″)



Xenakis's compositional methods mobilise the instrumentalist to develop a rational approach in parallel with physical training – the multi-faceted strategy includes the skill of distinguishing key elements in the score. The technical difficulties of the composition are in many ways intended to stimulate a creative momentum and expansion of capacities of both the performer and the listener.

[35] In my interpretative approach, generally and specifically in *Nomos alpha*, I tend to search for re-curring rhythmical patterns, shapes and dance-like rhythmical figures. As will be discussed in Part 1.3 'Structural Approach', this sense of rhythmical clarity will bring into focus a sustained pulsation of the events across the composition's temporal space, organising the energies into coherent patterns on macro- and micro- planes.

Based on my performance experience, I am exploring the pedagogical dimension of *Nomos alpha*; I consider the process of mastering the work to be a valuable event in itself as a significant landmark in the student's musical development that extends beyond a goal-orientated exercise. Irrespective of their particular personal musical preferences and artistic direction, the process of working on the score is highly beneficial for advanced cello students – including the composition (or a part of it) in daily practice is a truly rewarding effort for a contemporary cellist. As a rich source of technical material, it has the potential to refresh and energise the traditional practice routine. The benefits of this approach include:

1. Practising reading a score of this level of complexity develops intellectual 'fitness', expanding the field of attention: the ability to sustain focus while performing the rapid changes of textures of various densities and temporal ranges.

2. Refining various extended combinatorial techniques, such as artificial harmonics, *tremolo*, sustained bow, dynamic contrasts and others, benefits technique when applied to traditional repertoire.[36]

3. A continuous involvement with *Nomos alpha* is likely to markedly influence the performer's assumptions about the notion of cello technique – the way one uses the physical and mental faculties.

As a result of my theoretical and practical study of *Nomos alpha*, my understanding and approach to the technical and interpretative characteristics and problems – both in the repertoire and technical material such as scales and studies – has unequivocally changed. In this sense, the singularity of the composition brings into focus the need for re-evaluation and expansion of the established methodologies of cello playing. I envisage *Nomos alpha* being integrated into the core cello repertoire as it comes to the full attention of cellists who are looking for a challenging path to new technical development. Repeated live performance of *Nomos alpha* creates a stimulating environment for the natural expansion of the technical range and normalisation of the level of difficulties that the work contains.

[36] I will discuss the issue of inter-relation of 'traditional' and 'extended' techniques in Parts 1.5 and 1.6: '*Nomos alpha* and Contemporary Studies' and '*Nomos alpha* and Traditional Studies'.

1.2 Notation and Structure

In *Formalized Music*, the composer offers a detailed analysis of the theories behind the compositional methods applied to *Nomos alpha*. Since then, this aspect has been thoroughly investigated by a number of leading musicologists.[37] Matossian outlines Xenakis's compositional approach to *Nomos alpha*, which is based on the mathematical calculations of the rotation of a cube as the structural principle, stating that in his second composition for solo instrument (after *Herma* for piano, 1961) he was 'looking for symmetry, renewal and repetition'. Matossian explains the method used by the composer to create a singular soundscape in a work that explores the cello expressive domain from the basis of abstract theories:

> He sought a rich operational path which could combine sets in a *deterministic* method. He discovered that the symmetry of crystals is examined by treating their vertices as sets of points which are mapped onto one another following the rules of Group Theory. In the case of one of the most perfectly symmetrical polyhedra, the cube, mapping one set of vertices onto another results in periodic repetition. This became the framework for *Nomos alpha*, since it incorporated the periodic repetition suitable for combining sets of sound characteristics.[38]

For the performer, the awareness of the parameters of the composer's theoretical thinking is important at the beginning of working on the piece, which will develop and fuse organically with practical concerns and artistic realisations in increasing

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[37] Xenakis, *Formalized Music: Thought and Mathematics in Composition* (New York: Pendragon Press, 1992), pp. 218–236. Among theoretical analyses *Nomos alpha* are: Fernand Vandenbogaerde, 'Analyse de *Nomos alpha* de Iannis Xenakis', *Mathématiques et Sciences Humaines*, 24 (Paris: Centre de Mathématique Sociale, 1968), 35–50; Jan Vriend, '*Nomos alpha* for Violoncello Solo (Xenakis 1966) Analysis and Comments', *Interface*, 10.1(1981), 15–82; Thomas DeLio, 'Iannis Xenakis' *Nomos alpha*: The Dialectics of Structure and Materials', *Journal of Music Theory*, 24.1 (1980), 63–96; Makis Solomos, 'Esquisses pré-compositionnelles et œuvre : les cribles de Nomos alpha (Xenakis)', *Les Cahiers du CIREM* , 40–41 (1997), 141–155; Antonio Lai, '*Nomos alpha* de Iannis Xenakis: La matrice disciplinaire et une évaluation contextuelle de l'oeuvre', in Makis Solomos, (ed.), *Presences of/Présences de Iannis Xenakis* (Paris: CDMC, 2001), pp. 125–139; Robert Peck, 'Towards an Interpretation of Xenakis's *Nomos alpha*', *Perspectives of New Music*, 41.1 (2003), 66–118; Nouritza Matossian, *Xenakis* (Lefkosia: Moufflon Publications, 2005), pp. 231-230. Carlos Agon, Moreno Andreatta, Moreno, Gérard Assayag and Stéphan Schaub, 'Formal Aspects of Iannis Xenakis "Symbolic Music": A Computer-Aided Exploration of Compositional Processes', *Journal of New Music Research*, 33.2 (2004), 145–160; Evan Jones, 'An Acoustic Analysis of Col Legno Articulation in Iannis Xenakis' Nomos Alpha', *Computer Music Journal*, 26.1 (2002), 73–86. For detailed analysis of the *sieve method*, see for example, Christopher Ariza, 'The Xenakis Sieve as Object: A New Model and a Complete Implementation', *Computer Music Journal*, 29.2 (2005), 40–60, http://www.mitpressjournals.org/doi/abs/10.1162/0148926054094396#.VImaeIfA7eQ; Dimitris Exarchos and Daniel Jones, 'Sieve analysis and construction: Theory and implementation', Proceedings of the *Xenakis International Symposium* Southbank Centre, London, 1–3 April 2011.

[38] Matossian, *Xenakis*, pp. 232–233.

degrees during the consecutive stages of performing *Nomos alpha*. In my case, this awareness stimulates imagination that enlivens the intuitive physicality of instrumental techniques, which, however, does not issue from either intellectual understanding of the abstract theories or the extra-musical imagery of a rotating cube.[39] Prioritising the structure during live performance creates momentum and a sense of direction for transmitting the elegant mathematical procedures that activate the energies at the core of the piece.

The composition is structured in two layers (levels) of contrasting textures.[40] Matossian depicts the composition as

> an arduous procession of 192 micro-events, one self-contained unit treading upon the heels of the next, fracture and splinter the temporal course of the music into innumerable fragments and speeds which add to the technical difficulty of playing the piece.[41]

Focusing on the global structure – particularly with the aim of defining the two contrasting levels – will integrate the 'innumerable fragments' into a coherent whole, with the inner pulsating process of inexorable flow towards the final section of the Level Two. Sustaining the global vision of the work in live performance activates

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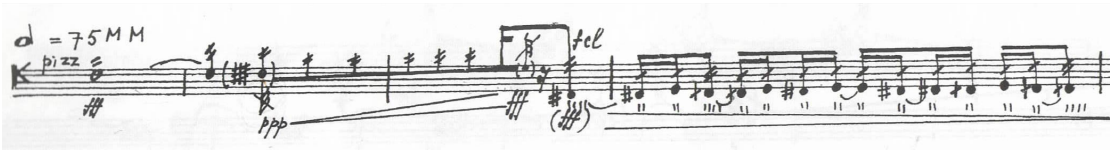
[39] In conversation with Solomos,'Nomos alpha. Remarks on Performance', in Alfia Nakipbekova (ed.) *Exploring Xenakis: Performance, Practice, Philosophy* (p.122), the cellists Christopher Roy and Arne Deforce respond to the question of understanding and expressing the mathematical models in their performance of *Nomos alpha*: for Roy, the way to embody these ideas in performance is to emphasise the 'inner pulsation' through extreme dynamics: 'The cube rotations [...] are indicated on the score by letters. We must be aware of this. When I play, I think about it a lot. [...] With the cube, Xanakis has a 3D vision, which must be heard. The whole dynamic of the piece (the nuances) is translated into distance and proximity'. Deforce acknowledges his interest in the theoretical analysis of the piece suggesting that in order to transmit its concepts in performance 'you yourself have to become this cube in rotation. [...]. I physically integrate the concept of the cube and its rotations to become the multiple voices of the cello with its particular modes of being played, to change from one to the next'.

[40] Thomas DeLio, 'Iannis Xenakis' "Nomos Alpha": The Dialectics of Structure and Materials', p.63, delineates the composition's structure:'*Nomos Alpha* is in twenty-four sections, which are separated into two layers of structure (referred to in this paper as levels I and II). Level I consists of sections 1 (mm. 1–15), 2 (mm. 16–30), 3 (mm. 31–45), 5 (mm. 65–79), 6 (mm. 80–95), 7 (mm. 96–111), 9 (mm. 126-142), 10 (mm. 143-160), 11 (mm. 161-177), 13 (mm. 188-202), 14 (mm. 203-218), 15 (mm. 219-234), 17 (mm. 249–264), 18 (mm. 265–280), 19 (mm. 281–297), 21 (mm. 317–332), 22 (mm. 333–350), and 23 (mm. 351–364). Level II consists of every fourth section-that is, sections 4 (mm. 46–64), 8 (mm. 112–125), 12 (mm. 178–187), 16 (mm. 235–248), 20 (mm. 298–316), and 24 (mm. 365–386)'.

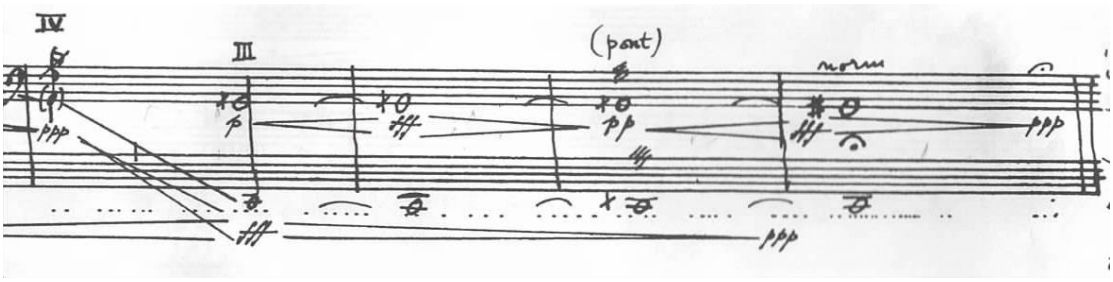
[41] Matossian, *Xenakis*, p. 238. Solomos, 'Nomos alpha. Remarks on Performance', p.109, refers to 144 events in his comments on performance of *Nomos alpha*: 'What a distance we've come since its premiere by Siegfried Palm in Bremen in May 1966! Today, it is greeted with loud applause each time it is performed. However, the piece remains 'difficult' for the listener: it is submerged in the torrent of 144 micro-events, an extreme fragmentation accentuated by the presence of many silences and tempered only by a few fuller gestures'.

a sense of forward movement – from the striking opening sounds of the C appearing in its brightest *tremolo pizzicato* 'identity' (Ex. 1.6), to the closing 'gasps' of the lowest C, juxtaposed with the emerging G *sul ponticello* (augmented with quartertone) that pushes the accumulated energies of the sound transmutations into infinity (Ex. 1.7).

Ex. 1.6 *Nomos alpha* bb. 1–4



Ex. 1.7 *Nomos alpha*, bb. 380–383



The score of *Nomos alpha* is a starting point for learning the piece away from the instrument, which will be densely covered with a multitude of signs (that include fingerings and other technical markings as well as personal comments and 'coded' instructions). As it is not humanly possible to sight-read a composition of such complexity, the period of working on understanding the notation constitutes an important part of the process. During this period the performer is faced with the challenge of developing his/her own methodology of reading, learning and internalising the score; in this process the aesthetics of the score carry the significance beyond the purely visual representation of music.[42] According to Brian Ferneyhough, 'Scores are more than just tablatures for specific actions or else some sort of picture

[42] With regards to the visual aspect of highly complex scores, Orning, *Polyphonic Performer*, p.200, makes a thought-provoking comment: 'The purely visual aspect, the visual representation of a score, is rarely discussed in relation to performance practice [...]. During reading, the eyes following the score simply cannot take in all the information in the note picture. Is it possible to read a score differently than the linear way from left to right? In New Complexity scores, the visual information contains something beyond the individual layers. When [Séverine] Ballon talks about playing through the score from day one, she is drawing upon a set of her resources that are not exclusively cerebral and rational. She responds to the graphic visuality of the score in an emotional and instinctive way, rather than purely technical'.

of the required sound: they are also artifacts with powerful aura of their own'.[43] The score of *Nomos alpha* exudes an aura of an encoded document that demands a dedicated intellectual effort from the performer to take the first step towards the goal of embodying in sound its intricate structure and content. The score's large format with a horizontal layout printed in facsimile, 'in accordance with the composer's wishes',[44] constitutes the first layer of complexity faced by the interpreter. From the practical perspective of live performance, the problems of reading the small-scale handwriting and page turning need to be addressed.[45] Scrutinising the score as an artifact, away from the instrumental concerns, helps to strengthen a sense of priority of the structure in relation to the other numerous components – from the timbral, dynamic and registral fluctuations to the praxis of technicalities. Tracing the grid, patterns, and densities becomes a part of the internalisation process of the musical architecture, integrating the abstract concepts with physical movements. In the course of the study, some questions relating to the tempi, rests and idiosyncratic markings will remain unanswered due to the absence of the composer's detailed performance directions and will be dealt with by each performer in his/her own unique manner.

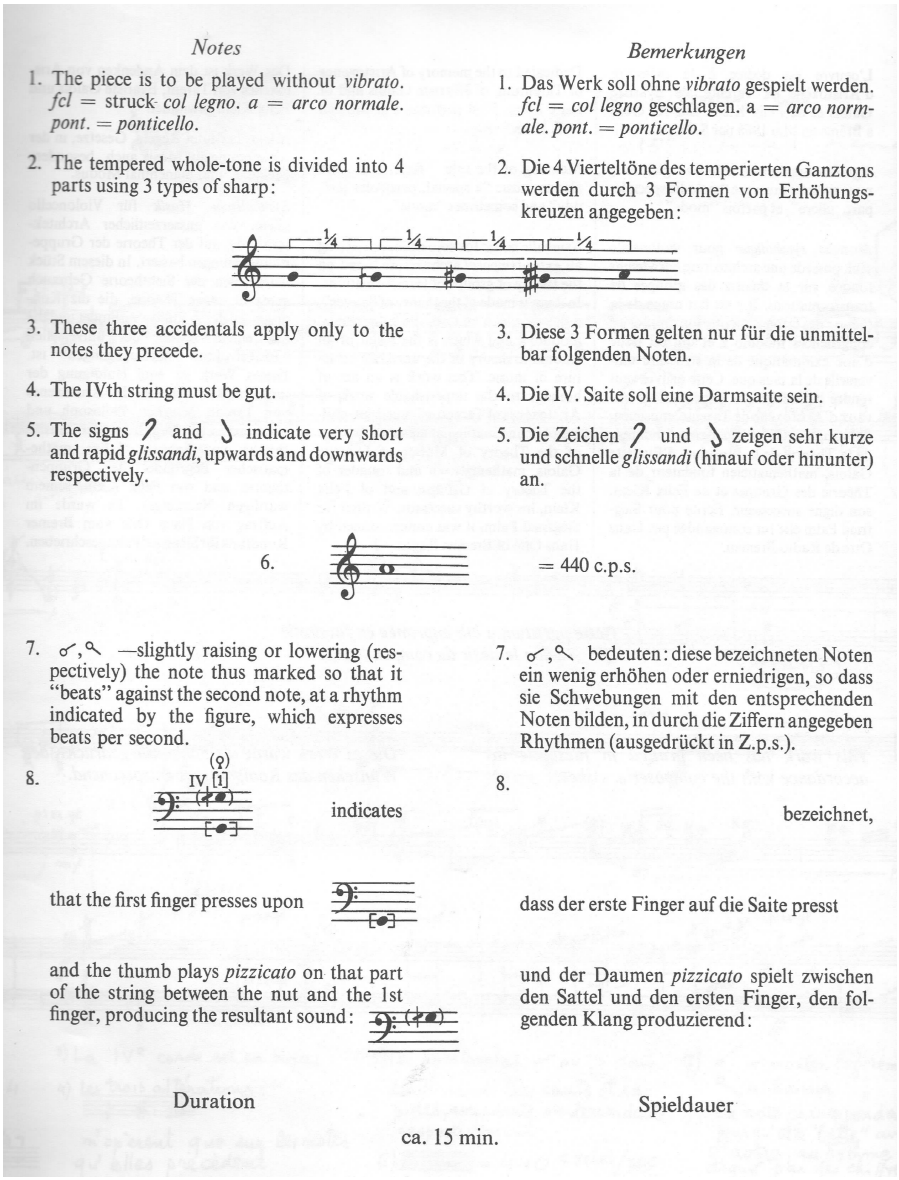
Xenakis's instructions on the first page of the score (Example 1.8) consist of eight points:

[43] Brian Ferneyhough, *Collective Writings*, p. 373. Kanach, 'Xenakis's Hand, or The Visualization of the Creative Process', 190–197 (p.191), highlights the significance of the visual aspect of Xenakis's writing for understanding the structure of his compositions – in his own words: '[M]y advantage over other composers was that I could design. It was much easier for me to use a graphic approach to music than the classical notation with which I had never been able to see everything at the same time, as you do on a graph'. She affirms: 'This then can be a first reason behind such trace-creating methods – in order to be able to secure a visible global overview'.

[44] Iannis Xenakis, *Nomos alpha* (London: Boosey & Hawkes Ltd., 1967), Preface.

[45] In my performances I use separate photocopied pages in a larger format throwing them off the music stand as I proceed, in a quasi-theatrical gesture. I find that having a page-turner or using two stands takes the listeners' focus away from the sound and physicality of performance. My preferred solution is performing the piece from memory.

Ex. 1.8 *Nomos alpha*, Preface



Notes

1. The piece is to be played without *vibrato*. *fcl* = struck *col legno*. *a* = *arco normale*. *pont.* = *ponticello*.
2. The tempered whole-tone is divided into 4 parts using 3 types of sharp:
3. These three accidentals apply only to the notes they precede.
4. The IVth string must be gut.
5. The signs and indicate very short and rapid *glissandi*, upwards and downwards respectively.
6. = 440 c.p.s.
7. —slightly raising or lowering (respectively) the note thus marked so that it "beats" against the second note, at a rhythm indicated by the figure, which expresses beats per second.
8. IV [i] indicates that the first finger presses upon and the thumb plays *pizzicato* on that part of the string between the nut and the 1st finger, producing the resultant sound:

Duration

ca. 15 min.

Bemerkungen

1. Das Werk soll ohne *vibrato* gespielt werden. *fcl* = *col legno* geschlagen. a = *arco normale*. *pont.* = *ponticello*.
2. Die 4 Vierteltöne des temperierten Ganztons werden durch 3 Formen von Erhöhungskreuzen angegeben:
3. Diese 3 Formen gelten nur für die unmittelbar folgenden Noten.
4. Die IV. Saite soll eine Darmsaite sein.
5. Die Zeichen und zeigen sehr kurze und schnelle *glissandi* (hinauf oder hinunter) an.
6. = 440 c.p.s.
7. bedeuten: diese bezeichneten Noten ein wenig erhöhen oder erniedrigen, so dass sie Schwebungen mit den entsprechenden Noten bilden, in durch die Ziffern angegeben Rhythmen (ausgedrückt in Z.p.s.).
8. bezeichnet, dass der erste Finger auf die Saite presst und der Daumen *pizzicato* spielt zwischen den Sattel und den ersten Finger, den folgenden Klang produzierend:

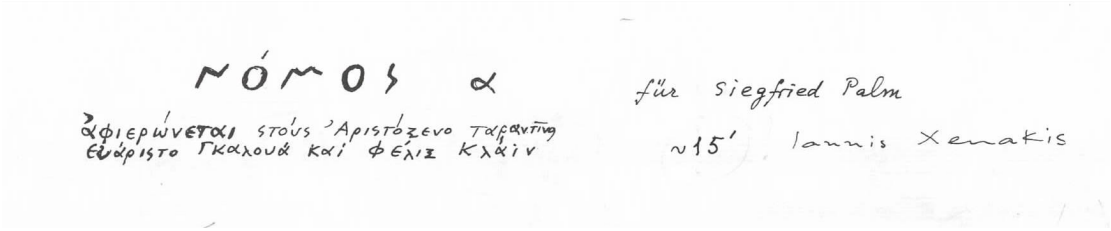
Spieldauer

ca. 15 min.

The point of reference in this case is the recording made by the dedicatee Siegfried Palm who was the first to perform *Nomos alpha* – the premiere was soon after the work's completion (Ex. 1.9).[46]

[46] The German cellist Siegfried Palm (1927–2005), one of the most prominent performers of the new music of the second half of the twentieth century, has premiered numerous works written for him by composers including Krzysztof Penderezki, Mauricio Kagel, Morton Feldman and György Ligeti. Palm's recording of *Nomos alpha* is part of the album *Intercomunicazione*, Deutsche Grammophon – 471 573–2 (2002). For detailed analysis of Palm's performance style, see Vasilisa Boykova, 'Extended Techniques in Siegfried Palm's Approach to Performance: a Path Towards the New Art of Playing Cello' (PhD Thesis, Moscow State Conservatoire, 2014), http://nv.mosconsv.ru/wp-content/media/Boykova_Tehniki.pdf [Accessed 5 July 2018].

Ex. 1.9 *Nomos alpha*, dedication in the score: *For Siegfried Palm*

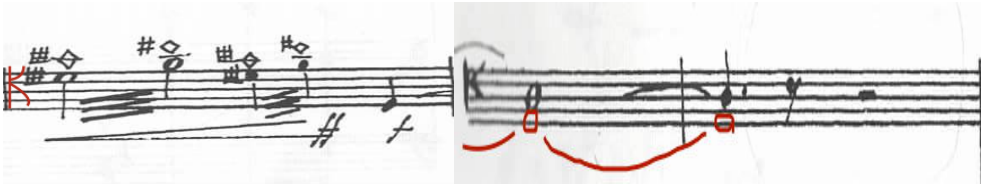


Palm's recording might be considered to be a reliable example of authentic interpretation of *Nomos alpha* (as a starting point for a personal exploration of thework). In his interview with Michael Schmidt, the cellist discusses his conversations with Xenakis regarding the performance, recording and the technical issues of the piece, including the possible solutions for the 'unplayable' concluding section. In his recording Palm overdubbed the second line – a solution that Xenakis approved.[47] Cellists Rohan de Saram (who made a recording of *Nomos alpha* in 2003) and Frances Marie Uitti are among the early exponents of the work – both have commented on working with Xenakis.[48] Within the performative process, the relationship with the score (on a theoretical and personal level) is also continuing to develop with the ongoing research that expands our understanding of Xenakis's compositional method and artistic vision. In my own practice, I am aware of the particular dynamic quality of this relationship that forms over a longer period of living with the piece as the score reveals new details and new possibilities beyond the written text. As pointed out by Solomos, there is also a problem with 'discrepancies between the composer's calculations and what is found in the score', suggesting the need for an updated edition of *Nomos alpha*. (However, in his view, for performers these 'errors' are 'part of the music').[49] Solomos gives an example of the 'error' in the score 'that many musicians have tried to correct. It is located between systems 5 and 6 on page 1 of the score [...] It reads *D-A*, a perfect fifth that is very explosive in the context of *Nomos alpha*', asserting that 'In terms of the theoretical sieve, the musician should play sustained D with the error rather being a wrong key indication: there

[47] See Boykova,'Siegfried Palm: Celebrated Cellist About New Music', *Nauchnyj vestnik Moskovskoj konservatorii*, 2 (2010), 245–261(p. 253) [Accessed 10 July 2018].
[48] Rohan de Saram, 'Xenakis: an ancient Greek born in the 20th century', in *Performing Xenakis*, pp. 297–302; Frances-Mari Uitti, 'Notes on working with Iannis Xenakis', ibid., pp. 335–340.
[49] Solomos, 'Nomos alpha. Remarks on Performance', in *Exploring Xenakis: Performance, Practice, Philosophy*, pp.122–125 (p.122).

should be an *F* at the beginning of system 6 of the score'.[50] (See Ex. 1.10) Following this observation, I play a sustained D in bars 35-36 (not A as in the score).

Ex. 1.10 *Nomos alpha*, bars 34–36 (see Sound File A1NomosAlpha: 55″)



Another performer of Xenakis's music, clarinetist Lori Freedman, reflects on the problematic of understanding and following the composer's instructions, asserting that the imprecision is inherent in describing the sound or its production: 'the description of a sound either by musical notation, word or physical approach to the production of the sound is a very personal matter. In the end what really matters is that the performer can contextualise the effect musically'.[51] The practical aspect of reading the score, however, is the most urgent for the performer – many questions will be resolved (to some extent) through experimentations, musical instinct and the physicality of playing.

The score consists of multiple elements: pitches, rhythm, speed, dynamics, timbres, agogics, rests, directions. To achieve fluency and spontaneity – freedom within the structural confines – the internalisation of the technical (textural/rhythmical) motions is a primal task. The percussionist Steven Schick encapsulates the actuality of internalisation in the process of learning *Psappha* (1975): 'The endless stream of dots in Xenakis's score were translated into physical motions.'[52] The preparation and the performance of the work as an ongoing *process* results in uncovering the unexpected reserve – the extended physical/intellectual 'space'. Even when a high degree of mastery is achieved, what one is striving for may appear doubtful at times, and indeed, may not be even fully realised; however, the process itself will lead to the opening of new possibilities in the development of the

[50] Ibid., p.124.
[51] Lori Freedman, 'Potent', in *Performing Xenakis*, pp. 3–10 (pp.5–6).
[52] Steven Schick, 'X is for Xenakis, Notes and Meditations on the Percussion Music of Iannis Xenakis', in *Performing Xenakis*, pp. 171–202 (p.175).

'extended' cello – an instrument that offers the enormous expressive power envisaged by Xenakis.[53]

Viewed from the perspective of juxtaposition of the micro-events and macro-structures, the techniques form both the structure and the musical content of the composition. Matossian's summary of this approach directs the performer's attention towards the processes and transitions within the global organism of the work:

> Since there can be no elaboration of thematic, melodic or harmonic development, colour and texture occupy the stage. Particular modes of playing such as pizzicato, col legno, battuto, sul ponticello with tremolo, harmonics and so on, traditionally of secondary importance take on a primary function – not textural filling but as geological features forming the crust of this landscape.[54]

The spatial and temporal aspects are expressed through the combinatorial technical tools – the method which gives an impetus for the development of new ways of organising and using extended techniques and the cellist's analytical thinking in practice and performance. In this sense, the technique in itself *is* the 'interpretation'. The more precisely, both in sound and artistic and personal intent, the score is realised, the more powerfully it comes to life and speaks to the performer and listener. At this juncture of the development of the cello, studying and performing the composition provokes a fresh re-evaluation of the notions of both 'interpretation' and 'technique'. *Nomos alpha* activates a quest for a multi-dimensional and inter-disciplinary attitude to the musical text and raises the issue of the performer's responsibility in finding new, singular approaches to instrumental technique and expression.

1.3 Structural Approach

A structural approach concerns viewing the work from the macro-perspective, analysing the global shape followed by 'zooming in' on its components. Xenakis's architectural and compositional method based on the principle of starting from the

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[53] The principle of a musical performance process as an *event* and 'an open-ended activity' is emphasised in the philosophy of Deleuze and John Cage: 'What one loses in assuredness of outcome, one gains in the capacity to generate a change far greater and wide-reaching than one could anticipate.' Joseph Edward Panzner, 'The Process That Is the World: Cage/Deleuze/Events/Performances', PhD thesis, Ohio State University. 2012, p. 247, https://etd.ohiolink.edu/!etd.send_file?accession=osu1332343323 &disposition=inline. [Accessed 4 February 2016].

[41] Matossian, p. 238.

whole rather than 'building up' from the details is, in many ways, applicable to the methods of working on *Nomos alpha*:

> I found that the problems in architecture were the same as in music. One thing I learned from architecture which is different from the way musicians work is to consider the overall shape of the composition, the way you see a building or a town. Instead of starting from a detail, like a theme, and building up the whole thing with rules, you have the whole in mind and think about the details and the elements and, of course, the proportions. That was a useful way of thinking [...] I thought that the best way to attack the problem was from both ends, details and general.[55]

From this perspective, the most efficient practice method is working on the sections in non-linear progression, finding the similarities in patterns and training the technical apparatus in smaller and larger units. The multiple way of seeing and organising the score expands the creative space and momentum for internalising the composition. This involves generating the *patterns* – drawing various phenomena (actions, images, ruptures and movements) into maps of their dynamic meshworks. For example, the preliminary charting of the first part of Level One (bb. 1–45) involves a clear delineation of the three inner sections marked by the double bar lines, where the second and the third sections are preceded by the rests (bb. 15 and 30); *performing* these pauses as part of the momentum creates meaningful spaces. By 'zooming in' to each of these sections, I discern the shapes within them that are structured in three parts: bars 1–6, 7–12 and 12–15, each part with its own respective centre; this mental map clarifies the design of the techniques corresponding either to the bow or the left hand. Finding patterns based on a particular technique or expressive device also assists the learning process – those patterns that have in common purely physical movements can be marked and practised outside the bigger structure for training these movements by repetition.

Scrutinising the score of *Nomos alpha* from a macro-perspective – as a system of overlapping tables of the techniques, events and shapes – helps to integrate intellectual, intuitive and physical planes: in Xenakis's words, 'the best way to attack the problem' is to see it from the perspectives of both 'details and general' (see the above quote). In my preparation for performance, I experienced the moments of artistic anxiety searching for the best way to realise Xenakis's ideas with a kind of

[55] Matossian, p.81.

virtuosity that does not obscure the structure and sound by foregrounding physical 'theatricality' of the extended techniques. To achieve this level of mastery I approach the score in a pragmatic manner, systemising the events and techniques as my practice strategy for developing both precision in detail and a sense of the global shape, as in live performance the cellist relies on continuity and plasticity of physical action in balancing discrete events within *Nomos alpha*'s structure. Matossian describes the extreme fragmentation of the work as

> a crazy quilt in which patches do not join up to form shapes and parts of a bigger pattern but remain distinct and separate in their shape and colour, while time is powerless to drive the events into continuous motion, for the abrupt changes of speed and duration break up the unity of perceptual time and pace.[56]

As a practical tool in the initial stage of organising the 'crazy quilt', I created a personal performance map by marking the score with various graphic signs – for example, using various colours to indicate the changes from *pizzicato* to *arco*, arrows to indicate the speed and direction for the *glissandi* and other markings and coded comments. At this stage, 'zooming in' to each page as if it was an independent unit, and later, mentally and physically 'assembling' the units into a whole, helped to gain a sense of order and continuity. The visual aspect of Xenakis's score embodies a fluid and transformative process: the layers of my markings receded gradually until completely erased and, at that point, I began using a new copy without the clutter of accumulated signs and markings. A series of copies of the score reflects a personal journey of the progressively changing relationship with the composition – from the beginning of the learning process to the final version.

Although the texture, sonorities and the succession of various extended techniques demand immediate attention, the rhythmical aspect is the most consequential element for transmitting the structural ideas of *Nomos alpha*. The rhythmic vitality provides a bigger context for the details – hearing the metrical stress at the beginning of each bar helps to fit the elements into time parameters giving a sense of their shapes and the dynamism of the evolving structure. The beginnings of the events often fall in between the bar lines – a subtle emphasis on the strong beat of the bar creates a particular rhythmical pulsing throughout the piece.

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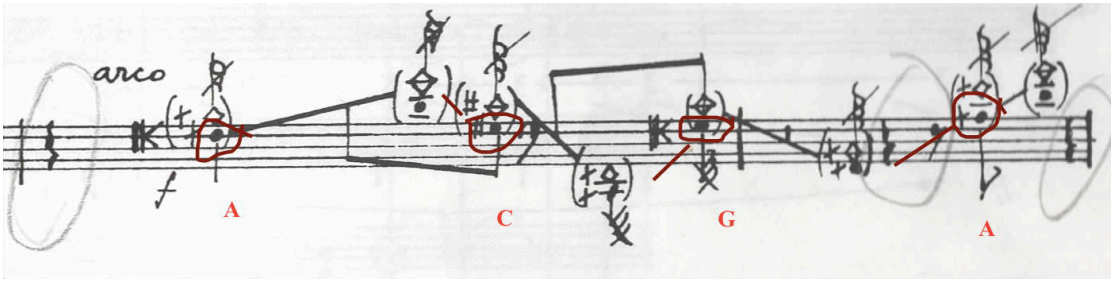
[56] Matossian, p. 238.

One of the significant difficulties in the piece is the dynamics – the rapidity and frequency of the dynamic changes are challenging for both hands. Prioritising the rhythm is beneficial in this area too – correct 'pulsing' transforms the dense textures into the fluid structure creating a forward motion; the intention of playing strictly within the 'grid' opens up spaces for the gestures to take shape and to propel the momentum of the multi-directional *glissandi* sound.

The tempi indicated in the score are not realistically playable if taken literally;[57] however, the grid may be artistically 'broadened' through creating spaces by maximising the contrasts between the colours and textures without distorting the rhythmic patterns. The kaleidoscopic alternations of narrow and wide intervals – at times within one bar – occur regularly throughout the piece. For example, bars 146–147 (Exx.1.11 a/b) contain a *glissando* 'sweep' from C¼ sharp to the A on A string *forte*, and immediately downwards from D# to the lowest C ¼ sharp (played on the G string) followed by a shorter slide from D to the C ¼ sharp one octave higher – all *glissandi* of various lengths are played in artificial harmonics, which are based on the thumb's sliding movements combined with the 'leaping' transitions across the strings, vertically and horizontally. (The letters in red in the example below refer to the strings).

Ex. 1.11 (a) *Nomos alpha*, bb.146–147 (see Sound File A1NomosAlpha: 3'56")

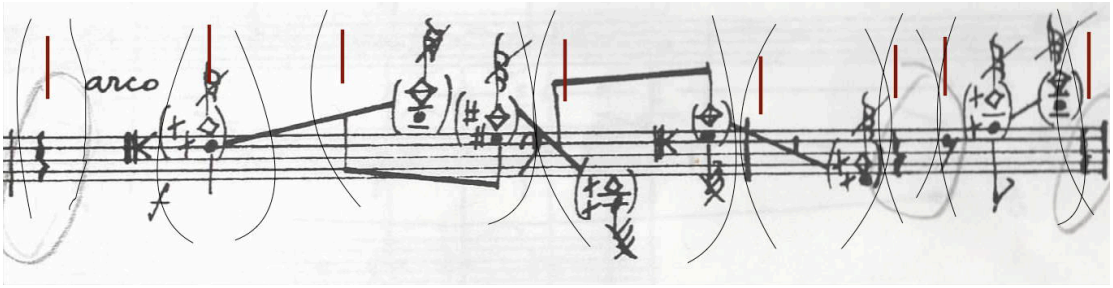


The thumb on the A artificial harmonic has to be rapidly transferred to the D# on the G string diagonally across the D string, and from C ¼ sharp – to the D on the G string, followed by an almost horizontal transfer to the E ¼ sharp on the A string after momentary pause. The cellist can differentiate and practise this pattern on the three

[57] The indicated tempi: (Level One) bar 1 minim=75 mm; (Level One) bar 65, minim=84 mm; (Level Two) bar 111, minim=75 mm; (Level One) bar 125, minim=62 mm; (Level Two) bar 176 minim=75 mm, (Level One) bar 246, minim= 84 mm; (Level Two) bar 295, minim=75 mm; (Level One) bar 314, minim=62; (Level Two) bar 362, minim=75 mm. In my recording I aimed for precision in following these indications for tempi fluctuations.

structural levels – focusing on the movements of the thumb (as zigzag shapes) as a sequence of directional *glissandi* and as a 'pulsing' line within the metre 'grid' (Ex. 1.11 b).

Ex. 1.11 (b) *Nomos alpha*, bb.146–147



This approach can be applied to all nine multi-directional clusters of *glissandi* throughout the score that could also be grouped and practised in a similar fashion (the variety of *glissandi* clusters is shown in Table 1.1):

Table 1.1 Multi-directional *glissandi* clusters

Pizzicato	bb. 23–24; 137–139
Arco (extreme dynamics)	bb. 165–166; 207–208
Arco	bb. 146–147; 218–219; 274–277; 322–323; 349–350

The aim of this approach is to embed the most efficient and economical micro and macro movements into familiar patterns and physical gestures over the short, and later, longer sections. Bars 136–141 are examples of a combination of the large intervals played in a rapid tempo with the intermediate sliding *glissandi* across the bar lines and smaller intervals connected by the *glissandi* with a slower motion. The oscillating registers and timing in reaching the extreme points – from the lowest to the highest – create a sense of temporal and spatial pulsation on the micro and macro planes, *within* and *between* the two Levels.

Nomos alpha provokes the search for new resources of technique and artistry through devising imaginative practice and performance strategies. In my performance experience, one of the most reliable strategies is cultivating awareness of the particular reference points in the composition that will translate into the most effective physicality of playing. The main reference that unifies fragmented events

into the coherent frame is the C – as a pitch and as the string (as part of the body of the cello and a conventional pitch in tuning), from the first C *pizzicato* to the final C in the lowest register – creating an arch across the pathways of the compositional development. In a sense, *Nomos alpha* explores and elaborates on the variations of the 'C' that is repeatedly challenged, unsettled and disrupted on audial and material levels by several instances of de-tuning; a focus on this persistent thread across the events' relentless activity offers a possible solution for integrating the subjective perception of the temporal flow with the invisible mathematical framework that underpins the composition's transformational processes.

1.4 *Nomos alpha*: Extended Techniques

My approach to the extended techniques is based on a traditional cello method that has been evolving since the eighteenth century supported by a substantial body of studies for establishing, maintaining and refining the technical apparatus. However, I am aware of the exigency of developing new methods and refining technical approaches for meeting the challenges of contemporary compositions that demand the ability to perform variety of diverse and highly complex tasks, which involve precision in the use of quartertones and microtones and the ability to discern between their subtle fluctuations, particularly playing in extremely high registers. Additional challenges include the agility in employing various types of *scordatura*, combinatorial techniques, two-bow techniques, extra-instrumental gestures (percussive, vocal) and other continually developing performance tools.

Nomos alpha is one of the most technically demanding compositions in the cello repertoire of the twentieth and twenty-first centuries in the way Xenakis expands the technical territory of the cello through a new physicality of playing within a broadly traditional string method. In her discussion of another landmark composition for solo cello, *Pression* by Helmut Lachenmann (1969/2010), Liza Lim notes:

> One of the interesting things that come out from the extensive literature around this piece is the realisation that the gestures, for all their radicalism, still point to the classical performance; the performer is still drawing the bow over the instrument, and even if that movement or lifting the bow creates a noise [...] it still has this relation to traditional past.[58]

[58] 'Best Practice in Artistic Research in Music Keynote - Professor Liza Lim', October 2017, youtube video, at 11′10″ https://www.youtube.com/watch?v=JoD_eKVywGY&t=1015s [Accessed 12 May 2019].

Xenakis eschews graphic notation and some of the ancillary techniques for producing unorthodox percussive sounds and timbres by means of physical gestures outside the domain of traditional cello playing: e.g. by striking the body of the instrument, tapping the endpin and using other objects for producing noises and percussive effects, vocal sounds, etc. He is, in effect, employing 'traditional extended' techniques, but extending them uncompromisingly further, to their extremes.

In the next section I will examine the notion of extended technique and the performability and functions of some of these techniques. This subject is contextualised through examining the established school of cello playing, taking David Popper's *Hohe Schule des Violoncello-Spiels,* Op. 73 as a notable example of this method.

1.4.1 General Background

The term 'extended techniques' refers to the methods of producing sounds on classical instruments outside traditional musical expression. Although the use of extended techniques is commonly associated with contemporary music (from the beginning of the twentieth century), many types of extended techniques were popular in the eighteenth and nineteenth centuries, for example, a *scordatura* tuning in the Fifth Suite in C minor, BWV 997, for solo cello by J. S. Bach and various colourful bow and left-hand techniques in the compositions by Paganini, Berlioz, and Saint-Saëns. The special effects – the techniques that enriched the sound palette of the early string instruments, such as *tremolo*, muted sections and harmonics – were employed by French composers from the early seventeenth century.[59] For this reason, the term 'extended technique' evokes contentious responses from some contemporary performers and composers. As Ellen Fallowfield notes:

> Another difficulty is that, although the term 'extended technique' was introduced in the twentieth century, such experimentation cannot be said to belong to a single period in time; 'extended' techniques are also present within Renaissance, Baroque, Classical and Romantic technique. Examples from composers as diverse as Biber (who prepared a double bass string with paper), Monteverdi (who probably invented *tremolo* on stringed instruments), Paganini (who wrote high harmonics) and Mahler

[59] See Mary Syr, *Style and Performance for Bowed String Instruments in French Baroque Music*, (Farnham: Ashgate, 2012), pp.116–132. Other techniques: *pizzicato, sul ponticello*, and *col legno* have also been used as early as the mid-17th century. See Dylan Messina, *Where will it End? Or Guide for extended techniques for the Violoncello*, http://www2.oberlin.edu/library/friends/research.awards/messina.pdf [Accessed 25 February 2016].

> (who used *col legno*) demonstrate an 'extension' of contemporarily conventional playing that predates the terminology. In other words, categorising techniques as outside the canon also creates contradictions in a historical sense.[60]

'Special effects' in the earlier periods were most likely used as a decorative or programmatic device,[61] while in the course of the twentieth century unconventional instrumental techniques have gone through the process of re-evaluation as tools for enlarging the sound material for expressing new musical ideas. This process stimulated the development of new technical approaches in all groups of classical instruments (which is reflected in various publications on this subject), [62] and their increasing role in collaborative methods. Lim elucidates the role of new techniques in her compositional process referring to them as collaborative tools:

> Because of the non-standardised nature of the sounds I use (often focused on fluctuating, morphing qualities) and the unusual techniques required to produce them, my work does often necessitate close collaboration with performers. This process of collaboration to explore so-called 'extended techniques' has become quite standard practice since the mid-twentieth century.[63]

Zoltán Kodály's landmark work for solo cello, Sonata Op. 8 (1915), features a variety of extended techniques, boldly unusual for the time in terms of the epic scope of the work and its virtuosic challenges. Among the striking sonorities that he 'extracts' from the cello are: the unusually broad contrasts in registers and dynamics, an expansive *tremolo sul ponticello* section with added left hand *pizzicato* (Ex.1.12), and an array of trills (on single notes and in double-stops) in an uncommonly high register (Ex.1.13).

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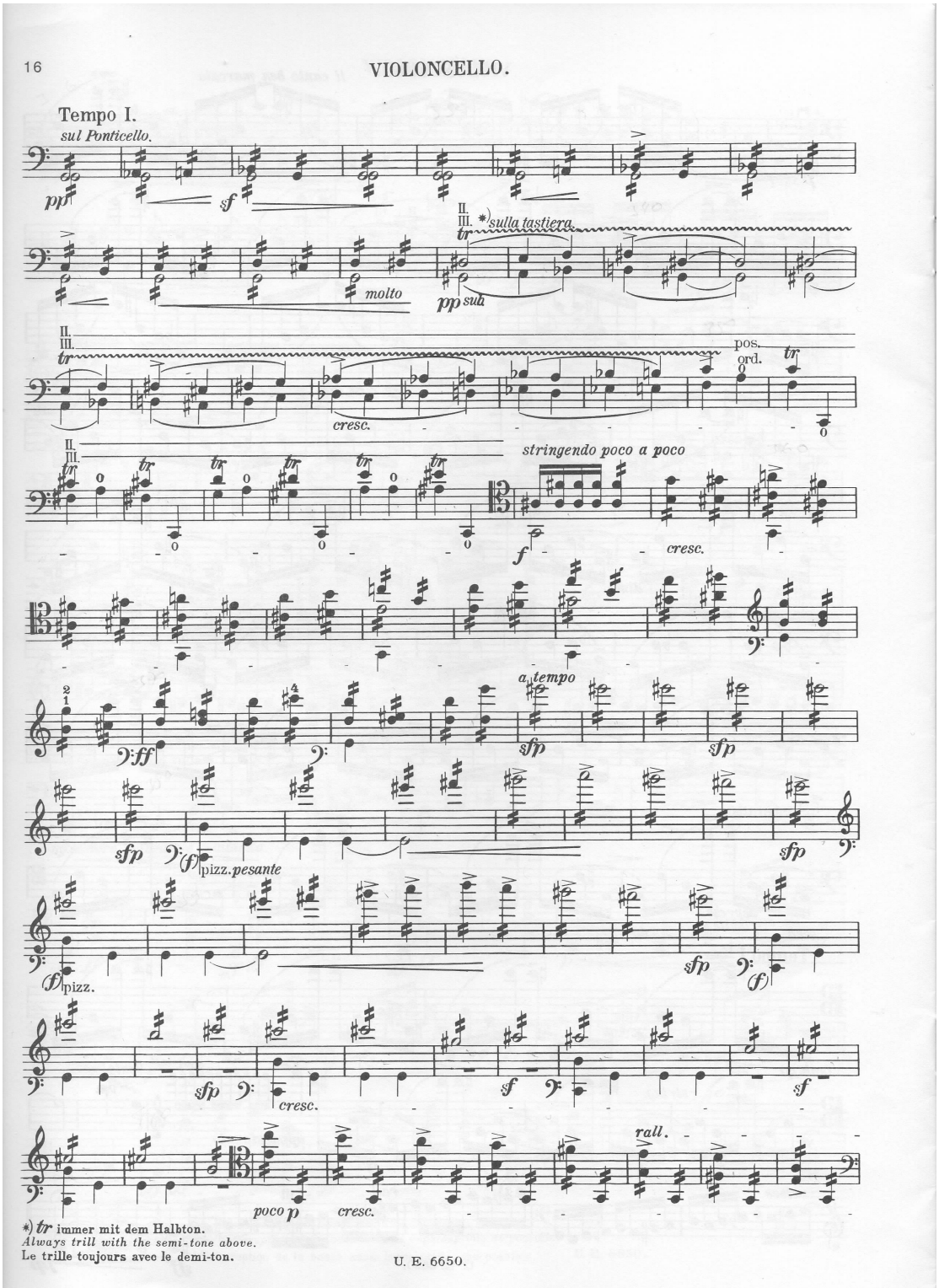
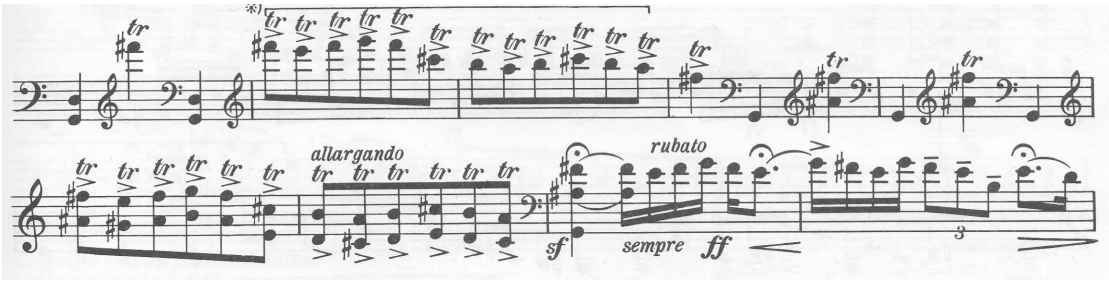
[60] Ellen Fallowfield, 'Cello map: a handbook of Cello technique for performers and composers' (PhD Thesis, University of Birmingham, 2010), p.28.
[61] For example, the use of *tremolo* in the 'Frost Scene' in *King Arthur* by Henri Purcell (1691) and in the opera *Isis* by Lully, 1677 (See Syr, *Style and Performance for Bowed String Instruments*, p. 118) and the double trills in the *The Sonate du Diable* by Giuseppe Tartini (1692–1770).
[62] See the recent comprehensive series by Barenreiter, 'Contemporary Instrumental and Vocal Techniques', the set of 11 books on contemporary techniques for various instruments and voice: trombone, flute (in 2 volumes), oboe, bassoon, saxophone, violin, percussion, accordion, guitar, singing and the 'Pro Musica Nova' series of contemporary studies for various instruments published by Breitkopf & Härtel. See also, Hugh Davies, 'Instrumental modifications and extended performance techniques.' Grove Music Online, 2001. Oxford University Press [Accessed 13 August 2018].
[63] Liza Lim, 'A mycelial model for understanding distributed creativity: collaborative partnership in the making of 'Axis Mundi' (2013) for solo bassoon', p.6, *CMPCP Performance Studies Network Conference*, Cambridge, 4–7 April 2013, University of Huddersfield Repository http://www.cmpcp.ac.uk/wp-content/uploads/2015/11/PSN2013_Lim.pdf.

Ex. 1.12 Zoltán Kodály, Sonata, Op. 8, Third Movement, bb. 326–419

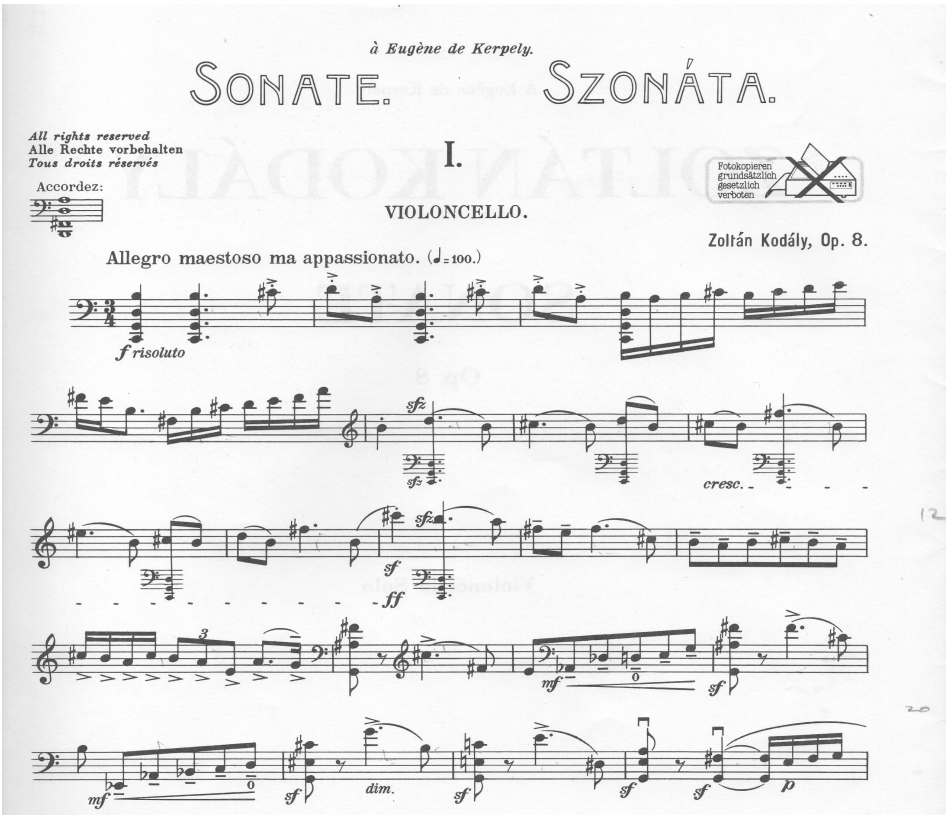


Ex. 1.13 Zoltán Kodály, Sonata, Op. 8, First Movement, bb. 137–142



The main characteristic, however, is the required *scordatura* – re-tuning the C and G strings a semitone lower to B and F#. The objective of Kodály's *scordatura* technique in this piece is to expand and enrich the sonorities of the cello by using open strings abundantly throughout the piece that enhances the B minor resonance. In addition, this particular re-tuning provides more possibilities for the use of pentatonic scales associated with Hungarian folk music and fuller chords, making the piece more playable.[64] (Ex.1.14).

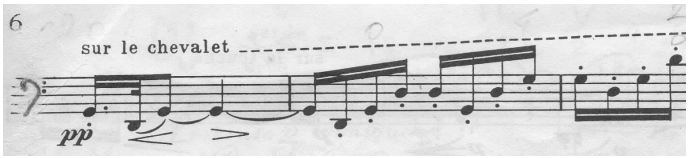
Ex. 1.14 Zoltán Kodály, Sonata, Op. 8, First Movement, bb. 1–20



[64] See Celeste Power, 'Zoltán Kodály's Sonata for Unaccompanied Cello, Op. 8: One CellIst's Path to Performance' (PhD Thesis, Louisiana State University, 2013).

In *Nomos alpha*, the *scordatura* and other extended techniques serve Xenakis's compositional concept to create a powerful work that embodies abstract mathematical models within a strictly circumscribed construction. Rather than adapting his compositional ideas to the commonly perceived technical possibilities of the cello, Xenakis prioritises his bold compositional ideas, expanding the cello techniques to their limits. Xenakis acquired a rigorous mental discipline through an intense period of studying various academic subjects;[65] this discipline, combined with his intuitive understanding of the instrumental possibilities of sound, generated a particular energy, a powerful amalgamation of the rational mind and unbounded creative imagination.[66] The historical importance of this work by Kodály (who was himself a cellist), is that he demonstrated the potential of the cello by composing a virtuosic showcase; Xenakis's main focus was the exploration of sound, temporality and structure through the medium of a single instrument, bringing the notion of extended techniques to the level of the traditional technique. For Xenakis, the choice of the cello, in itself, is not essential compared to the innovative compositions by Kodály and, as another example, Claude Debussy's Sonata for cello and piano (1915) that introduced some forms of extended techniques half a century earlier, such as *sul ponticello* (*sur le chevalet*), the distinctive *pizzicato* techniques and artificial harmonics. (Exx. 1.15 and 1.16).

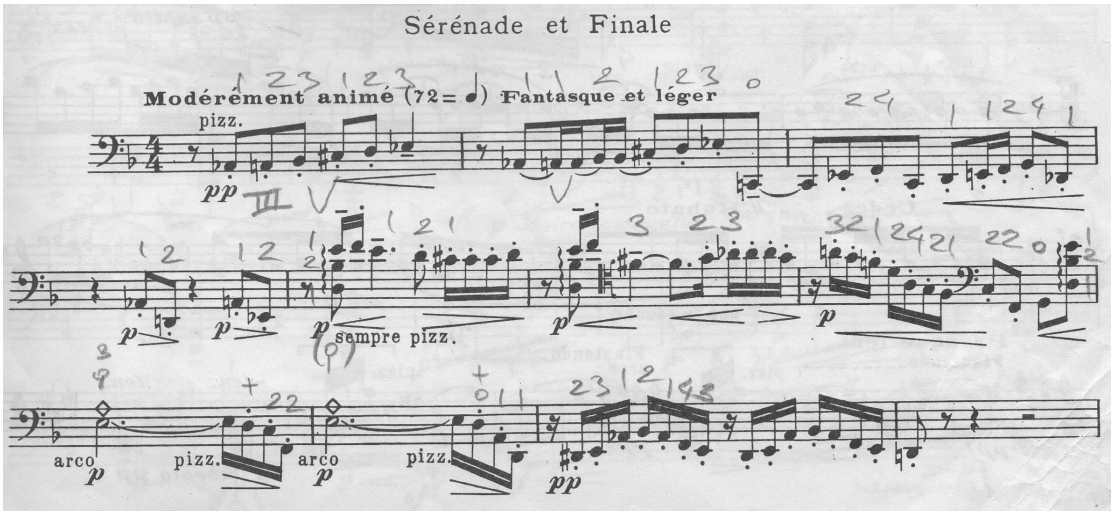
Ex. 1.15 Claude Debussy, Cello Sonata, *Finale*, bb. 39–41



[65] Matossian, *Xenakis* (London: Kahn & Averill, 1990), pp.17–18 and 28, narrates Xenakis's early years of education and his study at Athens Polytechnic interrupted by the war. She provides the list of the subjects and the marks he obtained, which 'already hints on his future involvement with electronics and computers, activities he could not even conceive of at the time'. The subjects listed include: Elements of Architecture, Building Construction, Experimental Physics, Geology, Mineralogy, Petrology, Mathematics, Descriptive and Projective Geometry, Electrical Engineering, Resistance of Materials.

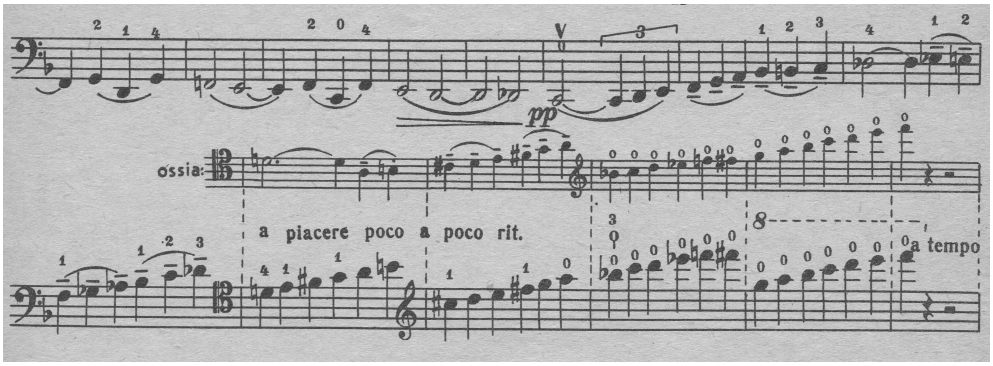
[66] Sander van Maas, 'The Xenakian Fold', *Definitive Proceedings of the "International Symposium Iannis Xenakis"* (Athens, May 2005), edited by Makis Solomos, Anastasia Georgaki, Giorgos Zervos, online http://cicm.mshparisnord.org/ColloqueXenakis/papers/Mass.pdf, October 2006, 67–71, asserts: '[T]he music of Xenakis is a music of intensities, forces, sonorities, structures, and gestures, rather than a music of material developed according to formal principles'. Hermann Scherchen, Varga, p. 34, comments on Xenakis's singular position in the musical world: 'in both pieces [Sacrifice and Matastasies] I find it interesting that you don't approach music as a musician. You look at it from a different point of view, from the outside'.

Ex. 1.16 Claude Debussy, Cello Sonata, *Sérénade*, bb. 1–11



A few decades earlier, in 1872, Camille Saint-Saëns used the artificial harmonics technique in his Cello Concerto No.1 (Ex.1.17).

Ex. 1.17 Camille Saint-Saëns, Cello Concerto No.1 in A-minor, bb. 413–426



The upward progression of artificial harmonics that challenged the cellists of the time in the use of the thumb position in an unusually high register was one of the examples of the virtuosic display of the technical range of the cello (the composer includes a simplified version of the passage an octave lower). This innovative use of artificial harmonics demonstrated the expressive possibilities of the cello, which in the second half of the nineteenth century was still in the process of establishing its status as a solo instrument.

The concluding part of *Nomos alpha* consisting of the two-tiered scalic progression is the epitome of the technical mastery that can be achieved on the cello

(see (see Sound File A1NomosAlpha: 10′03″).[67] The upper line, comprised of the sequence of artificial harmonics moving upwards, traverses the sixteen bars to the highest point and then descends expeditiously in quavers – proportionally, in octonary relation to the preceding bars; the second line, beginning with a downward whole-tone scale, contains the additional complexity of string crossing from G to the C (de-tuned down an octave). Combined with the challenges of quartertone tuning, extremes of dynamics and problem of playing two lines simultaneously, the section encapsulates the singularity of the composition as a multi-layered sonic edifice that transcends the established norms of cello technique and sound.

1.4.2 Overview of Extended Techniques and Comments on Practice

The range of the extended techniques employed by Xenakis in *Nomos alpha* contains left- and right-hand techniques that had already been used widely in the first half of the twentieth century (except a particular use of quartertones in the context of other textures). Most of these techniques are familiar to cellists and are not excessively challenging; what is new and unusually difficult is the manner in which they are combined in the dense score and the ferocity of the rapid changes of pitches, textures, dynamics and the assemblages of the smaller and larger units. This complex body of information must be processed and translated into physical movements simultaneously, at an expeditious pace.[68] The extended techniques in *Nomos alpha* create a singular sound world; the multiple components of these techniques comprise patterns consistent throughout the score. For the purpose of analysis and practice, I have classified them into the following categories (see Tables 1.2, 1.3 and 1.4):

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[67] Solomos, 'Nomos alpha. Remarks on performance', in *Exploring Xenakis*, p.115, defines the structure of the final sequence: 'In this passage, there's a scale of 96 pitches spread over 8.5 octaves, consisting of three movements: a whole tone scale ascending or descending; a three-quarter tone scale ascending or descending; a one and one quarter tone scale ascending only'.

[68] Brian Ferneyhough, *Collective Writings*, p. 372, makes a similar observation regarding the difficulties presented to the performer by his scores: 'What many players often fail to realize is that most of the textures in my works are to a large degree relatable to gestural conventions already familiar from other contexts. What is unfamiliar is, firstly, the unusual rapidity with which these elements unfold and succeed one another, secondly, the high level of informational density in notational terms, and, thirdly, the extreme demands made on the performer's technique and powers of concentration'.

Table 1.2 *Nomos alpha*: methods of sound production[69]

Stroking	Plucking	Striking
Sustained tones: single, double stops, chords	*Pizzicati* (right- and left-hands)	*Col legno battuti*
Tremolandi		
legato (bars 27-29) and *détaché* final passage marked *legatissimo* (bb. 362-383)		

Table 1.3 *Nomos alpha*: left- and right-hand techniques

Left Hand	Right Hand
Double stops	*Legato/Staccato/Détaché*
Chords	*Sul ponticello*
Glissando	*Tremolando*
Pizzicato	*Pizzicato*
Quartertones, three-quarter tones, microtones	*Col legno battuto*
Harmonics	Dynamics

Table 1.4 *Nomos alpha*: Techniques

Glissandi	*Pizzicati*	Double stops/chords	Harmonics	*Tremolando*	Dynamics
Long/Short/ Fast/Slow	Single/Double stops	With Quartertones/ Microtones	Sustained/ *Tremolando*	Sinlge/Double stops	Sustained
Artificial Harmonics	*Tremolando*	Sustained/ *Tremolando*	*Sul ponticello*	*Sul ponticello*	Extreme changes
Sul ponticello.	Right-Hand/ Left-Hand	*Sul ponticello*	*Glissando*	*Glissando*	Extreme registers
Tremolando	*Glissando*	*Col legno battuto*		Harmonics	Textural
Col legno battuto					

The recurring techniques that constitute the combinatorial apparatus utilised in *Nomos alpha* are: *glissandi*, quartertones/microtones, *pizzicato*, harmonics, dynamics and *scordatura*, which, in most instances, overlap and coalesce into 'events'.

Below is an overview of the composition's main technical elements that constitute these combinatorial techniques, with some comments on approaches to the difficulties they present to the performer, with a focus on *glissando* – Xenakis's singular

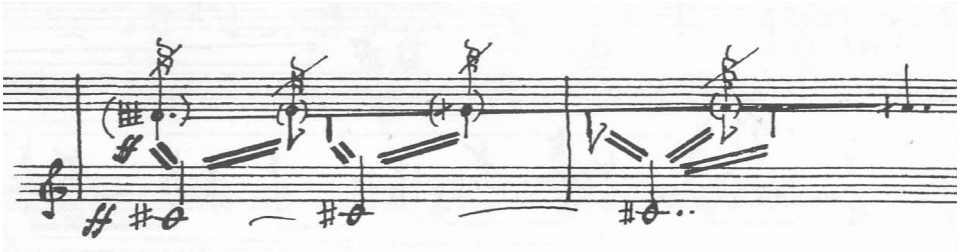
[69] Frances-Marie Uitti, 'Notes on working with Iannis Xenakis', in *Performing Xenakis*, p. 335, comments: 'In *Nomos alpha* (1966), Xenakis explores the three means of sound production for strings: stroking, plucking and striking. Each is transformed through the content of his grammar; fragmented lines, chopped remnants of melodies, extreme speeds contrasted by complete stasis'.

compositional tool, which he developed and used, most notably, in his writing for string instruments.

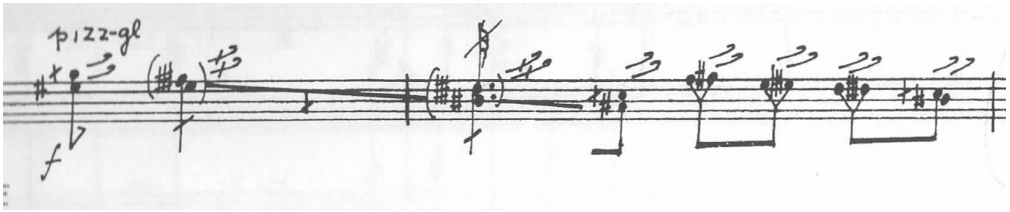
Glissandi

In *Nomos alpha* the 359 *glissandi* combine various angles and speeds – gradual, abrupt, slow, fast; with fluctuating dynamics, rhythms and textures; *glissandi* moving against the *tremolo* tone (Ex. 1.18); long *glissandi* (over one bar or more), short, i.e. quaver *pizzicato glissandi* in double stops with outward or downward 'motif' in double stops or single notes (Exx. 1.19 and 1.20); fast *glissandi* of various lengths within *glissandi* 'clusters', *glissandi* smooth and *batutto* and other combinations of techniques and textures. This compositional device creates the overall ambiguous pitch environment – the relationship between *glissandi* and quartertones is a significant characteristic of the piece – and promotes the expansion of audial perceptions and precision in the left-hand techniques.

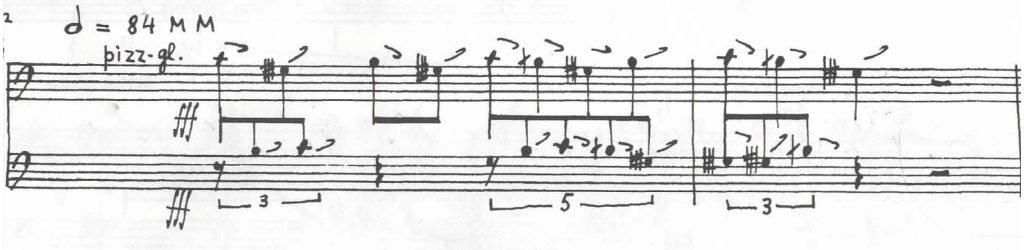
Ex. 1.18 *Nomos alpha*, bb.134–135 (see Sound File A1NomosAlpha: 3′32″)



Ex. 1.19 *Nomos alpha*, bb.144–145 (see Sound File A1NomosAlpha: 3′51″)

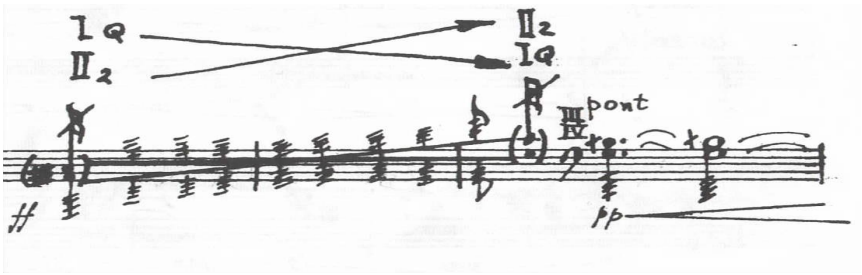


Ex. 1.20 *Nomos alpha*, bb. 246–247 (see Sound File A1NomosAlpha: 6′50″)



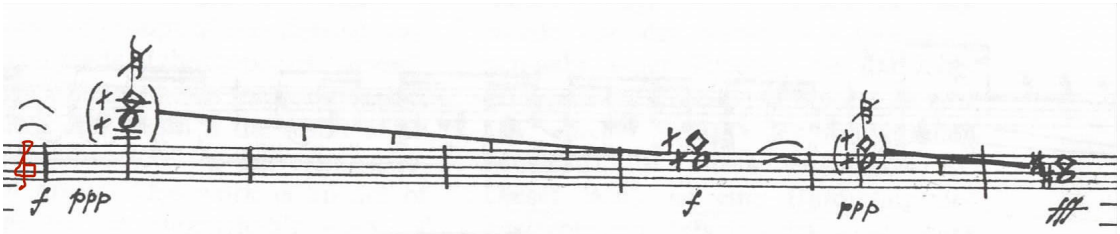
A recurring feature is the *glissandi* combined with artificial harmonics: continuous or *tremolo* (counted/free), single notes or in double stops. In bars 220–221, a unique combinatorial *glissando* in *tremolo* double stops (Ex.1.21) demands precision in tuning and co-ordinated action in the left hand's expansion and contraction to realise the unison at the beginning of bar 221 where the two lines cross over, and the fourth interval at the end of the two-bars long *glissando*. The second finger (F ¾) will move faster than the thumb (A) to 'arrive' at C in a perfect unison, slowing down for the octave interval before contracting into the fourth interval A–E.

Ex. 1.21 *Nomos alpha*, bb. 220–222 (see Sound File A1NomosAlpha: 5′55″)



A similar cross-over tuning effect occurs in bars 227–229 played *pizzicato* (see Ex.1.30). Level Two (i) section consists of an extended line of artificial harmonics beginning in an extremely high register, as a long *glissando* moves down from D ¼ sharp to A# with an elongated lower D ¼ sharp which is marked by contrasting dynamics *f* and *ppp* (Ex. 1.22).

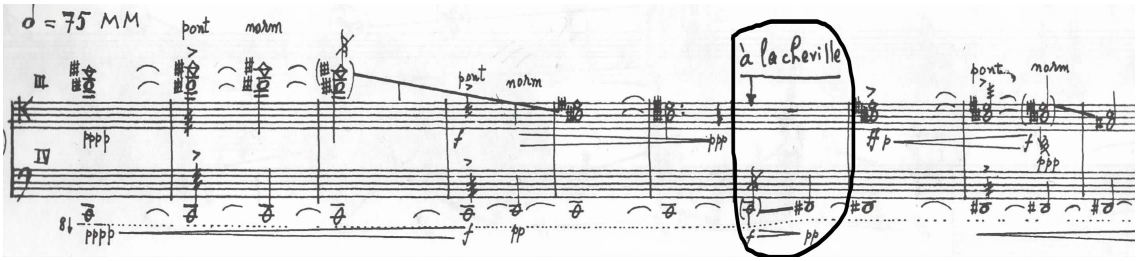
Ex. 1.22 *Nomos alpha* bb. 52–57 (see Sound File A1NomosAlpha: 1′23″)



In Level Two (ii), the rich timbral combination of artificial harmonics and *tremolo sul ponticello* with extended registers generates spatiality and depth. Additionally, these textures and the simultaneously opposing dynamics in bars 122–124 create a pulsing effect; to achieve the oscillating dynamics the bow must be finely balanced between the G and C strings. In bar 117, the *glissando* is realised by de-tuning C string (already de-tuned an octave lower) up to D# – the sliding *glissando* motion of the left

finger is substituted by the action of detuning to the precise pitch, marked *à la cheville* (Ex.1.23). The simultaneous action of the left hand turning the peg with release of bow pressure on the string to produce an abrupt *diminuendo* demands a developed physical and audial control as well as a thorough practical arrangement of a finely adjusted peg.

Ex. 1.23 *Nomos alpha*, bb. 111–124 (see Sound File A1NomosAlpha: 3′)



Level Two sections with their sustained tones, a broad range of registers and *glissandi* should be played with a continuous bow avoiding any audible bow changes to create a sense of timelessness. The contrast between the two Levels – internal and external – must be complete and radical, with the vigorous bow activity in the Level One sections opposing the continuity of directional flow in the Level Two sections.

The cellist will find and develop the methods for mastering the elements of the score for him/herself in the process of preparation for performance. In my experience, one of the ways to come closer to the composer's concept of the piece, in a technical sense, is to approach the 'impossible' techniques both intellectually (through analysing their components) and physically (by the method of repetition).[70] For example, the sequence of the ascending and descending *glissandi* in bars 274–277

[70] The extreme techniques in *Nomos alpha* demand a carefully planned practice strategy with minimal repetitive effort to avoid excessive muscular strain. Although in a different context, Elizabeth Le Guin's comments on repetition, 'Cello-and-Bow Thinking', *ECHO*, 15.1 (2019), http://www.echo.ucla.edu/cello-and-bow-thinking-baccherinis-cello-sonata-in-eb-minor-faouri-catalogo/ [Accessed 12 August 2019], is relevant to the subject of this kind of practice: 'Repetition is a process of centering, of focussing gesture. As with any form of balancing or centering, the object is to use fewer muscles, and none that are unnecessary; the process tends toward an ideal active stillness, in what might be described as a physical drawing-in'.

(See Ex. 1.24 a/b) in an extremely fast tempo (minim = 84mm) can be mastered by 'dismantling' the section into the elements related to notation and practice:

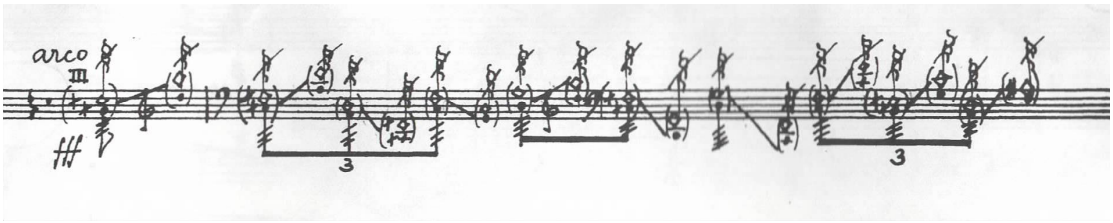
A. The score
1. Rhythmical groupings
2. 'Melodic' line
3. *Glissandi* directions

B. Practice
Left hand:

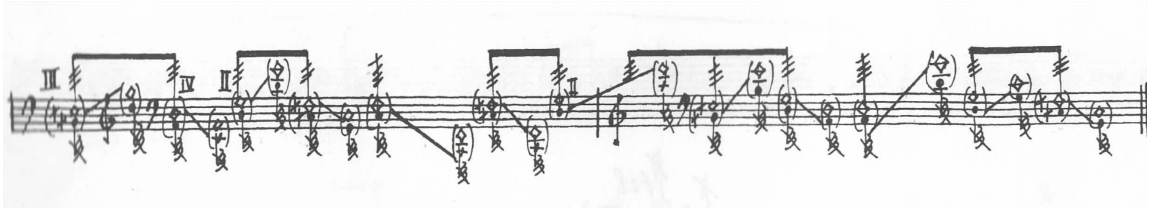
1. The pressure on the fingerboard with the thumb in artificial harmonics
2. The amplitude and the speed of the *glissandi*

The bow:
1. The pressure on the strings
2. The positioning of the bow
3. The part of the bow used
4. The speed of the *tremolo*

Ex. 1.24 (a) *Nomos alpha*, bb. 274–275 (see Sound File A1NomosAlpha: 7′33″)

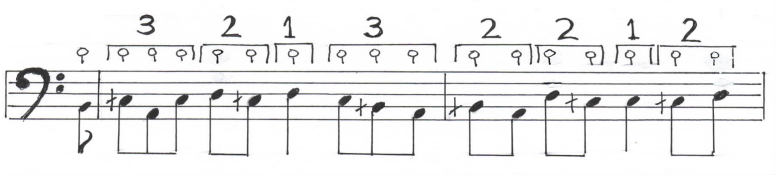


Ex. 1.24 (b) *Nomos alpha*, bb. 276–277

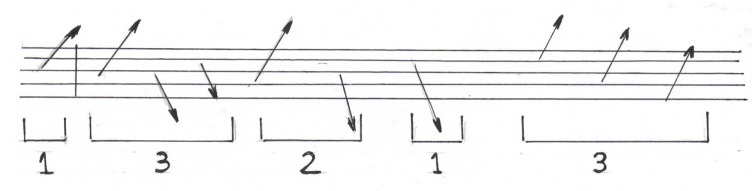


Below are the figures for differentiating the elements for practice purposes (Exx. 1.25 and 1.26). (The angles and lengths of the *glissandi* images are approximate).

Ex. 1.25 Rhythmic and 'melodic'elements, bb. 275–276

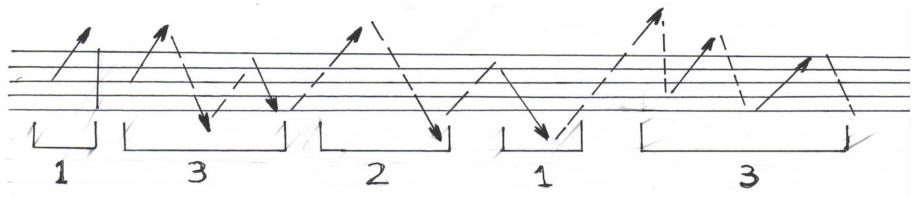


Ex. 1.26 *Glissandi* movements, b. 275



The function of the bow in this section is a pivotal factor: to achieve the required speed and fluidity in the left hand's manoeuvres, the bow must remain on an even level throughout the three bars, irrespective of the trajectories of the *glissandi* with rapidly alternating pitches. The *glissandi* occupy the spaces defined by their opposite pitches (some are quartertones). The important consideration in this passage and in similar instances (for example, in bars 165–166, 218–219, 322–323) is to avoid accentuation of the 'melodic' line in order to generate a pulsating sonic field. In the indicated tempo the downward and upward movements between the extreme points of the *glissandi* along the fingerboard will inevitably be audible due to the physicality of the continuous gesture – this will result in the individual *glissandi* interlacing into a global pattern (Ex. 1.27).

Ex. 1.27 *Glissandi* pattern, b. 275



'Disassembling' selected sections of the score into the elements of 'sound' and 'technique' is a practice strategy that evolved during my initial phase of reading and analysing the text; the objective of this method is to homogenise the intellectual and tactile planes from the beginning of the learning process. The relationship between the left- and right-hand movements is one of the fundamentals of cello technique that effectively determines playing style: the tone production, the various bowings, from *détaché* to *saltando*, as well as such seemingly unrelated issues of intonation and

vibrato. In the above two-bars passage (Ex. 1.24a) the stability of the bow position functions as a fulcrum for the total assemblage of diverse motions in the left hand; the *tremolo* attained by minimal oscillations (a bow '*vibrato*'), should not disturb this stabilising function. The dynamic marking – triple forte (*fff*) helps to sustain the stability of the bow that has to 'dig' into the strings. The string-crossing pattern must also be mentally clarified and practised as an element (within an element) of the section. This enables the left-hand thumb position to release (to some extent) the pressure on the fingerboard associated with playing artificial harmonics, to freely use the potential momentum inherent in the wave-like oscillographic *glissandi* patterns. Alternatively, the thumb can be used for D natural (as indicated by the composer in the score) on the G string, to avoid the additional movement involved in the string crossing – the bow remains on the G and C strings, with the left hand adapting to the *glissandi* parameters accordingly. This entails an adjustment to a wider scope of the left hand's trajectories with increased velocity. One of the most demanding tasks here is the need to develop the variety of speeds and the ability to combine them in one gesture. Suggestions for practising the various speeds in the movements of the left hand on the fingerboard, independently of the bow hand movements, include:

1. One broad impulse downwards without consideration of the pitches. The same with artificial harmonics. Practising these movements that are unrelated to any particular pitches aims for 'loosening up' the bow arm.
2. Mentally divide the fingerboard into several sections. Variations of the pitch 'areas' range for adding an element of precision and 'control' (attention).
3. Rhythmic variations.
4. Narrowing this approximate range to the particular shapes: intervals - two octaves, one octave; positions – the 1st, the 2d, the 3d etc. Practise inside and slightly outside of these parameters using various fingerings. The third and the thumb position are frequently employed in the piece. Practise artificial harmonics to combine both. This is important for developing the recognition of the subtle pitch oscillations and control over the movements on the fingerboard – the narrow, the wide and combination of both.
5. Combining the variations of the bow speed with the variations of the left hand speed and the ranges of the movements in both. Slow/fast, 'big' bow/narrow range in the left hand, 'loops'/straight, etc.

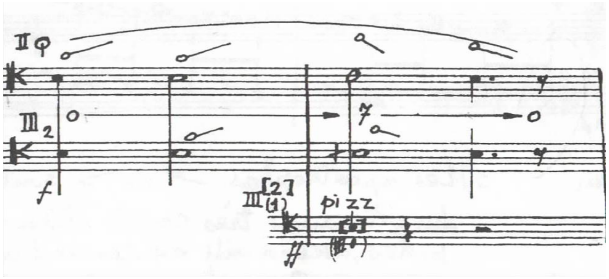
Quartertones and Microtones

The use of microtones is a prominent feature in *Nomos alpha*. In the score, the first performance instruction is the composer's stringent prescription to play without

vibrato (‘*sans vibrato!’*). Microtonal colouring created by ‘bending’ the notes seems to be Xenakis’s alternative *vibrato* method, both in single notes and double stops. To master this technique the cellist has to interrogate the listening strategies – the ability to hear and to connect to the microtonal fluctuations ‘in-between’ the pitches; he/she also needs to develop a meta-sensitivity in the left hand required for subtle deviations from these pitches - ‘listening’ with the fingers.[71] Xenakis indicates the microtonal oscillations (upwards or downwards) with the idiosyncratic sign above the notes –

– often with the precise number of ‘beats’ (‘*battements*’) per second (a counted ‘*vibrato*’). Although the number of these micro-beats might be virtually imperceptible in performance, the composer’s instruction generates a particular intensity and focus that animates the sound and gestures (Ex. 1.28).

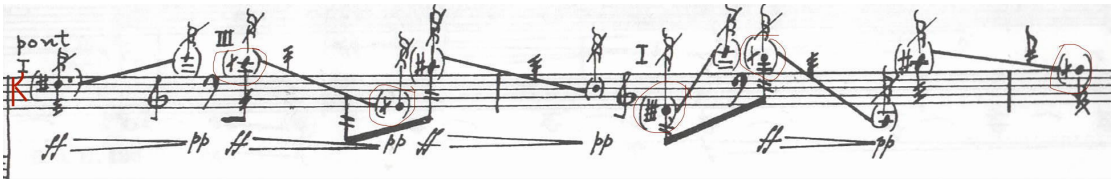
Ex. 1.28 *Nomos alpha*, bb. 76–77 (see Sound File A1NomosAlpha: 2′)



Nomos alpha’s unique sonority is determined by the distinctive ambience of quartertones within the *glissandi* textures. The combination of densely interlaced techniques and textures with meta-velocious fluctuations of extreme dynamics constitutes a new composite technique in the repository of the cello’s expressive tools (Ex. 1.29) that needs to be investigated as a new area in the cello technique – theoretically, practically and pedagogically.

[71] One of the practice methods that I use consists of working on whole-tone, chromatic and microtonal (¼ # and ♭, and ¾) scales and patterns exploring the variety of fingerings – this can also be combined with rhythms, dynamics and bowings.

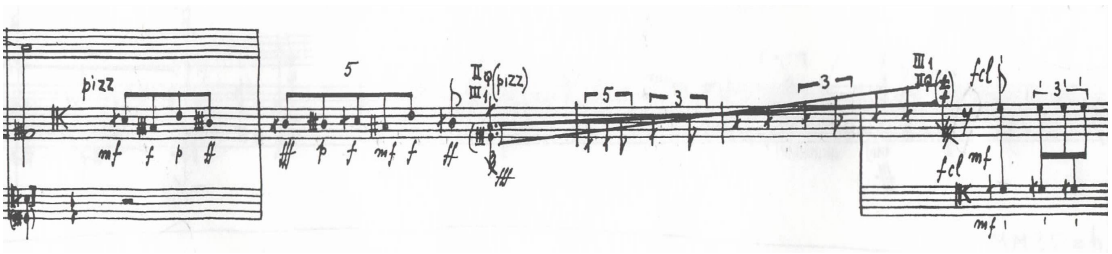
Ex. 1.29 Nomos alpha, bb.165–166 (see Sound File A1NomosAlpha: 4′29″)



Pizzicato

The rhythmical variety and velocity of the *pizzicati* pose particular technical difficulties: firstly, in finding solutions for achieving the prescribed dynamics and density and, secondly, in rapid transitions between the *pizzicato* and *arco* episodes (in most cases, played *battuto* (as illustrated in Exx. 1.6 and 1.30).

Ex. 1.30 *Nomos alpha*, bb. 226–230 (see Sound File A1NomosAlpha: 6′05″)



In the above example (bars 226–227), the rate of dynamic fluctuations is extremely high, with dynamic change occurring on each semiquaver; this group of 'jagged' *pizzicati* is followed by a *tremolo pizzicato* passage with precisely indicated rhythmical patterns. To articulate these subtle alterations within the line of upward *glissando*, the first note of each mini-group must be played with a light accent. The dynamic marking *fff* demands a strong striking motion downwards of the right wrist, similar to guitar strumming. In playing *pizzicati*, various plucking methods may be used in accordance with a particular character (the degree of 'percussiveness' etc.), dynamics, tempi and other considerations:

1. Using one finger (either first or second)
2. Using both fingers in succession
3. Alternating between left and right fingers (when possible)
4. Using first, second and third fingers in succession (*tremolo*)
5. Using thumb and third fingers (guitar technique, PIMA)

6. Playing with plectrum

The first three bars challenge the cellist to find a convincing solution for playing 'impossible' *pizzicato tremolo*: Xenakis indicates the rate of plucking of 20 within the duration of 2″ (See Ex. 1.6). Solomos compares the approaches by the three cellists – Deforce, de Saram and Christophe Roy – with distinct prioritising strategies (tempo *vs.* exact number of *pizzicati*, and in the case of Deforce's interpretation, sheer sonority – 'getting in sound').[72] In my performance and recording, I prioritise the density and expression of energy and transformation through the textures (from resonating plucking timbre to the 'duller' woody sound *battuto tremolo* in bars 4-6), and, on a global plane, a sense of 'urgency' in establishing momentum for the unfolding structural processes and sound. In most instances, *pizzicato* is used as part of combinatorial techniques: *glissando*, quartertones, *tremolo*. Table 1.5 shows the prominent use of *pizzicato* in *Nomos alpha*, highlighting the importance of refining this tool as part of the extended techniques repository.

Table 1.5 *Nomos alpha*: examples of the different types of *pizzicati*

Tremolo single notes *glissando*	Bars: 2-3
Double stops *glissando*	Bars: 38-42, 81-82, 137-139, 144-145, 190-192, 280-281, 315-317, 323-325
Tremolo double stops	Bars: 186-189, 227-230, 258-259
Left-hand *pizzicati*	Bars: 43, 77, 80-81, 125-127, 150-152, 209-211, 223-226, 279, 318
Single note *glissando*	Bars: 23-24. 45, 246-247, 273-274
Single note	Bars: 7, 226-227, 289-292, 314, 330-331, 361
Single note *tremolo*	Bars: 73-74, 128-130

Scordatura

The C string must be detuned down one octave in three instances and a major second in one (bar 295) and retuned three times; in addition, in the second section of Level Two (bar 117) detuning must be executed *while* playing – from the lower C to D#. Xenakis specifies the use of a gut C string; this requirement is motivated by his knowledge of the qualities of the material – the elasticity and liveliness of the vibration frequencies of the gut string make it more adaptable and resonant compared to a steel string. Palm is in agreement with Xenakis about the acoustic properties of

[72] Solomos, 'Nomos alpha. Remarks on performance', in *Exploring Xenakis*, pp.112–113.

the gut C string, describing the de-tuned steel C string as a 'washing line', and the gut string as an ideal material for producing the deep tone with distinctive lower pitches.[73]

The demanding *scordatura* requirements are yet another difficulty for the performer in many ways – technical, interpretative and psychological.[74] *Scordatura* in *Nomos alpha* presents significant practical difficulty in live performance. In the final part of Level Two, in addition to the *scordatura* requirement, the technical task of playing the scalic progression of the two lines moving in opposite directions and crossing over in the middle, challenges the performer to come up with the best outcome he/she can master. Palm and other cellists have tried a variety of solutions in approaching this 'impossible' section, whether playing with a pre-recorded part, involving another cellist, or playing on one cello (acoustic or electric). In his interview with Solomos, Roy describes his approach:

> In this passage, the notation is incomplete. It is impossible to play the harmonics of a fourth written with a note held simultaneously. Beyond a few of the sounds, the fingering requested by Xenakis cannot be done. This implies that everyone does their [*sic*.] own version. [...] The solution that I adopted is to replace the harmonics of a fourths by harmonics of an octave, fifth, fourth, third major and third minor, so that a gesture can be obtained that descends visually on the string and ascends for the ear. [...] This pre-supposes a rather slow tempo to really control things and give this liquid aspect.[75]

In my performances, my preference is to use a pre-record; with regards to the tempo, I aim to play as close to the indicated speed as possible, which is minim=75 mm (see my recording: 10′03″). In the course of my research, I examined the technical and expressive aspects of executing the concluding section without the additional tool of a pre-recorded second line. I studied the two performances that to my knowledge, are available at present – audio recording by Roy and the video recording by Martina Schucan[76] – in which the two lines are played as written in the score (this is realisable

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[73] See Boykova,' 'Siegfried Palm: Celebrated Cellist About New Music', p. 253. My translation from Russian.

[74] I discuss these issues in 'Performing *Nomos alpha* by Iannis Xenakis: reflections on interpretative space', in *Exploring Xenakis*, 89–107.

[75] Solomos, 'Nomos alpha. Remarks on Performance', p. 115.

[76] Christophe Roy, Xenakis, *Nomos alpha*, CD, Grave-GRCD16 (1998); Xenakis, *Nomos alpha*, performed by Martina Schucan Recorded live at soyuz21 concert May 27, 2011 - Hubertus Exhibitions, Gallery Hauser & Wirth Zürich, youtube video https://youtu.be/EN5qpvAG0_I [Accessed 12 December 2016]. See also Roy's talk on tte subject of the fingerings for the final section of *Nomos alpha* – 'Iannis XENAKIS: Nomos Alpha (1965-66) for cello solo. Christophe ROY: finguering of the last section', https://youtu.be/LXLIQaK_fyM [[Accessed 12 May 2020].

only by considerably slowing down the tempo to accomodate the 'acrobatic' leaps across the strings in the extremely high positions). As emphasised in Part 1.3, in my interpretation of *Nomos alpha* I prioratise the global structure where the rhythmical pulse between and within the two Levels and within the patterns and events, mould the temporal unity of the sonic architecture. In my artistic judgement, the expressive power of the final statement of the work can be conveyed by the seemingly effortless, agile and precise in execution, unaffected rendition close to the tempo indicated by Xenakis; it is this evanescent fragility of the uncanny progression of the two lines intersecting in the middle and 'dissapearing' beyond the threshold of the human audial perception that evinces the unbounded dimension of the composer's cosmic vision.[77] Using technology for creating such effect fulfils the composer's conception of the overall structure and distinctive sound characteristic in this part of the piece. Palm recounts Xenakis's concern about technical execution of this very important concluding passage: 'Xenakis understood that this [particular section] is almost impossible to play; he always listened intently to what extent the cellists come close to his ideal.'[78] Perhaps, his intent was to stimulate the performer to discover a unique solution to the designated task, instigating a collective effort across generations of cellists by involving an individual performer in the process of re-conceptualising the norms of cello technique and sound.

1. 5 *Nomos alpha* and Contemporary Studies

Practising selected 'preparatory' pieces and studies, such the twelve studies *Pro musica nova: Studien zum spielen neuer Musik für Violoncello*, stimulates understanding and strengthens the physical and expressive aspects of the extended

[77] Xenakis's musical imagination and thinking is grounded in his philosophical views on universal existence and his perception of reality from the perspective of the cosmic expance and cosmic unity. The composer asserts: 'According to certain theories, life on earth comes from the cosmos. In the artistic sphere, we ourselves are also no doubt rooted in the cosmos'. Xenakis, Iannis, et al. 'Xenakis on Xenakis', *Perspectives of New Music*, 25, 1.2 (1987), 16–63 (p.24) [Accessed 16 January 2014]; Mihu Iliescu, 'Beyond the modern-postmodern cleavage: Xenakis' mythical thinking', *Proceedings of the Xenakis International* Symposium, Southbank Centre, London, 1–3 April 2011, www.gold.ac.uk/ccmc/xenakis-international-symposium, p.2, highlights one of the aspects of mythical thinking, 'Unity of the world' that he discerns in Xenakis's music: 'Mythical thinking offers a unitary vision of the world – of nature in the sense of the whole universe or of the cosmic infinity. It precedes and surpasses dichotomies such as those between rationality and irrationality, nature and culture, the celestial world and the terrestrial world'. Iliescu asserts: 'The Greek mythology along with Pythagoras', Parmenides' and Plato's philosophy inspired Xenakis in various ways. Oresteïa, his highly original version of Aeschylus' theater, recalls Nietzsche's interpretation of the Greek tragedy as a synthesis between apollonian and Dionysian trends. Mythical thinking is in fact omnipresent in Xenakis' musical approach'. Ibid.

[78] See Boykova, 'Siegfried Palm: Celebrated Cellist About New Music', p. 25.

techniques. Compiled and edited by Siegfried Palm, the set is a valuable source of repertoire pieces by Palm's contemporaries, 'who have sought to build a bridge between the inexperience with contemporary instrumental techniques and the demands made by contemporary composers in their works' that feature these new (at the time) techniques.[79]

The content of Palms' book *Studien zum Spielen Neuer Musik für Violoncello*:

1. Günther Becker *Studie zu „Aphierosis"* (1968)
2. Hans Ulrich Engelmann *mini-music to Siegfried Palm,* Op.38 (1970)
3. Wolfgang Fortner *Studie zu „Zyklus"* (1964)
4. Michael Gielen *Passagen aus „die glocken sind auf falscher spur"*(1969)
5. Mauricio Kagel SIEGFRIEDP' (1971)
6. Milko Kelemen *Vorstudie zu „Changeant"* (1969)
7. Konrad Lechner *Drei kleine Stüke* (1971)
8. Nikos Mamangakis *Askisis* (1969)
9. Krzysztof Penderecki *Cadenza aus dem Konzert für Violoncello und Orchester* (1967/72)
10. Jacques Wildberger *Studie* (1969)
11. IsangYun *Studie aus „Glissées"*(1970)
12. Bernd Alois Zimmermann *Vier kurze Studien* (1970)

As an indirect approach to *Nomos alpha* these compositions are helpful for identifying and refining the techniques that might be new to the cellist.[80] Many types of extended techniques are presented in the set: a variety of *glissandi* (Becker *Studie zu „Aphierosis"*, Engelmann *mini-music to Siegfried Palm*, Kagel SIEGFRIEDP', Kelemen *Vorstudie zu „Changeant"*, Mamangakis *Askisis* and Yun *Studie aus*

[79] Siegfried Palm, Preface to *Studien zum spielen neuer Musik für Violoncello* (Wiesbaden: Breitkopf & Härtel, 1985) p. 3. I discuss Palm's *Studien zum Spielen Neuer Musik* and Sophia Gubaidulina's *Ten Preludes* (*Etudes*) for solo cello in my article 'Contemporary Cello Technique: Performance and Practice', *Music & Practice*, 6, July 2020, https://www.musicandpractice.org/volume-6/contemporary-cello-technique-performance-and-practice/. For overview of the development of contemporary cello technique and a compendium of contemporary studies, see Valerie Welbanks, 'Foundations of Modern Cello Technique; Creating the Basis for a Pedagogical Method' (PhD thesis, Goldsmiths, University of London, 2017).

[80] The compositions in the set are written between 1964 and 1972, a period of intense development and expansion of the cello as evidenced by the number of works – many of them for solo cello – exploring newly discovered expressive capacity of the instrument. The extended techniques and extra-musical expression that at the time were stunningly new are still in the process of establishing their pedagogical status, almost a half of the century later.

„Glissées"); harmonics (Kagel SIEGFRIEDP', Wildberger *Studie*); large 'leaps' into high positions (Gielen *Passagen aus „die glocken sind auf falscher spur"*, Kagel SIEGFRIEDP', Zimmermann *Vier kurze Studien*) and other techniques.

As part of my research into the performative approach to *glissandi* in *Nomos alpha*, I examined *Studie aus »Glissées«*, 1970, by the Korean composer Isang Yun (1917–1955). *Glissées* investigates the *glissandi*'s expressive properties in the context of Korean traditional music (in this tradition, according to the composer, there are thirty different kinds of *glissandi*). In this work *glissandi* function as a medium for the flexibility of the pitch, which is the 'unifying idea of the whole piece.'[81] In the 1960s Xenakis established a strong connection with Oriental culture and music: on his first trip to Japan, to participate in the conference *East-West Music Encounter* (with Luciano Berio and Elliott Carter also attending), he found a rich source of artistic inspiration and made significant links with important Japanese and Philippine composers and performers.[82] In relation to *Nomos alpha*, composed in this period (soon after completing the opera *Oresteïa*), the analysis of his use of *glissandi* brings to mind a possible influence of the *Noh* and *Kabuki* theatre and the expressive style of *Gagaku* court music.[83] Xenakis's approach to the sound might be thought as resonating, in some ways, with the musical philosophy of the East as elucidated by Yun:

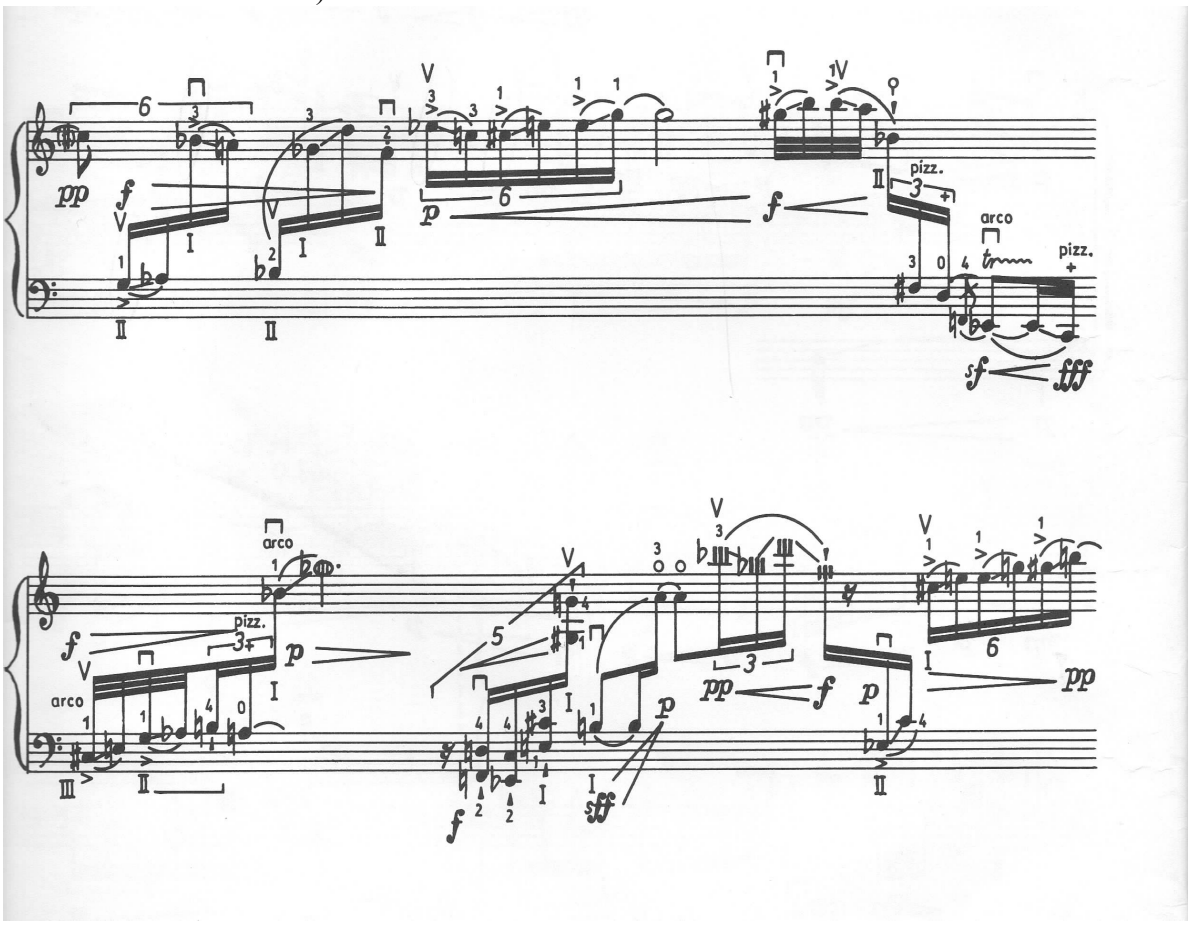
> In spite of all the difference, there is a common factor in Chinese, Japanese and Korean music: it is based on the individual note, which is independent of melodic content, and which has a completely different character from that of a single tone in a piece of European music [...] European music lives from the combination of notes; the individual note is relatively abstract. For us in the East, the tone already lives in itself. Each tone is subjected to alteration from the moment it sounds until it dies away. It is endowed with ornaments, grace notes, vibrato, glissandi and changes in dynamics; above all, conscious use is made of the natural vibrations of every tone as a means of construction.[84]

[81] See Jee Yeoun Ko, Isnag Yun and His Selected Cello Works (PhD Thesis, Louisiana State University, 2008), p. 37, https://digitalcommons.lsu.edu/gradschool_dissertations/3936 [Accessed 25 January 2016].
[82] See James Harley, *Iannis Xenakis*: *Kraanerg* (Farnham: Ashgate, 2015), p.16.
[83] See James Harley: *Xenakis, His Life in Music*, pp. 46–48, for detailed discussion of *Oresteïa* and *Terettectorh* in this context.
[84] Isang Yun, 'The Contemporary Composer and Traditional Music', *The World of Music*, 20.2, 57–60 (pp. 57–58) [Accessed 15 February 2016].

Perusal of the score of *Glissées* and its companion piece *Studie aus »Glissées«* brought to my attention the recurring accent markings above the notes from which the *glissandi* begin, both in *Vorschlags* and above the regular notes (Ex.1.26). In the commentaries on the technical features of the twelve studies, Palm writes with regards to the *glissandi* in *Studie aus »Glissées«*:

> Of utmost importance are the glissandi, which are to be correctly performed by sliding away from the initial tone and not be [*sic*.] sliding into the tone to be reached. [...] This principle is often underscored by an accent on top of the initial tone.[85]

Ex. 1.31 Isang Yun, *Studie aus »Glissées«*, p. 56, no bar lines (see Sound File PalmB1dGlissees: 1′30″)



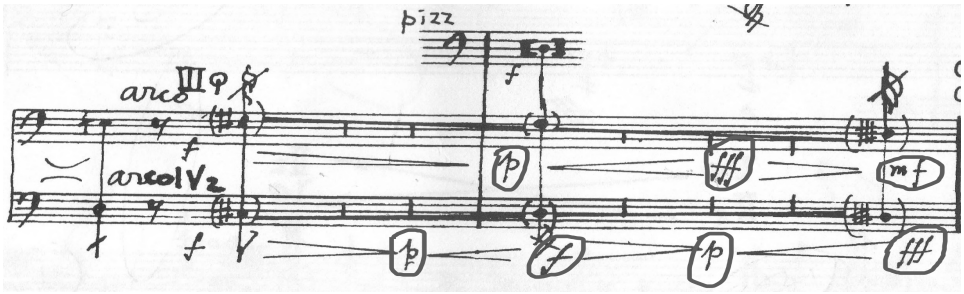
In *Nomos alpha* the *glissandi*'s initial tones are notated throughout the score with a crossed over note (similar to a *Vorschlag* sign*)* and, occasionally, in brackets. I

[85] Siegfried Palm, 'Remarks and Explanation of Signs', *Studien zum Spielen Neuer Musik für Violoncello*, p. 4.

interpret this particularity of notation as the composer's indication of the manner in which the *glissandi* must be executed: the beginnings of the slides are to be played without accents, in all cases including the *arco*, *pizzicato*, *battuto*, *sul ponticello*, in single or double stops. Both the beginnings and the endings of the *glissandi* are notated with precise indication of the pitches, which are frequently quartertones. The performative mode requires the quality of continuity within and without the *glissandi* gestures. The continuity does not negate short rests (pauses and sustained notes) within each section, but contains and absorbs the energy inherent in these moments of stasis. This particular feature adds to the technical sophistication of the score through the dialectic tension between the delineated contours of the sonic patterns and relentless motion of the *glissandi* within them – as linear traces and clusters. In bars 253–275, for example, various *glissandi* events create pulsating textures: *glissandi* double stops and as a single tone – *tremolo* (bars 253, 266–267, 272–273), *battuto* (bars 254–256), *arco* with left-hand *pizzicato*, (bar 261), *legato* (bars 260–263), counted *tremolo* (bars 266–267, 272–273), sustained dynamics (bars 253–256, 266–267, 274–275), pulsating dynamics (bars 256–258, 260–265, 272–273), *pizzicato* (bars 273–274) and clustered (bar 275) – juxtaposed with the moments of stasis as pauses or sustained sound (bar 259 *pizzicato*; bars 267–268 *battuto tremolo*; bars 269–271 double stop).

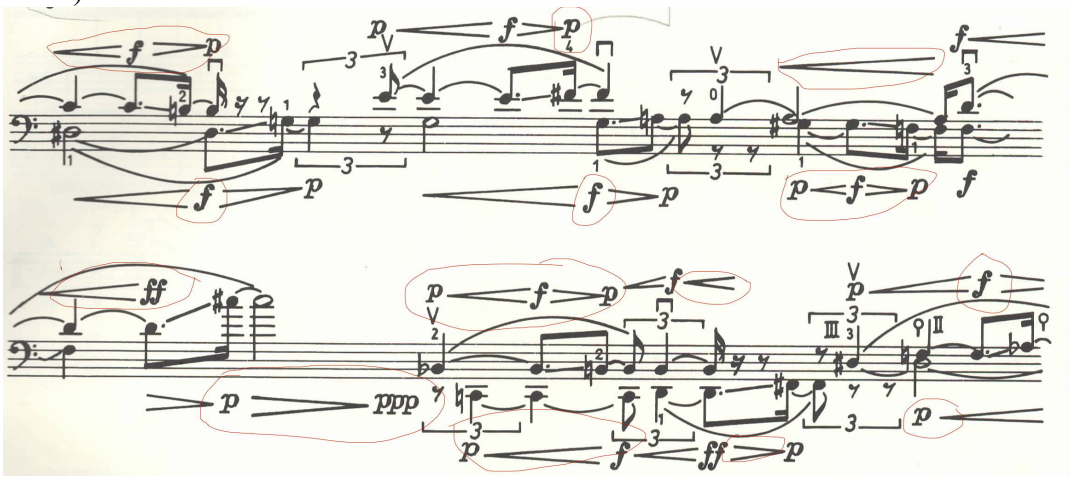
A singular expressive device of playing the notes comprising of double stops with different dynamics, for example, requires an extremely refined control of the densities and distribution of the bow. In bars 260–261 (Ex. 1.32) the contrasting dynamics are combined with a diminutive sliding motion in the left hand – a very slow *glissandi* in opposite directions. Emphasising the leading finger in each line will help to realise a pulsing sonority.

Ex. 1.32 *Nomos alpha*, bb. 260–261



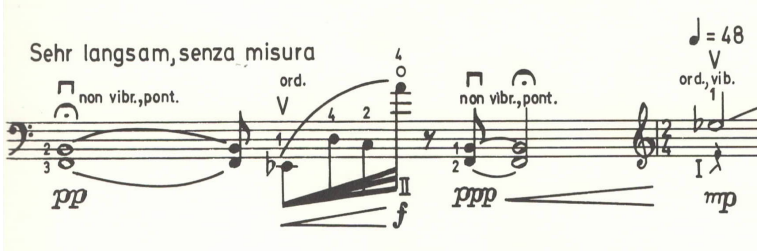
A similar technical device is employed extensively in Yun's *Studie aus »Glissées«* in the concluding section, pages 56–57 (Ex. 1.33). In his commentary on the piece, Palm notes: 'The work on this episode leads to a surprising control of various pressure levels combined with a flawless bowing'.[86]

Ex. 1.33 *Studie aus »Glissées«*, p. 57, no bar lines (see Sound File PalmB1dGlissees: 2'33")



In *Passagen aus „die glocken sind auf falscher spur"* by Michael Gielen,[87] the large intervals played on one string and across the strings require precision in position changes and contrasts of the tonal colours: *vibrato*/*non-vibrato*, *sul ponticello*/*ordinario*, accented/soft (Ex. 1.34).

Ex. 1.34 Michael Gielen, *Passagen aus „die glocken sind auf falscher spur"*, the beginning, p. 21, no bar lines



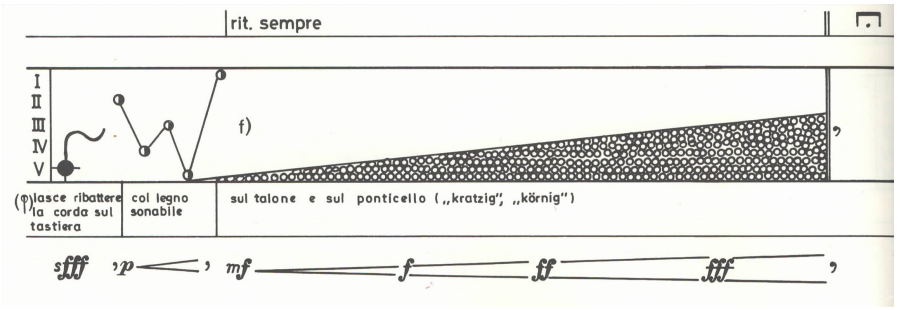
[86] Ibid.

[87] The study is part of the composition *Die Glocken sind auf falscher Spur* (1970) – *The bells are on a wrong track* – melodramas and interludes on poems by Hans Arp, for cellist, singer, guitarist, pianist, percussionist and reciter, their voices, metallophones and harmonium, premiered in Saarbrücken in May 31, 1970.

This Etude is most beneficial when practised with awareness of the original context; listening to the recording of *„Die glocken sind auf falscher spur“* by Gielen (1927–2019) stimulates insights into the expressive range and gestures of the complete composition by placing the technical issues within the singular musical structural and expressive framework.[88]

Engelmann's *mini-music to Siegfried Palm* is an example of the score where graphic indications are juxtaposed with short sections written in traditional notation – these should be played with a 'certain irony'.[89] In relation to *Nomos alpha*, the most useful technical features of the Etude relate to the variety of percussive effects, skillful transitions between the playing modes, the extended techniques and the delicately sounding 'ironic' phrases, as well as the *overpressure* (tonal distortion obtained by moving the bow close to the bridge and applying forceful motion (Ex. 1.35).[90]

Ex. 1.35 Hans Ulrich Engelman, *mini-music for Siegfried Palm*, p.16, no bar lines, (see Sound File B1aPalmMiniMusic: 4′03″)



This technique is prominently featured in Xenakis's second work for solo cello, *Kottos* (1977), where the grinding textures obtained by the extreme *sul ponticello*

[88] See performance of the work recorded in Baden-Baden, Hans-Rosbaud-Studio des SWF (Hans Rosbaud Studio of Southwest German Radio), September 1987, with Siegfried Palm (cellist), Hanna Aurbacher (mezzo-soprano), Wilhelm Bruck (guitarist), Bernhard Wambach (pianist), Christoph Caskel (percussionist), Jochen Bartels (reciter) & Bernhard Kontarsky (reciter, harmonium player and conductor), youtube, https://www.youtube.com/watch?v=9nd09dIRv2M&t=558s [Accessed 14 September 2019]. This recording contributes to understanding Gielen's compositional style and Palm's instrumental style.

[89] Palm, 'Remarks and Explanation of Signs', p.2.

[90] For analysis and practical comments on this type of extended techniques, see Welbanks, 'Foundations of Modern Cello Technique', pp. 93–102. See also Russell Rolen, ModernCelloTechniques, https://www.moderncellotechniques.com/bow-techniques/pressure-techniques/overpressure/ [Accessed 2 August 2019].

embody the composer's extra-musical ideas inspired by Greek mythology – the title *Kottos* pertains to the name of the mythical one-hundred handed son of Earth and Sky, Uranos and Gaia. As de Saram notes, the composer 'mentioned the fact that the grinding noise at the beginning of the work, which recurs several time during the piece, was the sound of earth and rocks as Uranos thrusts Kottos into the ground'.[91] In contrast to the programmatic function of the device, *Nomos alpha*'s *sul ponticello* sound constitutes one of the parameters of the conceptual framework and one of 'the eleven ways to articulate the macroscopic events'.[92]

In Xenakis's string music, the range of *sul ponticello* sound – from brittle sonorities to brutal 'noise' – is extended and enriched beyond the familiar sound effect produced by playing 'near the bridge' and needs to be examined by the cellists as part of their technical studies. Engelman's piece presents an opportunity to explore the degrees of pressure on the string beyond the territory of a 'clean' tone with defined pitch intensified by the variety of dynamics. Palm highlights an explorative nature of the graphically notated extended techniques in the Etude: 'it [the work] requires an absolutely pure and precise execution of the traditionally notated parts and otherwise: unlimited imagination and inventiveness!'[93] The combinatorial nature of *Nomos alpha*'s extended techniques, however, demands the integrated resources of both exemplary precision and 'unlimited imagination' – the cellist's creative tools in his/her striving for instrumental mastery; this totality of technical and artistic ideas will shape and vivify the interpretative space of the composition.

1. 6 *Nomos alpha* and Traditional Studies

Many cellists who come into contact with *Nomos alpha* will probably be from a classical cello background and will approach the composition from the perspective of a theoretical and practical knowledge of traditional techniques. The approach of cellists specialising in performing new music will differ from those who embrace a broad range of musical styles and historical periods. It is possible to play contemporary works where extended techniques are used almost exclusively without mastery of nineteenth- and traditional twentieth-century approaches. However, a thorough knowledge and experience of various historical performance practices will

[91] Rohan de Saram, 'Xenakis: an ancient Greek born in the 20th century', p.300.
[92] See Matossian's explanation of Xenakis's *deterministic* method. Matossian, pp. 232–234.
[93] Palm, 'Remarks and Explanation of Signs', p.2.

add depth to the sound and a physical relationship with the instrument.[94] Indeed, the notion of sound includes expression created through extended techniques, often bordering on unorthodox sound textures, which can also differ in quality.

A productive approach to *Nomos alpha* must be supported by a broad technical base and a vision that embraces many decades of development of the cello leading to its spectacular metamorphosis into a rich and uniquely responsive medium of meta-modern artistic expression. In this section I will discuss the established methods of cello playing taking as an example the *Hohe Schule des Violoncello-Spiels* by David Popper with the aim of highlighting the links between the two seemingly incompatible instrumental techniques, from theoretical and performance perspectives. To elucidate their relevance to the extreme difficulties presented by *Nomos alpha*, my analysis includes an overview of the set and my approach to their use as a preparation and practice tool for *Nomos alpha*, as well as some references to my recordings of the selected studies.

Popper's student and biographer Steven De'ak notes that the cellist/composer produced works 'by means of which technical innovations become firmly established as a part of standard equipment', recognising Popper's significance regarding the development of contemporary cello technique.[95] Adriana Venturini stresses the importance of Popper's contribution as a crystallisation of the principles of cello technique for twentieth-century cellists:

> Since the publication of Popper's *Hohe Schule des Violoncello-Spiels,* the frequency of publication of etudes dropped significantly. Not only had Popper and the Dresden School covered the majority of information that is needed to perform at a virtuosic level on cello, but the invention of recording devices and other technological advancements lessened the need to publish pedagogical materials. Popper was one of the greatest cellists of the nineteenth century and through his etudes, he lives on today in every virtuosic cellist's muscle memory.[96]

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[94] Boykova, 'The Extended Techniques for Cello in the 20th Century: a Case of Systematizsation', *Nauchnyj vestnik Moskovskoj konservatorii*, 4 (2012), 176–205 (p.199), notes: 'Despite all stylistic and aesthetical differences between the traditional and new music repertoire, the cellist has to deal, after all, with the same kind of technical issues', http://nv.mosconsv.ru/wp content/media/Boykova_Tehniki.pdf [Accessed 5 October 2017]. My translation from Russian.

[95] Steven De'ak, *David Popper* (Neptune City, N. J.: Paganiniana Publications, 1980), p. 261.

[96] Adriana Venturini, 'The Dresden School Of Violoncello In The Nineteenth Century' (BA Thesis, University of Central Florida, 2009), p. 83.

The traditional cello repertoire, such as the cello sonatas by Brahms, Shostakovich and Debussy, demands a high technical proficiency in every area of the left-hand and bow techniques. Generally, the instrumental method of the major compositions of the nineteenth and the twentieth centuries and much of the new cello works is not radically different, therefore these traditional methods of developing basic technique are still valid. So-called extended techniques, however, employed in much of contemporary and new music repertoire for creating a rich spectrum of textures and unconventional sounds, necessitate additional strategies for practising and performing. The sources of a preparatory technical material for approaching combinatorial extended techniques utilised in *Nomos alpha* may include traditional cello studies and the expanded repertoire of scales from the angle of learning the ubiquitous principles that function universally at the core of the movements. From this perspective, understanding Popper's method embodied in the book of forty ingenious studies will inform and support the process of mastering radical techniques.

Popper's studies are composed in the romantic *salon* style with a concise structure, providing the cellist with an adaptable and coherent framework for mastering conventional techniques.[97] In current pedagogical practice, the pieces are still considered to be one of the most reliable encyclopedias for the development of traditional cello technique including string crossings, a variety of bow strokes, velocity, evenness of tone, double stops, harmonics and key changes. The problem of establishing a secure sense of positions, however, is the major issue addressed

[97] Charlotte Lehnhoff, 'The Popper School of Cello Playing', originally published in *The Cello Scroll*, 8.4 (July 1991), Internet Cello Society, http://www.cello.org/Newsletter/Articles/ poppercl.htm [Accessed 2 February 2017], explains:'The etudes are written in standard forms, such as A B A (*e.g.*, no. 9); rondo (*e.g.*, no. 21); song form A A B (*e.g.*, no.4); repeated internal A A B B (*e.g.*, no. 34); something I call modified rondo, with bridge sections and parts of the rondo itself repeated (*e.g.*, no. 15); and free, or fantasia, form, where there are no repeats whatsoever (*e.g.*, no. 2)'. De'ak, *David Popper*, p. 261, comments on the pedagogical and musical value of the four volumes of Popper's Etudes Op.73: 'Unless the student can derive musical stimulus as well as technical training from the world, practicing could become a boring mechanical experience. Popper succeeded admirably in his studies, placing the emphasis on the harmonic and rhythmic aspects of the horizontal structure with creative zeal, as it progresses through cadences, and modulations, sometimes to distant keys. At the same time, the formal proportions and balance are maintained'.

throughout the set.[98] The studies are designed for internalising regular fingering patterns and clean position changes – a technical discipline that is required for playing the pieces composed for cello within the established boundaries of the instrument's range and expressive means (of that time). The studies address the problem of static and dynamic position changes, negotiating the moving octaves and the left hand positioning within the octaves. The concept of moving into *positions*, rather than merely to the next note or group of notes makes the Etudes useful for 'mapping' the fingerboard – aurally, visually and kinaesthetically. For example, in Etude 26 (bars 24–27), the pattern of octaves moving downwards on the last four-note group in a bar illustrates the principle of unifying the multiple elements of playing. The position changes in the Etudes may be executed both as slides (light *glissandi*) and by using the 'preparatory method', or 'articulated shifts'.[99] The method based on repeated progressions of patterns moving upwards or downwards on the fingerboard combined with bow strokes, as an exercise for developing mental clarity and muscle memory relating to the movements across the fingerboard's invisible 'map', is the main organising principle of the whole set. This approach, although mechanical and static by nature, is still very practical for spatial orientation on the fingerboard, stimulating the kinaesthetic and mental adjustments to the instrument. In each piece the patterns 'travelling' along the fingerboard form left-hand shapes (blocks). These 'shapes drills' are beneficial for strengthening and establishing the automatisms of the left-hand movements in a logical and rhythmically regular manner. *Nomos alpha* contains the 'residues' of these shapes while propulsing the cellist outside the familiar zone. The shapes are at times broken into micro-movements scattering the fragments in rapid bursts – to control these multi-directional motions of the left hand, the cellist has to find a way of re-training established physical and mental impulses. Popper's Etudes instill a clear understanding and precision in executing the movements of the left-

[98] Gerhard Mantel, *Cello Technique* (Bloomington: Idiana University Press, 1995) p. 65, elucidates the relationship between the practical and 'mechanical' approach to the idea of positions: 'One of the first terms to be introduced in the string pedagogy is *position*. It is, no doubt, valuable for the beginner to organize the fingerboard conceptually, but there are two disadvantages: 1. *Position* refers to the hand rather than to the fingerboard [...] 2. In normal playing, the hand never really falls into a position; if indeed all four fingers are on the string at chromatic distances, it is only for a short time within a fast passage. When playing moderately fast, the movement of the hand has nothing in common with the idea of the position. We will keep the term position for the practical purposes, i.e., in order to describe the "geography" of the fingerboard. The only constants are the chromatic distances on the fingerboard itself '.

[99] This subject is discussed in Paul Tortelier, *How I Play How I Teach* (London: Chester Music, 1975), pp. 68–69. See also, Diran Alexanian, *Complete Cello Technique: The Classic Treatise on Cello Theory and Practice* (New York: Dover Publications Inc., 2003) pp. 50–65.

hand blocks – the cellist must have this grasp of 'normal' patterns in order to deviate from them, as in *Nomos alpha* he/she will have to play off the 'grid'. One of the many challenges on the way to mastering *Nomos alpha* is the unfamiliar 'geography' of the fingerboard – the writing frequently takes the cellist into areas free from any references to positions by a disorienting sound environment generated by *glissandi*, *scordatura* and quartertones, often combined with an extremely high register.[100] However, the physicality of the techniques demanded by *Nomos alpha* corresponds to the established traditions of playing, directly or indirectly. As a foundational model of traditional cello technique, Popper's set of Etudes op. 73 provides a reference point to the technical environment of Xenakis's composition – the analysis of both approaches clarifies the way of integrating traditional and contemporary cello techniques. This helps to diminish the psychological and physical barriers the performer might experience when confronted by the challenging score of *Nomos alpha*. Richard Slavich classifies the etudes by the various facets of cello technique that they explore, and by their musical characters, for an informative overview of the set (Tables 1.6 and 1.7):[101]

Table 1.6 Popper, Etudes classified by techniques

Separate strokes, mostly in the neck positions, string crossings prominent	1,11,16,19
Separate strokes, over the whole length of the fingerboard	5,15,18,30,37
Long slurs, mostly in the neck positions	2,3,36
Long slurs, over the whole length of the fingerboard	7,10,12,21,22,23,24,26,28,31,35,39
Double stops (3rds, 6ths, 8ves)	9,13,17,20,29,34
Thumb position	4,8,13,33,38,39
Specific bow strokes	6,14,15,25,27,32
Coordination between the hands in fast tempi	6,27,38
Harmonics	18,24,28,40

[100] Frank Reineke, a Xenakis performer, 'Musica Viva, *Iannis Xenakis Mythos und Technik*', Filme von Peider A. Defilla Wergo, 2006, DVD, comments on the technical challenges of playing in the high registers in *Theraps* for solo double-bass: 'This is a two-part *glissando* movement, which starts here. In the course of the piece, it is being continued at this point. It then reaches a range, which is extremely high. In this range, I can still play the notes quite well [...]. Then, however, the piece continues. I will now play the following bars, and you will see that I leave the safe ground of the fingerboard and have to steer into the open sea'.

[101] Richard Slavich, 'A Player's Guide to The Popper Etudes', Internet Cello Society, 1995, in http://www.cello.org/Newsletter/Articles/popper.htm [Accessed 12 March 2017].

Table 1.7 Popper, Etudes classified by their character

scherzando	5,15,40
appassionato	10,20
capriccioso	16
grazioso	22,28
parody of Bach Suite #3 gigue	36

De'ak asserts the prevalence of left-hand techniques in the studies: 'Little emphasis is placed on bowing technique, except in #27, which is a study in *spiccato*, and #14 and #32, which are both played *staccato*.'[102] However, Slavich argues that the various bow techniques are given an equal importance:

> 1. The string crossing (#1,5,11,19,25)
> 2. Single string crossings within slurs (#8,12,31,36)
> 3. Long slurs over many shifts and string crossings (#2,7,12,21,23,24,29,31,33), especially in those with asymmetric slurs (#7,14,26)
> 4. Bow apportionment (#11,14,15,17,22,29,36)
> 5. Finally, there are three etudes in which specific bow strokes are explored, staccato (defined here as separated notes in the same bow direction) (#14,32), and the "shoe shine", the dotted rhythm down-up stroke so often met in Schubert's chamber music (#25).[103]

A more detailed list of specific bow techniques is outlined by Venturini (Table 1.8):[104]

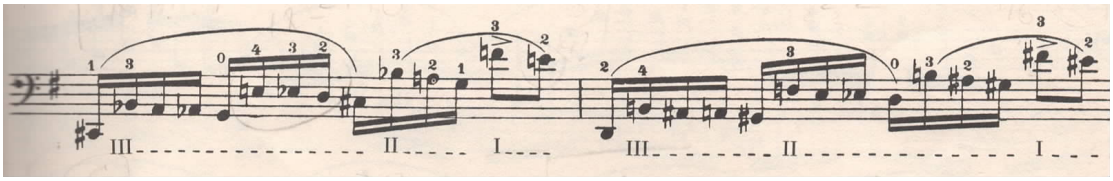
Table 1.8 Popper, bow techniques

Techniques	Etudes featuring these techniques
Detaché	5, 6, 18, 3 and 25
Legato (trademark of 29, early Dresden School)	2, 3, 4, 7, 8, 9, 10, 12, 13, 17, 20, 21, 22, 23, 24, 26, 28, 31, 33, 34, 35 and 39
Spiccato and Staccato	1, 14, 19 and 32

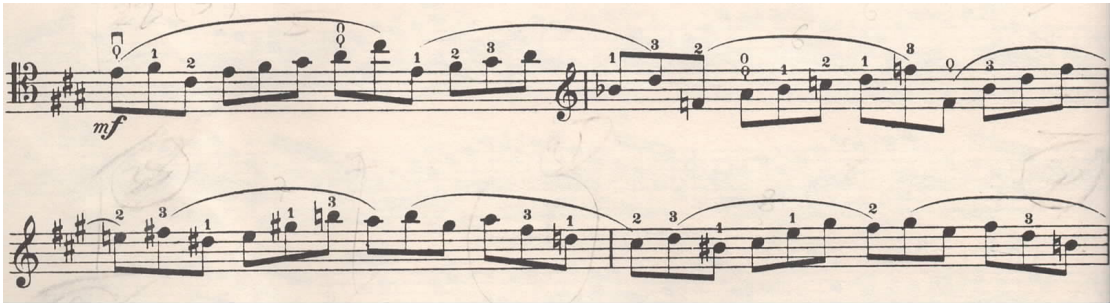
[102] De'ak, *David Popper*, p.263.
[103] Slavich, 'A Player's Guide to The Popper Etudes'.
[104] Venturini, 'The Dresden School Of Violoncello In The Nineteenth Century', p. 82.

From this chart, it is evident that *legato* technique is given the most prominent position.[105] In many cases *legato* technique is subtly intertwined with other specific technical points covered by a particular Etude, as if 'enveloping' these featured techniques (Exx. 1.36–1.43): string crossings (Nos. 2 and 12), bow distribution (No. 7), double stops (Nos. 13 and 29), chromatic passages and patterns (Nos. 27 and 39), *tremolo* (No. 13), left-hand *pizzicato* (No. 34), natural and artificial harmonics (Nos. 7 and 40) and *bariolage* (No. 36).

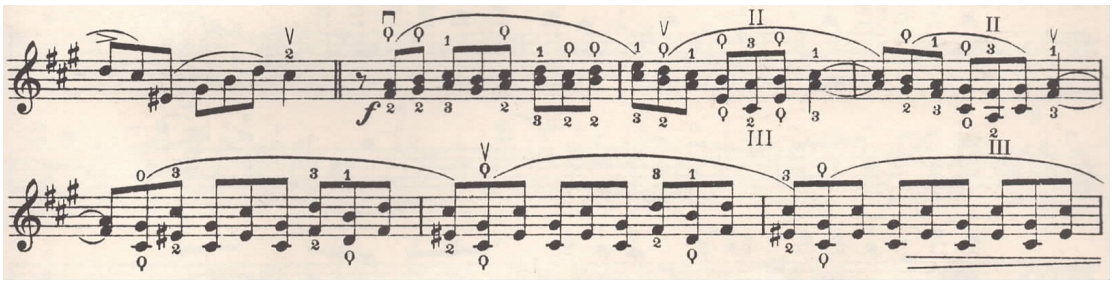
Ex. 1.36 Popper, Etude 2, bb. 21–22



Ex. 1.37 Popper, Etude 7, bb. 5–8

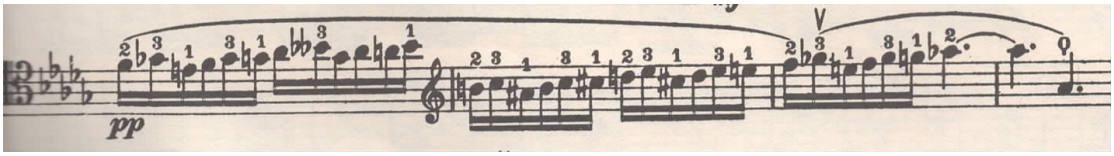


Ex. 1.38 Popper, Etude 29, bb. 57–62

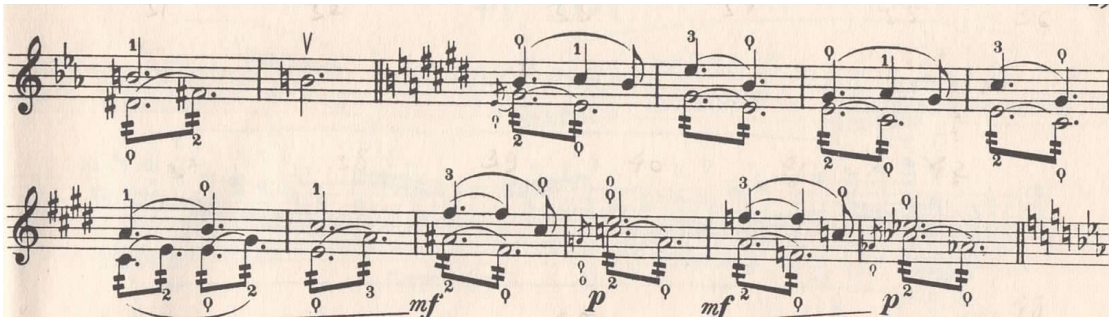


[105] With regards to the issue of *legato*, Felicity Allan-Eames, 'Techniques in David Popper's *Hohe Schule des Violoncello-Spiels, Op. 73*' (BA Thesis, University of Tasmania, 2013), p.15, specifies: 'Legato playing is required in thirty-three of the etudes from the *Hohe Schule.* Etudes that require legato playing alongside additional bow strokes include: *Etude Nos. 15, 16, 11, 20, 28, 30, 32, 36* and *40* while etudes requiring legato playing throughout include: *Etude Nos. 2, 3, 4, 7, 8, 9, 10, 12, 13, 20, 21, 22, 23, 24, 26, 28, 29, 31, 33, 34, 35, 36, 38* and *39*'.

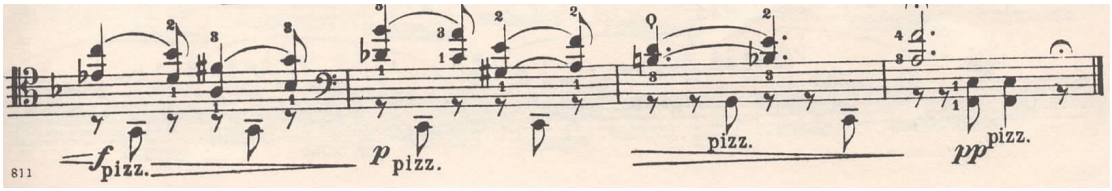
Ex. 1.39 Popper, Etude 39, bb. 32–35



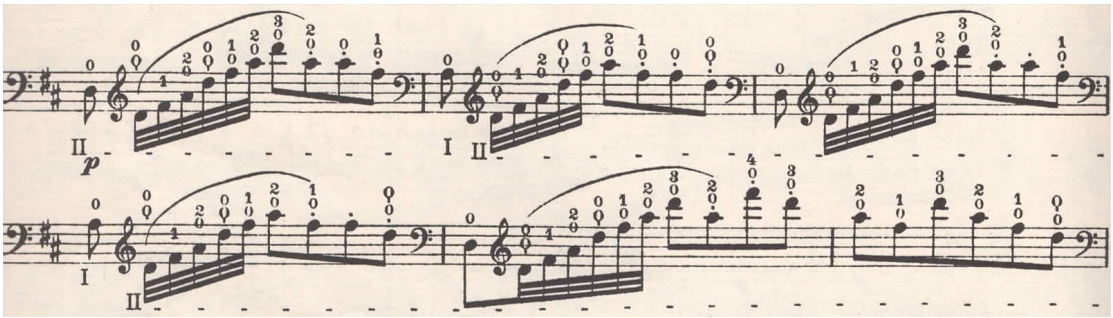
Ex. 1.40 Popper, Etude 13, bb. 31–42



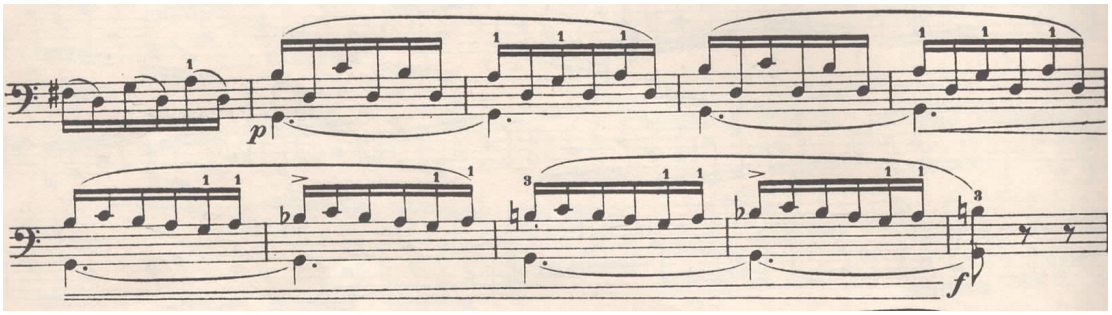
Ex. 1.41 Popper, Etude 34, bb. 31–34



Ex. 1.42 Popper, Etude 40, bb. 21–26



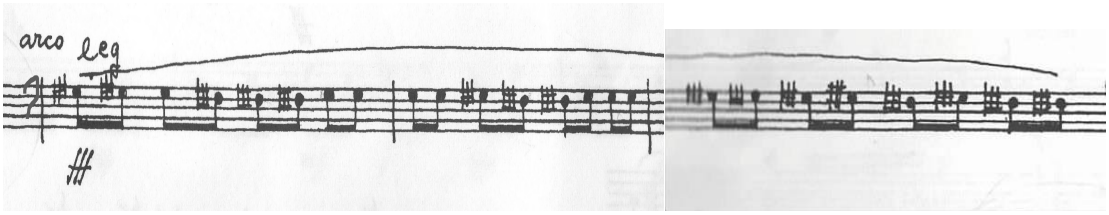
Ex. 1.43 Popper, Etude 36, bb. 35–42



Practising Popper's Etudes from the perspective of combinatoriality of techniques will advance the development of agile and adaptable style (which was a distinct attribute of the cellist/composer himself, as noted and appreciated by his contemporaries). Presenting a particular facet of the technical arsenal of the time, each piece expresses Popper's individual style of playing that is described as elegant and effortless, with a singing *cantilena* tone.[106]

The significance of the *legato* bow stroke in relation to *Nomos alpha* lies in its nature of connectivity between the sounds in various spatial relationships – from quartertones to 'leaps' that cover two or more octaves, and the quality of connections: within a sustained long tone/*glissandi* that demands imperceptible bow changes (in the Level Two sections) and in the concluding passage, where the 'rolling' upwards and downwards scalic progression is articulated by a *legato-détaché* bow motion, marked in the score as *legatissimo*; I play this non-slurred passage with smooth bow changes (see my recording: *Nomos alpha* at 10′03″). Xenakis indicates *legato* bowing at another point – bars 27–29 (Ex.1.44). However, the slur over the three bars combined with microtonal oscillations marked *fff*, implies a particular expression, and must be played *portato* in order to articulate the pulsating line.

Ex.1.44 *Nomos alpha*, *legato* bowing, bb. 27–29 (see Sound File A1NomosAlpha: 0′41″)



Another crucial technical aspect in the interpretative domain addressed by Popper's Etudes, is bow distribution – this aspect of the right arm mastery is indirectly related to *Nomos alpha*'s combinatorial techniques, which require a highly developed control of the bow action.

[106] See De'ak, *David Popper*, (Chapter XI, pp. 147–150) for a detailed account of Popper's reception as a touring virtuoso. The critics of the time noted that Popper's technique was an integral component of his interpretations: 'In his performance he showed an ideal virtuosity...which uses his technique not to enhance himself, but serve and ornament his art', p.148; 'His performance is a combination of assurance and exuberance, full of vitality, warmth and poetry... He is one of the most intelligent and sensitive musicians known', p.150.

In my preformance and pedadogical practice, I emphasise the importance of developing mastery in the art of transitions – as part of the advanced technique and sense of structure. A focus on the liminal 'in-between' spaces (sounds/shapes) in the formulaic structures of Popper's score enhances the sense of time and timing – expansion and contraction in the connective 'tissue' of the score's audial body. This way of exploring the dichotomy between the transitional and the static illuminates the global architecture of a musical piece. In this regard, working on *glissandi* – the principal structural and expressive aspects of *Nomos alpha* – brought up the problem of negotiating the shifts (position changes) in the Etudes into a clear focus.[107] Pablo Casals's concept of the 'lizard' shift is relevant for achieving fluency in connecting close and distant points on the fingerboard. David Cherniavsky observes Casals's particular quality of percussiveness in the left-hand fingers for articulation and tonal clarity, relating to position change techniques:

> An extension of Casals's percussive technique is what is called the 'lizard movement'[...] Its main aim is to produce a movement that is quick and clean – in fact, as darting as a lizard – combined, however, with relaxation and ease.[108]

One of the shifting methods that I employ in my performance and pedagogical practice, is what I term as a 'caterpillar shift', which is similar to the above, in a sense of elongating the note just before changing position – the note played by the third finger before shifting into the first finger as if hesitating slightly before the movement. The first finger is sliding simultaneously towards the third to the point of contact, 'pushing' the third finger 'out of the way' whilst sliding continually before reaching the position. This intermediate movement performed with the left fingers *legato* combines a swift 'darting' motion with a smooth sliding transition, integrating the two contrasting qualities into unified action.

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[107] I am investigating the 'reverse' connection in the technical domains of traditional/contemporary techniques – how working on the extreme techniques of *Nomos alpha* is 're-structuring' my instrumental reflexes and a global apperception of the playing process. As noted by Boykova, 'The Extended Techniques for Cello in the 20th Century', p.200: 'The latest compositional experimentations (in the second half of the XX– beginning of the XXI centuries) call for re-evaluation of the instrument and the development of extended techniques. The knowledge acquired in the process of working [on these techniques] might become useful even for those who won't be later involved with the new music repertoire: their mastery of the traditional technique will be broadened and become deeply reflectorial'. My translation from Russian.

[108] David Cherniavsky 'Casals's Teaching of the Cello', *The Musical Times*, 93.1315 (1952), 398–400 (p. 399).

A younger contemporary of Popper, Casals performed several of Popper's pieces in his recitals and recorded some of them.[109] Casals's technical style represents a link between the nineteenth century and the new era; his progressive views on the development of cello technique demanded by the new compositional concepts of the twentieth century can be glimpsed from his approach to performing and teaching.[110] In the Preface to *Complete Cello Technique* compiled by Alexanian, his assistant at the École Normale de Musique, Casals espouses the idea of the spiral development of technique:

> [T]he method employed could be compared to the ever-widening circles created by the dropping of a stone in a pond. The stone is the "basis" or starting point of instruction. If we examine an object of small dimensions we are able to look at it from all sides. Could we do the same with more voluminous one? Evidently not, as our minds follow diverging lines so that certain things, except, by a miracle, will certainly be missed. Therefore, the best method to follow in the study of technique is to trace a spiral, starting from a sound basis and ending at the extreme limits of physical possibilities.[111]

If the development of the technique of an individual performer and instrumental technique generally, in a historical sense, could be conceived as a spiral process, then the new technical methods (which are still developing) are a necessary extension of the established base – as a response to the new expressive environment of contemporary compositions such as Xenakis's *Nomos alpha* that develop cello playing towards 'the extreme limits of physical possibilities'.

With the aim of elucidating the technical value of Popper's Etudes I will discuss the shared attributes of traditional and unorthodox cello techniques and comment on selected Etudes. The broadly defined functions and properties exemplified by particular Etudes (this is not a rigid classification, however, as the

[109] De'ak, p. 241, gives a summary of these recordings: 'Casals recorded the following pieces by Popper: Chanson Villageoise, Victor 1083; Gavotte (Op.23), Col. 68025 D; Mazurka (Op.11), Col. A 5698; Serenade Espagnole (Op.54), Col. A 5650; Vito (Op.54), Victor 1311; Chopin-Popper Nocturne in E flat, Victor 6589, LM 2699; and Col. 68024D, 8901M; Rubinstein-Popper Melody in F, Victor1178, Victor LCT 1050; also Col. A 4649, Col. 68026D.'

[110] De'ak, ibid., p.240, observes: 'The new audiences of the twentieth century instantly sensed the fresh musical experience, which was both a leap into the new century, and a reinterpretation of the old'.

[111] Alexanian, *Complete Cello Technique*, p. 4.

techniques in most studies 'overlap', folding into a flexible whole) are shown in juxtaposition with some examples from *Nomos alpha* (Table 1.9)

Table 1.9 Popper and Xenakis, juxtapositions of tecniques

Techniques	Popper Etudes	Xenakis *Nomos alpha*
Independent Actions of the Hands	2, 20, 40	For example, bb. 159–161
Grid, Pulse and Units	6, 11, 12, 33	For example, bb. 38–41; 65–68; 155–158
Stamina and High Positions	12, 13, 25, 33	Mostly in artificial harmonics: V2 Sections 1, 2 4, 6, and the upward *glissandi* throughout the score.
'Mapping' the Bow	7	Required in all instances of abrupt changes of dynamics and techniques
Expansion/Contraction	17	For example, bb. 218–222
Bow Density	7, 25	For example, bb. 205–206
Static and Dynamic Positions Placements	26	For example, bb. 132–137
Tactility	7, 40	For example, bb. 38–41 and similar textures

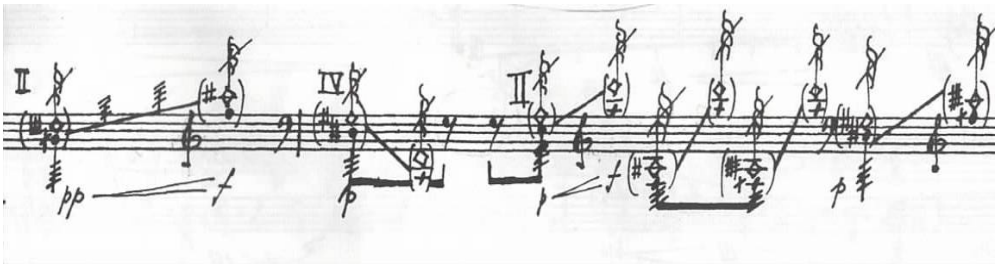
Etude No. 2 in G major

This study explores the downward and upward shifts (executed with a gentle slides) within the short phrases, with a *legatissimo* bow uninterrupted by the vertical movements of the left hand. The density of the bow strokes counteracts the succession of rapid shifts – the slow and fast movements occurring simultaneously in both hands. In my recording of this Etude, I use *rubato* and discreet *portamenti* – for example, in bars 11–12, where seven position changes within the space of two bars indicate flexibility in the timing (see my recording: Popper Etude No. 2, 0′37″).

Glissando with various textures, speed and dynamic permutations is the major technical complexity of *Nomos alpha*. In bars 165–166, 218–219 for example, the movements of the left hand negotiating multiple *glissandi* with various speeds and dynamic contrasts are combined with a counter-directional bow action. The two hands are performing independent movements – the left hand must traverse the

fingerboard's length while the bow hand, playing oscillating *tremolo*, must remain in one spot, resisting the impulse to move forward along with *glissandi* within the dense time-space of the two bars (Ex. 1.45).

Ex. 1.45 *Nomos alpha*, bb. 165–166 (see File A1NomosAlpha: 4′29″)



Etude No. 6 in F major

To develop velocity and an effortless co-ordination of both hands I use the method of 'zooming in/zooming out', which consists of playing in units of 8, 16 and 32 semiquavers or sections (i.e. bars 1–7 and 7–14), conceptualising a chosen section as a structure within a structure, eventually playing the piece from the beginning to the end as one unit. Where does physical release occur? If one plays, for example, two bars on one beat, the particular pulse is established and the release occurs in the time intervals between the two-bar units. Here, again, Popper employs the patterns method – melodic as well as rhythmic. However, a mechanical approach to this method could become an impediment to the development of authentic virtuosity; to counteract this, two aspects might be considered: *connective* and *directional*, both elements relating to the concept of *rubato.* The action of the bow should be consistent in every dimension – the pressure, angle and distribution, and the left-and movements must be identical in any tempo when alternating between the 'time zones', i.e. avoiding lifting the fingers higher and/or broadening *détaché* in a slower tempo. The reference to the idea of the time grid helps to play in fast tempo within a slow pulse, diminishing the psychological pressure of playing 'fast'.

In *Nomos alpha*, the use of the patterns method allows instinctive physical release to occur – in the micro-rests within them and the spaces in-between the patterns. In fact, the awareness of patterns will actually create these spaces.

Analysis of the two facets in this process helps to develop a multi-dimensional approach to understanding (on physical, visual and structural levels) and using

1. the patterns of the events and within the events
2. their respective centres.

Etude No. 9 in Eb major

The double stops techniques are explicitly covered by studies Nos. 9, 13, 15, 20, 29, 31, 34 and 39. Etude No.9 is the most challenging of all, as its homogenous texture demands a consistency of *legato* throughout the piece, which depends on the strength and suppleness of the left thumb. The double stops study in thirds, fifths, sixths and octaves establishes a sense of positions aiming to consolidate the left hand's 'architecture' and strengthen the thumb. This Etude requires a high level of mastery in the execution of the singing melody in double stops with seamless transitions between the positions and in string crossings. Etude No.13 features octaves, broken octaves, *tremolo* and chords; No. 17 consists of two contrasting parts, with additional left-hand *pizzicato* effect; No. 34 also features left-hand *pizzicato* accompaniment.

In *Nomos alpha* the majority of double stops are used in combinatorial techniques, with added variety of textural strata: *tremolandi*, harmonics, *sul ponticello,* left-hand *pizzicati* and *glissandi*. A strong structure of the left thumb positioning in all these instances allows playing the sequences of *glissandi*, for example, with more ease; in *glissandi*, at times, I substitute the third finger with the thumb to alleviate the strain produced by the third finger's repetitive sliding motions of various lengths, dynamics and speed.

Etude No. 11 in F major

The aim of this study is to refine the string crossings bringing attention to the mechanics of co-ordination between the hands. The focus on the two elements in the string crossings – *connective* and *directional* – unifies the techniques. My working method consists of differentiating the units that can be practised *détaché* and slurred, with the aim of playing evenly in both cases, i.e. aiming to sustain the regularity of the left-hand movements irrespectively of the chosen bow stroke. Both slurred and *détaché* units should be played close to the bridge with measured, minimal right-arm movements. As a variation, the combinations of *détaché* and *legato* bowings can be augmented with *portato* (articulated *legato*), while observing the positioning of the bow. In this Etude I explore the possibilities for inserting the double stops by

grouping the horizontal progression of quavers vertically. At the beginning, I make them visible by marking them with circles in the score, then isolate the melodic and bass lines and play various patterns based on these figures. They can be practised first as separate lines and then combined – both variations played with awareness of the 'vertical' flow. As a result, the bow movements are minimised, as it becomes clear – in terms of physical sense and mental perception – that only strictly necessary adjustments are needed for adroit string crossings. The emphasis is placed on moving the left hand in advance of the bow (similar to the advanced preparation in playing arpeggios in scales practice), which leads to awareness and refinement of co-ordination between the two hands. This practice method consists of the three stages: 1. Playing long double stops (out of context) 2. Playing rhythmically with the insertion of double stops at every opportunity 3. Playing as written. The bow will follow the mental image of double stop patterns and, as a result, the string crossings will be less laboured. The use of chromatic patterns, as in most Etudes of the set, is another element to consider. For example, in bars 25–26 and bars 29–30 the patterns move downwards and upwards in two-beat rhythmical patterns.

Although the semitones are equal in pitch distances, the C# leading to the D played by the third and the fourth fingers respectively, has more 'tension' as it is directed to be resolved to the D and sounds slightly (micro-tonally) sharper. The fingerings are the same in consecutive three-note figures – the first, second and the third; having an awareness of the various degrees of tension between the semitonal progression of pitches facilitates development of an 'expressive tuning' (*justesse expressive*) – an important principle in Casals's playing and teaching.[112]

I suggest using various combinations of fingerings to explore the expressive tuning of semitones in these patterns, whilst paying attention to the differences in playing the same pitches with different fingers in order to avoid a tendency to a mechanical approach to tuning (the 'abstract' pitches). As the physical distances on the fingerboard change according to the positions along the fingerboard, the cellist must look for ways to refine sensitivity and suppleness of the fingers required for precision in intonation and richness of tonal expression.

[112] See Cherniavsky, 'Casals's Teaching of the Cello', 398–399.

Cherniavsky draws an analogy between the functions of expressive intonation (*justesse expressive*), *rubato* and percussive quality (articulation) of the left hand fingers in Casals's interpretations:

> [Now] if *justesse expressive* enhances music's sense of progression – in other words, the feeling it imparts of an inevitable expressive flow – just as *rubato* achieves this with regard to rhythm, transforming mechanical metre into a living pulse, so Casals's second main principle, his percussive technique, enhances the resonance and clarity of the actual sounds. Again this is a principle that is basic to his whole style and technique, and brings about an extraordinary sense of vitality and precision.[113]

This particular energy generated by the percussive quality in the left hand fingers can be further developed for clarity and precision in *Nomos alpha*'s combinatorial techniques.

Etude No. 12 in C major

This study develops agility and co-ordination between the left hand patterns and a consistently smooth bow motion across two, three and four strings, independent of the left hand movements – expeditious action of the left hand is supported by stability of the bow. Etude No. 36 the longest in the set at 192 bars, however, this study looks and *feels* long – with its four pages of the relentless semiquavers passages. The Etude is useful for developing a sense of pulse in long passages – this is needed for overcoming the difficulty of moving through (mostly) higher positions with *legato* bowing. The changes regularly occur on the main beat – to avoid a mechanical way of accenting the bow changes, the phrasing of the line should be shaped across the bar lines. For example, bars 1 and 3 are divided into two rhythmical elements with accented second and fourth beats; bars 2 and 4 can be played on one beat; bars 9–10 and 13–14 can be played in four beats with accents on the beginning of each beat; bars 11–12 and 15–16 can be played as a longer line – all on one beat. One can think of wave-like shapes to create a rounded movements of patterns: the patterns of regular 'waves', i.e. two waves in the bar 1 and 3; one C major arpeggio 'wave' in bars 2 and 4 etc. The accents on D sharp and A sharps in bars 1 and 3, and on each beat in bars

[113] Talking about the importance of avoiding mechanical attitude in applying *justesse expressive*, Cherniavsky, ibid., p. 399, stresses: [...]And it is for this reason (among others) that it can never be employed in a merely imitative way, an intuitive grasp of its *instinctive* basis being absolutely essential, just as is the case with *rubato*, *vibrato* and *glissando*'. For a more detailed discussion on this aspect of intonation, see also George William Kennaway, 'Cello Techniques and Performing Practices in the Nineteenth and Early Twentieth Centuries' (PhD Thesis, University of Leeds, 2009), p.198.

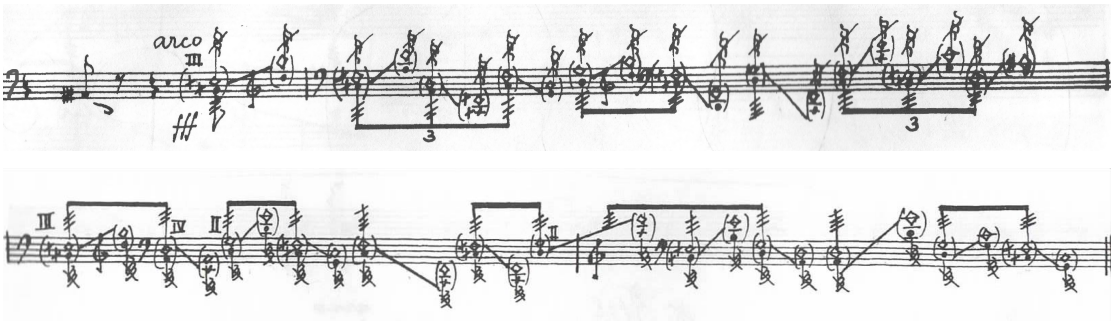
9–10, 13–14, 21–22 and similar patterns of four in recapitulation, are indicated to emphasise the *legato* characteristic of the whole piece – the *arpeggio* sequences should be played in a smooth unaccented manner, avoiding habitual accentuation of the first note in the group when changing position in fast tempo.

Although achieving rhythmical evenness in fast passages is one of the pedagogical aims of this Etude – a composition that features a regularity and logic of 'blocks' – the melodic and harmonic playfulness of the piece requires a sense of *rubato* to convey the elastic quality of weaving musical lines. In this sense, the overarching aim of the composition is mastering the application of irregularity within regularity, freedom within constraints. In my performance of the piece, I employ the method of 'concealed' *glissandi* – moving the left hand as a unit in *arpeggiated* patterns upwards and downwards, with awareness of sliding the thumb in a *glissando* fashion. For example, in bar 2, in order to facilitate the precise but relaxed movement of the left hand, I elongate the first note of the bar with the idea of releasing the rest of the passage as a single upward gesture. The same gesture (but downwards) is executed in bar 4, with other similar patterns throughout. This is a small example of how *rubato* contains the functions of both 'musical expression' and 'technical' solution. Another technical feature of this etude is the counter actions of the left and right hands – the left fingers are articulated but the bow is moving *legato*. Popper's instruction to play *legato forte* throughout the piece (except *fortissimo* in bars 71–75 and *mezzo forte* in bars 31–35) is aimed, firstly, to keep the bow in the same place close to the bridge irrespectively of positions changes, secondly, to develop independence between the movements of the bow and the left hand juxtaposing the light percussive action of the left fingers with continuous *legato* in the bow, and, thirdly, to establish a sense of 'gravity' and stability in the bow, even during the intricate passages across the strings, for example, in bars 7–8, 23–30 and 62–29. In addition to these pedagogical aims of the study, the problem of developing stamina is addressed, as in many other pieces in the set.

In *Nomos alpha*, stability of the bow is essential, generally and specifically, i.e. in *glissandi*: in the clusters of rapid bursts of the short upward *glissandi* (as, for example, in bars 12–13, 146–147, 252–253); in extended events – for example, in bars 31–34, consisting of *glissandi tremolo* that 'settles' on the two-and-half bars of repeated *tremolando* oscillations; and sustained *glissandi*, in bars 52–54 – in this

instance, the dynamic marking *ppp* adds an additional difficulty in moving the bow evenly in a suspended 'airy' motion. An exceptionally robust and concentrated bow positioning/action is demanded by the section of the twenty-two *glissandi tremolos* in various registers, lengths and directions, condensed into the four bars 274–277 (Ex. 1.46).

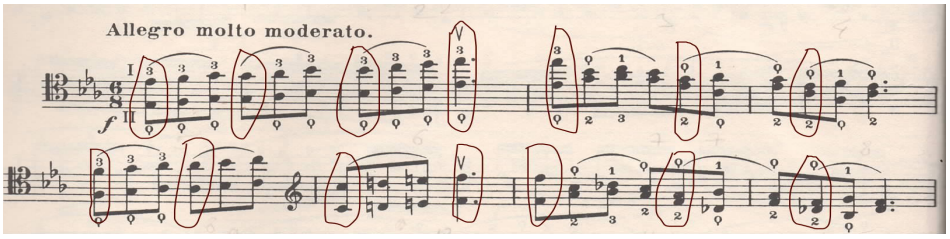
Ex. 1.46 *Nomos alpha*, bb. 274–277 (see File A1NomosAlpha: 7′32″)



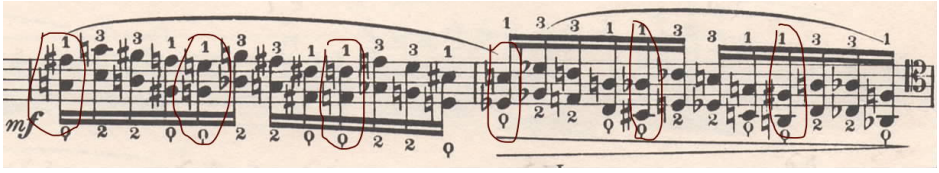
Etude No. 13 in Eb major

This Etude develops a clear sense of thumb positions with references to the chords and whole-tone scales within the patterns of octaves, thirds and sixths that are combined with the sliding motion of the left hand (Exx. 1.47 and 1.48).

Ex. 1.47 Popper, Etude 13, references to the Eb and F tonic triads



Ex. 1.48 Popper, Etude 13, references to the whole-tone scale in sixths

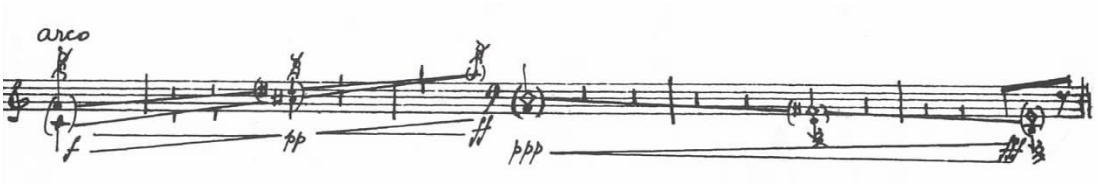


The Etude contains the *tremolo* technique (bars 29–47) sustained over the middle part of the piece, contrasting in character to the main theme in octaves. The technical challenge here is to create an impeccable evenness in *tremolo* and imperceptible

transitions between the double stops, without pausing or hesitating. The *tremolo* indication could also be interpreted as counted semiquavers – this will add to the difficulty of controlling the *tremolo* action and subsequently increase the stamina in the left fingers.

Nomos alpha demands extensive use of the thumb positions, particularly those using artificial harmonics – sliding motion of the thumb in numerous *glissandi* of various spans and ranges of speed can be organised by the references to the distinct centres, which, in many instances, are specified by the composer (Ex. 1.49).

Ex. 1.49 *Nomos alpha*, bb. 326–329



Etude No. 20 in G minor

This virtuosic piece demonstrates the organic use of *rubato* as an interpretative device and a technical tool. In bar 17, for example, *rubato* is integral to the technical difficulty in executing a dramatic 'leap' upwards in octaves: from D in the middle register to Eb, two octaves above (bar 17), expanding the D octave to the maximum fullness before the slide allows the performer to shift rapidly and smoothly to the Eb octave, which is the highest dramatic point of the study. The first of the repeated Eb octaves should also be stressed dynamically and expanded in time; the 'stolen time' is compensated for by *accelerando* in the following downward passage (my recording: Etude No. 20, 0′40″).

In *Nomos alpha*, a composition based on abstract mathematical procedures, the concept of *rubato* as an expressive musical tool for shaping the phrases is not relevant – the fluctuating timing of the sound material in the process of live performance is determined mainly by the duration and performative content of the pauses that differ by their 'visibility' and functions. However, *rubato*, as an extended (or contracted) physical gesture that is part of the time-texture and the global structure of the composition, can be experienced and expressed at the junctions between and within the two Levels. For example, the first transition between the Levels (bar 45) is

the only one that is unobstructed by a particular technical requirements, i.e. *scordatura* de-tuning. Although the fourth transition does not involve re-tuning, the *con sordino* indicated in the score (bar 231) requires a physical action of placing a mute on the strings, which is unrelated to the expressive intent of the moment – however, as a visible gesture this might be thought as part of the performance.

The static and dynamic position changes relate to the dialectic tension between these states in *Nomos alpha* – as pure and micro-tonally 'coloured' octaves and unisons, in the context of *glissandi*. The relationship between the thumb and the third finger is challenged relentlessly by the demands of playing pure unisons, 'distorted' unisons, the unisons within the chords, in artificial harmonics, and those moving with extreme speed upwards and downwards. These oscillations require precise alterations in the fourth intervals (in artificial harmonics) formed by the thumb and the third finger movements in the opposite directions i.e. opening (stretching) or closing (contracting) the left palm, sliding the thumb in medium, ultra-short and ultra-long *glissandi*, and other techniques. For example, an idiosyncratic passage of the two intersecting lines (in bars 220–221) requires expeditious expansion and contraction of the left palm (see Ex. 1.21).

Etude No. 33 in D major

Repetitive arpeggiated chord patterns played with legato bowings with 16, 8 and 2 notes on one bow bring awareness of the bow distribution and the balance of the bow weight in string crossing. The active fingers of both hands participate in the process with a subtle interaction – in the sixteen- and eight-notes-patterns the bow is 'carrying' the left fingers converging the passages into a unit. By cultivating the awareness of these two planes – horizontal (in the bow arm) and vertical (in the left hand), the physical motions and instinctive adaptability to the playing 'zone' will be integrated into a distinct style of playing. The study can be mastered by bringing the focus to the thumb's sliding motion, which supports the *arpeggio* patterns upwards and downwards.

Changing the focus from other fingers – mainly, the third finger that moves towards the next pattern to the sliding motion of the thumb – feels unsettling at first, but soon becomes a preferred method of playing the patterns throughout the piece. In the downward sequence in semitones (bars 34–35), Popper 'catches' the cellist with

an unexpected one-tone shift in bar 35 with the second finger –from E sharp to D sharp; the relationship between the third and the second finger is explored in this section. A D major tonic *arpeggio* is the main melodic element in this Etude.

The position changes in octaves are the main technical task in combination with the bow distribution, which is challenged by dividing the sequences of *arpeggios* in 16, 8 and 2 notes in one bow stroke. This brings attention to the bow distribution before the bow changes as the cellist has to 'arrive' at the appropriate part of the bow at certain junctions, i.e. between bars 21 and 22, 31 and 32, 44 and 45. As it is often the case, the difficulties in the left-hand technique – precision in position changes combined with speed and evenness in executing long passages – can be alleviated by directing attention to the bow arm, shaping the lines of *arpeggiated* sequences with *legato* strokes and broadening the pulse (the same principles applied in Etudes Nos. 6 and 12). The bow movement in string crossings in a wave-like motion oscillating between A and D in the bars 1–8 follows a pattern four beats in a bar. Each bar consists of a single up or down stroke – focusing on the *legato* motion helps to release the left hand by grouping 16 notes in one gesture. The bow weight is also brought into focus in longer phrases played *crescendo* down-bow (bars 13 and 15). Popper varies texture by dividing the groups into two-note and eight-note units (bars 22–29 and 41–48). This produces a variety of subtle accentuation within the bars; it is important to articulate the slurs to reveal the playful character of the piece. From the perspective of right-hand technique, the Etude is designed for refining bow distribution skill, evenness of the *legato* strokes unaffected by the left-hand rapid movements in position changes, and developing sensitivity and elasticity of the right wrist required for smooth string crossing. Playing the Etude in a fast tempo with clear articulation in the bow and the left fingers facilitates stamina and co-ordination. Regarding stamina, Lehnhoff makes a general observation:

> [T]here is simply no let-up in the etudes. This quality, of not stopping, is doubly reinforced by the absence of contrasting or different thematic material. Not being able to stop, along with the absence of contrast, provides yet another very important contribution to the development of virtuosity, namely, building up the stamina needed to play through an entire work.[114]

[114] Lehnhoff, 'The Popper School of Cello Playing', Internet Cello Society, http://www.cello.org/Newsletter/Articles/ poppercl.htm.

From my experience of practising *Nomos alpha*, I gained a deeper insight into the issue of instrumental stamina. In the process of investigating approaches to the 'impossible' tempi in *Nomos alpha*, my awareness of the muscle groups and their interrelations in the left-hand and bow-arm actions has considerably expanded; this new level of understanding and ability for spontaneous co-ordination has become an integral part of my technical style. Practising *Nomos alpha* for a period of time intensifies the tactile relationship with the cello as a material tool, and with the properties of sound on a granular level. This new instrumental tactility takes the art of cello playing towards an unprecedented territory of technical dexterity that needs to be explored.

The techniques in Popper's studies can be mastered by combining application of the learning apparatus for acquiring and developing endurance, suppleness and agility, with a knowledge of the style of the era in which they were created and utilised.[115] For example, *rubato*, *portamento* and *vibrato* are the elements that have been extensively examined in studies of nineteenth- and early twentieth-century performance practice – these elements are interrelating aspects of technique and expression.[116] When I recorded Popper's Etudes, my method of exploring the function of *rubato* as an integral element of the interpretative space consisted of several strands: 1. Allowing myself to play with intuitive *rubato*. 2. Exploring various *rubato* possibilities (also intuitively). 3. Listening and analysing the correlation between a chosen *rubato* and a particular technical issue in the Etude (see, for example, my commentary on Etude No. 20) The repetitive inflexions became discernable after listening to selected recordings as *rubato patterns* within *compositional patterns*; this tendency was at times enlivened by some subtle variations in their shapes and articulation. The question of tempi was also considered within the context of an

[115] De'ak, *David Popper*, p. 261, comments on the significance of the Etudes as virtuosic compositions that integrate the 'technical' and 'musical' aspects, directly relating to the contemporary repertoire of Popper's era: 'Among those who wrote violoncello studies very few realized an ideal synthesis – pleasing and interesting music of excellent form which clearly project a virtuoso technique [...] Many of the studies explore the technical problems that Popper had met in the music of his contemporaries such as Wagner, Liszt, Berlioz, Schumann, Saint-Saëns and Volkmann, as well as those he had introduced in his own concert pieces'.

[116] See, for example, Clive Brown, *Classical and Romantic Performing Practice 1750-1900.* (Oxford: OUP, 1999); Kennaway, 'Cello Techniques and Performing Practices in the Nineteenth and Early Twentieth Centuries', 2009; Stowell, Robin (ed.) *The Cambridge Companion to the Cello* (Cambridge: Cambridge University Press, 2000); Daniel Leech-Wilkinson, 'Portamento and Musical Meaning', *Journal of Musicological Research*, 25 (2006), 233-261.

overall shape – the tendency to take a faster *tempo* in some Etudes ensued from a dual focus on the flexible shapes of the individual phrases and their direction within the overall structure – mentally 'condensing' the whole.

Vibrato as an expressive and technical tool can be viewed as having a connective role, re-directing intent from its function as an external ornamental accessory to the internal animating quality expressed by 'super-charged' left fingers. Kennaway, in his research on the development of *vibrato* (as a part of cello playing technique), comments on Casals's view on *vibrato* (as articulated by his disciple Alexanian) as being: 'actually ahead of its time in its constant subtle modification in relation to pitch-context, the presence of open strings, and changes in dynamics.'[117] The subtle modifications of *vibrato* are required for a better connection between the notes and phrases in string crossings and changes of registers. In the fast passages (e.g. Etudes Nos. 7, 12, 20, 33), I use *vibrato* for enhancement of animated action of the percussive, yet supple, left fingers. In his string music Xenakis requests a *non-vibrato* sound – this instruction pertains to the composer's dislike of the routine application of *vibrato* that has become a part of twentieth-century string playing tradition.[118] However, a *non-vibrato* instruction does not equate to the total absence of *vibrato* as the quality of the 'charged' articulation of the left fingers produces a 'concealed' *vibrato*. This particular technique in *Nomos alpha* can be examined from the angle of the quality of a pure tone and its permutations (activated by the 'alert' left fingers), mini-*glissandi*, quartertones and the 'beating' microtones (a singular device in the Xenakian score). In addition, the extreme dynamic fluctuations in the lines extended over several bars, are played with a 'pulsing' bow that can be viewed as rhythmically controlled *bow vibrato*.[119]

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[117] Kennaway, p.198.

[118] In conversation with Feldman, 'Morton Feldman and Iannis Xenakis In conversation', edited by Vincent Gasseling and Michael Nieuwenhuizen, Xenakis elaborates on his view on *vibrato* in string playing: 'When you listen to the traditional music of India then you see how they master the vibrato. In India it's an esthetical technique in order to make the sound itself more interesting, but here in the West it is a mechanical thing, especially in schools. [...] To hold a sound for a long time without changing the timbre or the dynamic is very difficult on a string instrument and that should be one of the tests for their diploma'.

[119] For a detailed discussion on *vibrato*, including *bow vibrato* – undulating bowing, in the nineteenth and the beginning of the twentieth centuries, see for example, Kennaway, Chapter 5: Playing with Expression – Vibrato, pp. 174–201; also Clive Brown, 'Bowing Styles, Vibrato and Portamento in Nineteenth-Century Violin Playing', *Journal of the Royal Musical Association*, 113.1 (1988), 97–128.

The Etudes reveal Popper's preoccupation with developing an elegantly understated virtuosity focusing on the quality of connections between the notes with fluid musical phrasing implied even in the 'purely' technical passages and patterns. Although the awareness of the HIP style in my recording of the selected Etudes was an important consideration, the most relevant part of my research relates to the idea of an integrality of technique and interpretation. This consideration was motivated mainly by my desire to connect to the *root* of Popper's technical apparatus. As asserted by De'ak, the four volumes of the etudes were composed by Popper in response to the technical demands of the contemporary repertoire of his day, so one can assess and approach the technical methods presented in the set from the perspective of the common musical expression of his era.[120] For example, the prominent feature of the nineteenth-century style (continuing into the twentieth century) is *portamento* – the audible slides between the pitches. Researchers of the performance style of this period point to the discrepancy between various sources regarding the use of *portamento*.[121] A pedagogical intent of Popper in his Etudes regarding his view on this mannerism could be to provide exercises in negotiating position changes from the two opposed angles: practising shifts with the aim of minimising their audibility, or conversely, practising them in order to refine the audial aspect of the *portamenti* as an integral part of the technique. In both cases the elastic timing (*rubato*) is implied. The extent of *portamenti* that Popper employed in his performance can be glimpsed from De'ak's record of his teacher's impression of Casals:

> Another first impression was Casals' limited use of slides. These were accepted by nineteenth-century string players as a technical device for large leaps, as well as intensely expressive effects, without regard for the distortion of musical playing.[122]

To contemporary players and listeners, the use of *portamento* in Casals's recordings may seem excessive; this device was even more prominent in Popper's playing.

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[120] De'ak, p. 261.
[121] For analysis of *portamento* of that time, see Robert Philip, *Early Recordings and Musical Style: Changing Tastes in Instrumental Performance, 1900–1950* (Cambridge: Cambridge University Press, 1992), pp.141–204.
[122] De'ak, p. 240.

An awareness of nineteenth-century performance style and technique broadened my ability to adapt my instrumentalism to the enormous challenges of *Nomos alpha*. Focusing on the sliding action in Popper's pieces, by varying the speed, dynamics of *glissandi* and their relation to the bow movements intensified the tactility and a sense of the 'granularity' of the physical connection with the fingerboard. Practising the Etudes with the idea of experiencing a particular aspect of physicality of Popper's style enriches the technique by converging the seemingly antithetical elements of playing – Popper's method and Xenakis's new approach to cello – into an integral whole.

In the process of recording, my intent was directed towards the expressive sound world of Popper's compositions, transcending the study genre. My approach to recording was guided by the question of how technique and expression constitute an interpretative space. During the process I (re) discovered and (re) affirmed my conviction in the inseparability of these two domains. Although practising the Etudes outside of their musical appeal and stylistic context can be useful to some extent (at the earlier stages of accumulating technical proficiency), the major benefit of in-depth research and practice of the pieces pertains to establishing an integral *connection* of technique and expression within the totality of the sound and physical gestures – in this case, as experienced through Popper's particular instrumentalism. The authentic experience of this connection will allow the range and complexity of the movements to expand and deepen, providing the foundation for developing a plasticity of expression in approaching diverse compositional styles.

My experience of researching and performing *Nomos alpha* has remarkably expanded my understanding of the theoretical and physical parameters of cello technique. In approaching *Nomos alpha* from the tradition of the Soviet/Russian School of string playing with its strong emphasis on technical prowess, I made ample use of my practical knowledge of this tradition and my experience of performing works in a broad range of styles (from baroque to twentieth-century repertoire). A large part of my repertoire consists of compositions from the second part of the twentieth century that involve a multifaceted array of extended techniques. In *Nomos alpha*, the unprecedented application of these techniques in a singular combinatorial mode re-invigorated my search for a system in which the manifold aspects and styles of cello techniques are explored from the platform of universal principles of thinking

and physical training, with the aim of establishing 'total technique'.[123] The approach to Xenakis's composition discussed in this Chapter is based on the practical re-evaluation of the relationship between the traditional and extended techniques, with the focus on further development of a methodology for both types of technical apparatus. The expressive amplitude of Xenakis's music demands a level of mastery that transcends the physicality of the performer and the performance itself.[124]

Matossian recognises the uniqueness of the composition in the way it utilises the polychromic spectrum of possible sound and textures obtained from the cello: 'In fact to experience a performance of *Nomos Alpha* is to see the intricacies and particularities of cello-playing under a microscope'.[125] For the performer, *all* aspects of the interpretative space are brought into clear focus, magnified 'under a microscope' – encompassing the technical devices and their applications, the quality of artistry and attitude to performance. The composer illuminates the cello's innate power of expression beyond its perceived boundaries (at the time) transforming the instrument into a 'found object', which is recognisable and unfamiliar at the same time; this fresh outlook instigates new pathways in methodology of practice and new sources of artistic imagination, thus expanding the horizons of the art of playing cello.

[123] See Nakipbekova, 'Contemporary Cello Technique: Performance and Practice', 2020.
[124] In relation to the interpretation and performance in the domain of classical ballet, Anya Peterson Royce, *Anthropology of the Performing Arts* (Plymouth, UK: AltaMira Press, 2004), pp. 82–83, states: 'The difficulty of achieving an artistic performance of the highest level lies in having mastered all the craft, having studied all the possibilites, having learned all one can about the creater of the piece, and then stripping oneself down to what is essential, the essence of the piece and the performance [...]. You spend your life perfecting yourself as an instrument and, in the moment that counts, that moment of re-creation, you must disappear'. This comment on the importance of transcending individual ego in performance implies the level of technical mastery that makes it possible. Correspondently, in the art of cello playing, this kind of artistic 'disappearance' must be supported by a highly developed technical foundation.
[125] Matossian, *Xenakis*, p.237.

Chapter 2

James Dillon *Parjanya-Vata* for solo cello

Parjanya-Vata was composed in 1981 for cellist Alan Brett and performed by him in May of that year at the British Music Information Centre, London. An informed performance of this work needs to focus on several factors. Dillon is known as a composer with an unconventional background whose works explore a broad spectrum of references to and influences from various artistic genres and philosophies. As Michael Spencer notes:

> it is extremely difficult to separate literary influences, the few musical influences, issues of acoustics, philosophical ideas and aesthetic from the compositional procedures and the music itself. He [Dillon] is a composer fixated with the notion of the boundary, yet who persists in keeping that boundary blurred and ambiguous.[1]

An exploration of these porous boundaries – a significant aspect of Dillon's music – is an important element in creating an informed realisation of the work. To define the composition's interpretative space several interrelated aspects will be examined including musical influences, extra-musical issues, performance, sound and structure.

2.1 Musical Influences

Among the musical influences in Dillon's music one can identify the contemporary and the earlier classical musical styles as well as the non-classical genres such as the blues. A significant strand in the eclectic gamut of influences in Dillon's compositions is Hindu philosophy and music. His interest in Indian rhythms and culture led him to study with Ravi Shankar's student Punita Gupta, in the early 1970s. According to Michael Alexander (1995), 'such grounding still shapes elements in Dillon's compositional attitude and certainly influences the way in which he wishes

[1] Michael Spencer, 'Re-Placing the Dialectic: Notions of Compositional Procedure in James Dillon's German Tryptych', *British Postgraduate* Musicology, 5 (2002), http://britishpostgraduatemusicology.org/bpm5-replacing.html [Accessed 2 April 2018].

his music to be performed.'[2] An awareness of Dillon's multi-hued musical and cultural influences enlivens interpretation of *Parjanya-Vata*, subtly infusing the vestiges of these references into the sound and physicality of techniques.

2.1.1 Western Classical Music Influences

Xenakis's influence is among the important artistic forces that shaped Dillon's creative expression. In *Parjanya-Vata* this is discernible on many levels in the techniques and textures that allude to Xenakis's compositions for solo cello (*Kottos* and *Nomos alpha*).[3] The work is a significant contribution to the solo cello repertoire broadening further the technical and expressive possibilities of the cello. Dillon comments on the formative influences that stimulated the development of his own musical language:

> [M]y terms of references when I was 20 or 21 were Stockhausen, Xenakis and Messiaen, so naturally I began to develop a language that had something to do with their work. I wasn't going to become a little Messiaen or a little Stockhausen but it has something to do with them.[4]

Arnold Whittall makes a similar observation:

> Dillon has never been reluctant to express his admiration for his fellow composers, who, he believes, have laid down the right kind of challenges – Xenakis and Lachenmann are recent instances.[5]

For Dillon, the sense of his personal identity, in many ways, shapes his compositional approach – he points out that both he and Xenakis belong to the 'fringes of Europe'

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[2] Michael J. Alexander, 'The changing states of James Dillon', *Contemporary Music Review*, 13. 1 (1995), 65–84 (p. 66). Gerry Farrell, 'Reflecting Surfaces: The Use of Elements from Indian Music in Popular Music and Jazz', *Popular Music*, 7. 2 (1988), 189–205, gives an overview of the influence of the Indian music in popular, jazz and classical music, noting that Ravi Shankar inspired many important musicians in the period between the fifties to the seventies, which was the formative time in Dillon's musical development. See also, Farrell, *Indian Music and the West* (Oxford: Oxford University Press, 2001) and Michael J. Budd, *Jazz in the Sixties*, *The Expansion of Musical Resources &Techniques*' (Iowa City: University of Iowa Press, 1978).

[3] For example, the density of textures and the extreme *sul ponticello* effect in *Kottos* and *Parjanya-Vata*, the prominent use of *glissando* as a structural tool and expressive device, extreme pitch ranges, the use of microtones and wildly fluctuating dynamics and timbral contrasts in *Nomos alpha* and *Parjanya-Vata*.

[4] Igor Toronyilalic, *Theartesdesk Q&A: Composer James Dillon,* 31 October 2010, *theartsdesk.com* http://www.theartsdesk.com/classical-music/theartsdesk-qa-composer-james-dillon [Accessed 12 December 2018].

[5] Arnold Whittall, 'The Elements of James Dillon', *The Musical Times*, 148.1899 (2007), 3–17 (p. 3).

outside the Western European classical music establishment.[6] Both did not train formally in composition, and both were influenced and inspired by Olivier Messiaen.[7] Philosophically and artistically, there are many links in the composers' outlooks and interests: for example, Greek mythology and expression of the elemental forces exemplified in the two solo cello works, *Kottos* by Xenakis and *Eos* by Dillon (among other compositions). The grounding in sciences influenced both Xenakis's and Dillon's compositional thinking.[8] Simone East underlines the scientific dimension in compositional approaches of the four British composers – Ferneyhough, Barrett, Dillon and Dench – that have been grouped by some musicologists as the 'New Complexity' movement:

> All of the composers have referred to recent scientific developments such as chaos theory, quantum theory, geophysics, astronomy and biology. [...] all of the composers in question have recognised their debt to Iannis Xenakis and to a lesser extent Edgar Varèse [...] whose aesthetic positions were based on their belief in and exploration of the inextricable link between music and science.[9]

East also points out that 'Dillon's interest in stochastic procedures is in a large part due to his interest in Iannis Xenakis. Similarly, the organisation of musical material is often derived through the use of mathematical procedures such as probability functions'.[10]

Xenakis and Dillon share an affinity with string instruments and a strong interest in performance, challenging performers to question the boundaries of musical expression and transcend their perceived instrumental limitations. Both composers provoked a considerable expansion of the cello sound using extended techniques 'organically' as an extension of the established traditional cello style; the process of mastering and performing these compositions elevates cello technique to a new level

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[6] Richard Toop, 'Four facets of the New Complexity', *Contact*, *a Journal for Contemporary Music*, 32 (1988), 4–50 (p. 41), https://www.academia.edu/887987/Four_facets_of_the_New_Complexity [Accessed 17 November 2018].

[7] Xenakis took a few lessons with Messiaen, Dillon wished to become Messiaen's student in his youth, but this was not practically possible at the time. Ibid., 49. See also James Harley, *Xenakis: His Life in Music*, pp. 3–7, and Matossian, *Xenakis* (Lefkosia: Moufflon Publications, 2005), pp. 58–61.

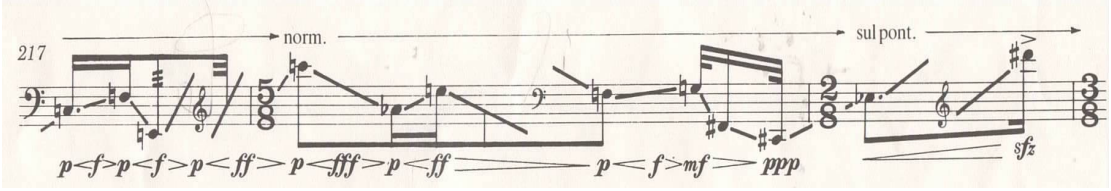
[8] According to Whittall, 'The Elements of James Dillon', p. 11, Dillon's experience working in the science laboratory is one of the many influences in his development as a composer. 'Dillon has always made it clear that scientific enquiry for him is not an entirely materialistic exercise; with reference to his work as a laboratory technician at Imperial College in the early 1970s, at a time when the quark was discovered, he has linked his preoccupations at that time with aspects of the nature/culture debate, and the possibility of pursuing the study of structuralism and metaphysics concurrently'.

[9] Simone East, 'Science: a Model and a Metaphor in the Work of Four British Composers' (MMus Thesis, Sydney Conservatorium of Music, University of Sydney, 2005), pp. 1–2.

[10] Ibid., p. 32.

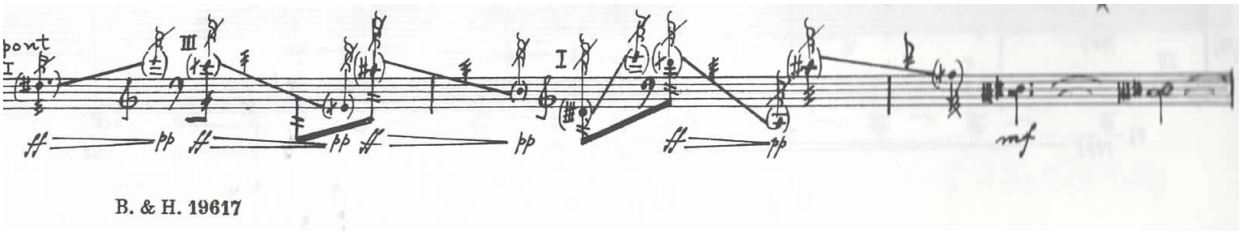
of virtuosity. Their contribution to the cello repertoire contains two symmetrical sets of three pieces (two for solo cello and one for cello and piano). Dillon's use of some types of the extended techniques in *Parjanya-Vata*, e.g. *glissandi*, microtones and combinatorial techniques, could have been influenced by Xenakis's *Nomos alpha* – the composition that opened new horizons in the expressive possibilities of the cello. Ex. 2.1 (a/b) highlights some examples of *glissandi* in *Parjanya-Vata* and *Nomos alpha* by Xenakis:

Ex. 2.1 (a) *Parjanya-Vata*, bb. 217–219 (see Sound File A2Parjanya-Vata: 8′56″)



James Dillon: *Parjanya-Vata*, Edition Peters No. 7247 © 1982 by Peters Edition Limited, London. Reproduced by permission.

Ex. 2.1 (b) *Nomos alpha*, bb. 165–167



In his analysis of Dillon's piano work *The Book of Elements*, Ian Pace discerns 'resonances and echoes of the music of Debussy, Ravel, Scriabin, Szymanowski, Enescu, Varése, Messiaen, Xenakis and numerous others'.[11]

Similarly, *Parjanya-Vata*, in addition to the allusions to nonclassical genres and performance styles, encompasses 'a sophisticated network of reference' that includes 'echoes' of music by Messiaen, Xenakis and Eugène Ysaÿe. Discussing Dillon's later compositions, Whittall reproduces the composer's observation: 'perhaps, all music is a play with memory. [...] The allusions are generally fleeting and in a state of flux.'[12]

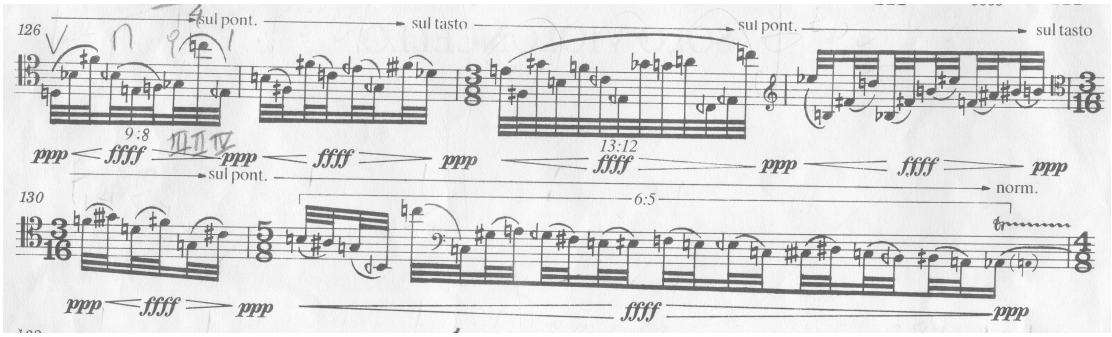
In parallel to Pace's comments on 'allusions to pianistic figurations and stylistic

[11] *Tradition and Invention: ~ personal response by Ian Pace to The Book of Elements and contemporary culture*, quoted in Peter Graham Woolf, 'Ian Pace - Marathon Transcendental Pianist', 2003, http://www.musicalpointers.co.uk/reviews/liveevents/dillon_bkofelements_article_ian_pace.htm [Accessed 19 April 2018]. See also Whittall, p. 10.

[12] Whittall, p. 10.

traits' in the piano music of Liszt, Whittall notes that 'Similarly, it could well be that the violinistic pyrotechnics of Traumwerk play homage to the 19th-century heritage extending from Paganini to Ysaÿe.'[13] Whittall's reference to Ysaÿe may also relate to the dense line in the demisemiquavers at the beginning of the section B (Ex. 2.2 a, bars 126–131) that develops into the ornate figurations that 'echo' the Sonata for Solo Cello Op. 28 by Ysaÿe (Ex. 2.2 (b/c).

Ex. 2.2 (a) *Parjanya-Vata*, bb. 126–131 (see Sound File A2Parjanya-Vata: 6'20")



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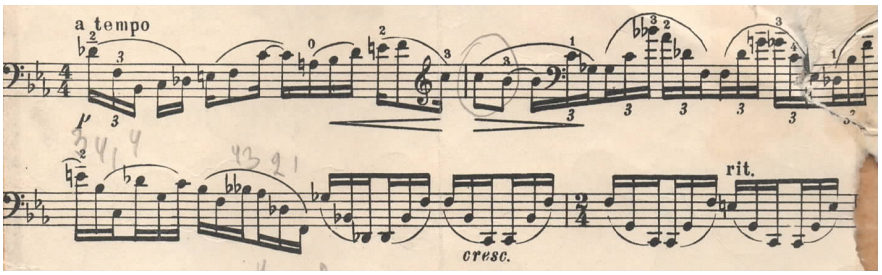
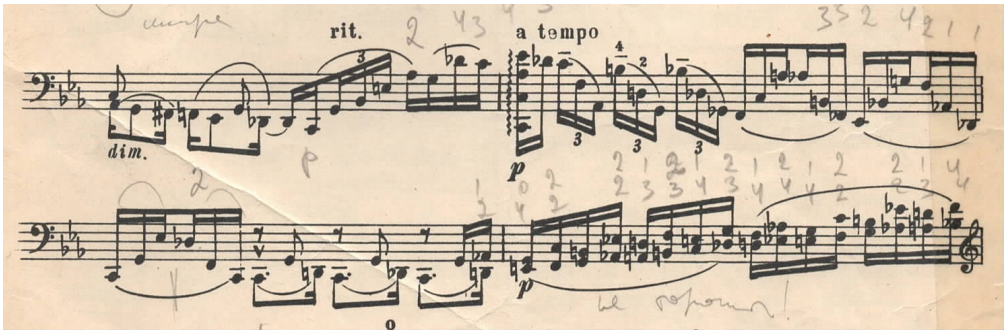
Ex. 2.2 (b) Ysaÿe, Sonata for Cello Solo, Op. 28, *Grave*, *Lento sostenuto*, bb. 5–8



Ex. 2.2 (c) Ysaÿe, Sonata for Cello Solo, Op. 28, *Grave*, *Lento sostenuto*, bb. 26–27



[13] Ibid.

Parjanya-Vata is written in a traditional notation, but with extremely dense details and intense overall pace demanding a highly developed left-hand technique. As a contemporary virtuosic piece it contains the 'echoes' and 'memory' of the early twentieth century's virtuosic cello music integrating the flamboyant passages (slurred or *staccato*), trills, double stops, 'vertiginously' high registers and other virtuosic features within the complexity of the textures and dramatic expressiveness of the elemental energies.

2.1.2 Blues

One of the significant influences in Dillon's music is the blues. In *Parjanya-Vata* the correlation between this early musical influence and the expressive devices, such as some types of *glissandi* and phrasing, evokes a particular subjective association that adds another layer of expression to the performer's approach to interpretation and tonal range.[14] Dillon's comment on this influence is important in the sense of his attitude to performance, in any genre of music, as he is mainly concerned with authenticity, 'rawness' and depth:[15]

> My initial great passion in popular music was really the blues [...] you either use it commercially or you take that on board as a part of actually something which is very, very deep in the music, it gives to this music this depth which is poignant but also at the same time edginess and is full of innuendo, is full of poeticism; the one thing I did not want lose is the rawness.'[16]

Dillon's reference to the blues as a distinctive expression that is poetic and 'raw' at the same time suggests a certain approach to some of the passages with regard to the texture and *rubato* (Exx. 2.3, 2.4, 2.5 a/b and 2.6).

(i) Textures

The 'screaming' double-stopped *glissandi*:

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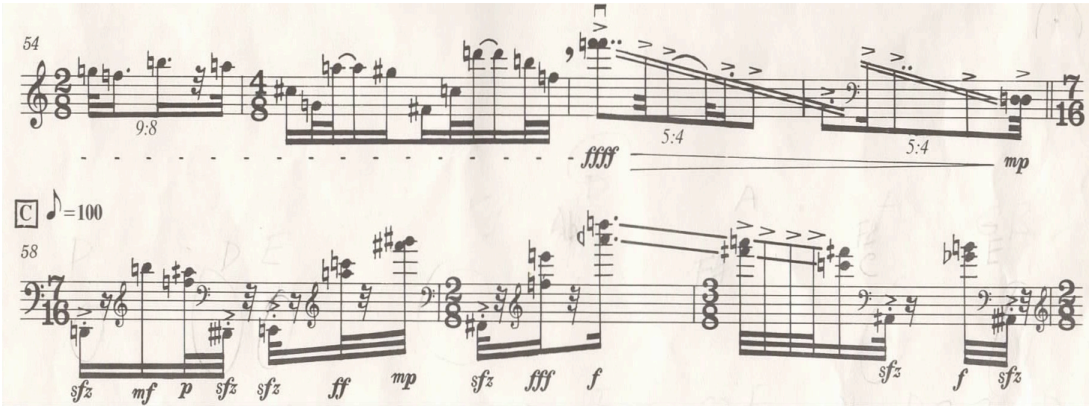
[14] In particularly, the type of blues known as '*Delta Blues*' – in the American South at the river Mississippi, where playing on a slide guitar creates a distinctive *glissando* expression. Dillon mentions the significance of this style in his interview on BBC Radio 3: 'James Dillon (1950), *Physis II* for large orchestra (World Premiere)', 7 August 2017, https://www.youtube.com/watch?v=Uohbdl1PojY [Accessed 3 February 2019].

[15] The issue of authenticity will be discussed in the part 2.3 'Dillon's views on performance'.

[16] BBC Radio 3, Interview with James Dillon, 'James Dillon (1950), *Physis II* for large orchestra (World Premiere)'.

Ex. 2.3 *Parjanya-Vata*, bb. 54–57 (see Sound File A2Parjanya-Vata: 2′48″)



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Double-stopped *glissandi* (bars 56–57) might be associated with an unresolved guitar *bend* unison – as technically it is not possible to play it perfectly as a unison, there is a possibility of rawness in the tuning – the effect is not dissimilar to Jimi Hendrix using the tremolo arm in downward *glissandi*.[17] Spencer, in his discussion of Dillon's chamber work *L'évolution du vol*, comments on the references to Hendrix's expressive style in some of the textures: 'Here, the double bass reiterates the fast open string/glissando texture that is also notable for the gradual transition to and from sul pont/sul tasto articulations which evoke Jimi Hendrix's *Machine Gun'*.[18] Another example of a rock guitar expressive effect is a short trilled *glissando* – trilling with the left hand while creating a *glissando* by depressing the tremolo arm (Ex. 2.4, bar 2). Dillon may or may not have intentionally drawn from his early musical influences, but the resemblance with a variety of rock and blues guitar expression in the piece is uncannily strong.

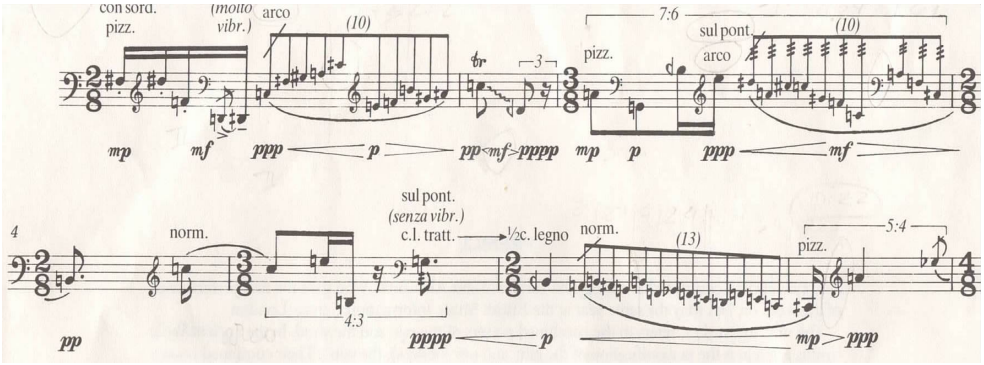
(ii) *Rubato*:

[17] These sonorities are similar to other electric rock guitar expressive devices –'octave-doubling'. Richard Keena-Levin, 'Jimi Hendrix', *Popular Music*, 10.1, 1991, 89–91 (p. 90), describes two methods of achieving 'the octave-doubling sound' by Hendrix in his song *Purple Haze*: 'During that song, the guitar solo features electronic octave-doubling device called the 'Octavia' designed by Roger Meyer. Hendrix clicks it on during the solo, the intro and the outro. Another interesting innovation is his use of playing the guitar unamplified, but putting a microphone close to the strings, during the fade-out of 'Purple Haze'. This effect, combined with the distorted and octave-divided guitar, achieves an almost psychedelic calliope-like effect.'

[18] Spencer, 'Dillon's *L'évolution du vol*: an Evolution of Stylistics or a Flight from National Identity?', *Musica Scotica*: *800 years of Scottish Music, Proceedings from the 2005 and 2006 Conferences*, edited by Heather Kelsall, Graham Hair & Kenneth Elliott (Glasgow: The Musica Scotica Trust, 2008), pp. 83–96 (p. 86).

In bars 1 and 6 the two *rubato* phrases are reminiscent of the so-called 'sheets of sound' in John Coltrane's improvisation (Ex. 2.4):[19]

Ex. 2.4 *Parjanya-Vata*, bb.1 and 6



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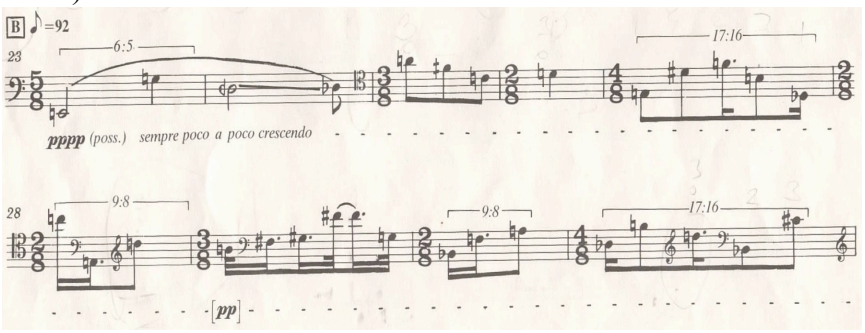
Rubato is implied by the irregular groupings of the notes within the bars, for example, 'stretching' and 'condensing' the patterns developing across the bar lines and the frequent metre changes in the B sections (Ex. 2.5 a/b, bars 23–57). This creates the feeling of 'looseness' within a regular pulse, which, perhaps, is another reference to the blues. To internalise this 'feel' helps the performer to view and to practise the section as one continuously evolving one long 'phrase' that dynamically intensifies from *pppp* (b. 23) to *ffff* (b. 56), dissociating from the bar lines and the metre signs.

Ex. 2.5 (a) *Parjanya-Vata*, B section, bb. 23–31 (see Sound File A2Parjanya-Vata: 1′26″)



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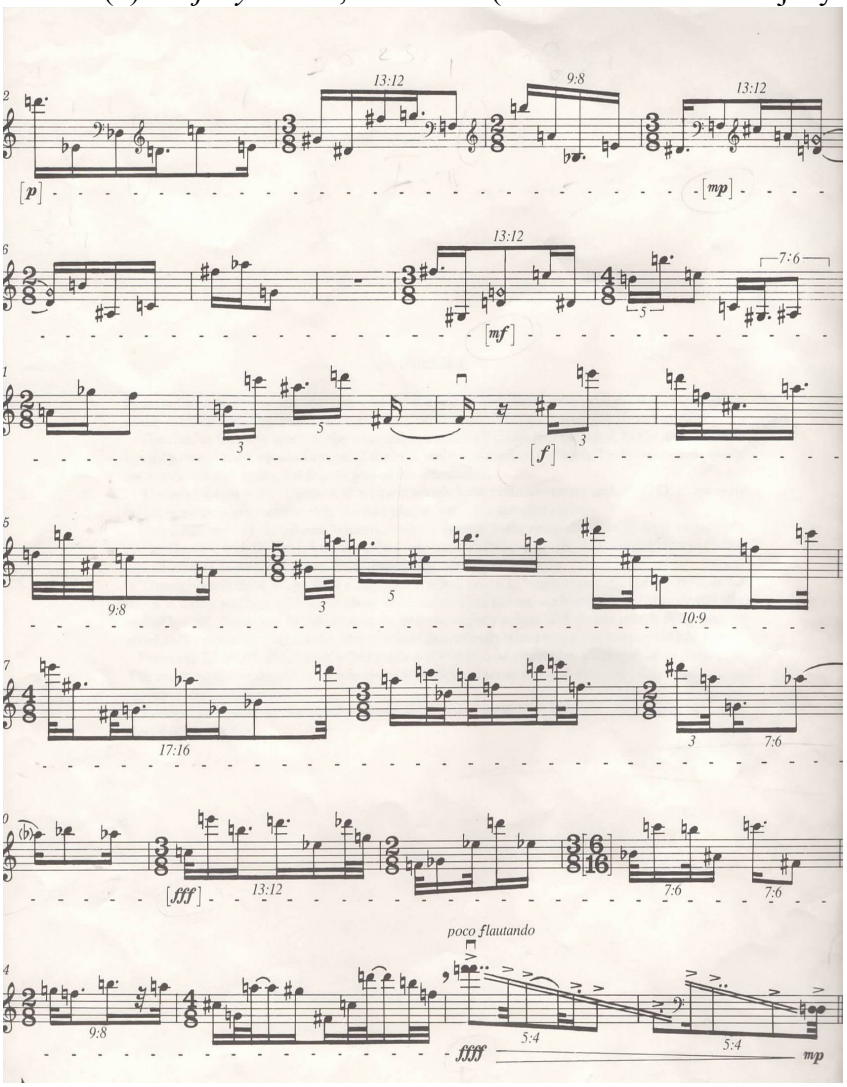
[19] Patrick Milligan, *John Coltrane: Giant Steps (Deluxe Edition),* Liner Notes, http://www.rhino.com:80/features/liners/75203lin.html, explains: 'While he was with Miles, Coltrane was tagged with the phrase "sheets of sound." Jazz critic Ira Gitler had first used it. These "sheets of sound" were multinote hailstorms of dense textures that sound like a simultaneous series of waterfalls'. Mark Myers, 'John Coltrane: Sheets Of Sound'. https://news.allaboutjazz.com/john-coltrane-sheets-of-sound.php, quotes Gitler: 'The image I had in my head when I wrote that phrase were bolts of cloth undulating as they unfurled', 19 June 2019 [Accessed 14 August 2019]. These pictorial descriptions stimulate the performer's imagination linking the 'expressive' and 'technical' elements.

Ex. 2.5 (b) *Parjanya-Vata*, bb. 32–57 (see Sound File A2Parjanya-Vata: 1′53″)



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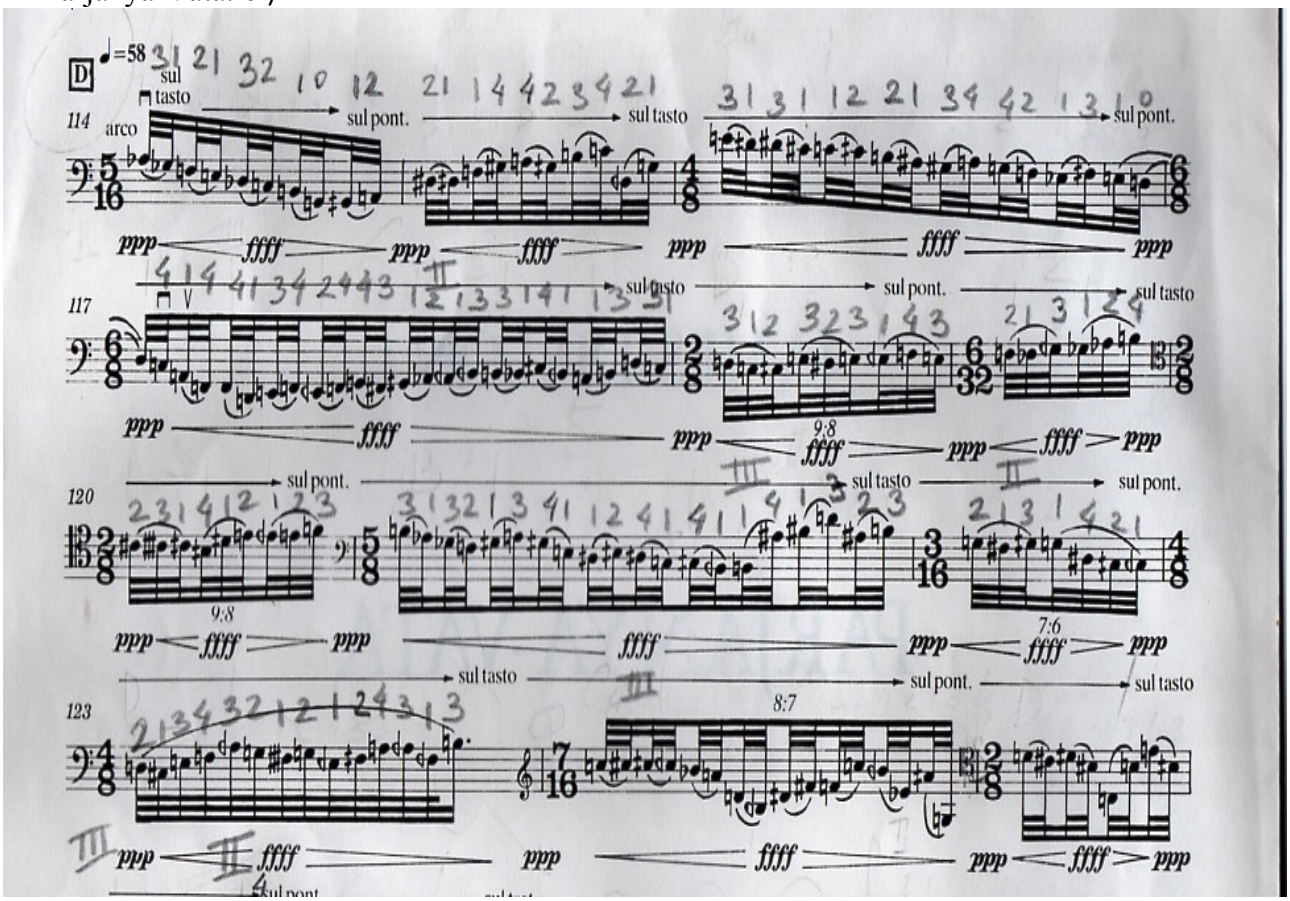
(iii) 'Hammers on' and 'pull offs':[20]

Below is an example of the blues guitar technique at the beginning of Section D (Ex. 2.6):

[20] These techniques are explained by Simon John Nelson: 'Melodic improvisation on a twelve bar blues model: an investigation of physical and historical aspects and their contribution to performance'. (PhD Thesis, City University London, 2001), pp. 198–200: 'There are a number of left hand techniques that are commonly utilised by the improvising guitarist whereby more than one tone is produced from a single right hand pluck. These are string inflections (of which there are various types), hammerons, pull-offs, and slides. [...]With a hammer-on a tone articulated by plucking the string is followed by a higher tone which is produced, by rapidly fretting the same string with a second left hand finger, but without re-articulating the string with the right hand. A pull-off is made when two left hand fingers are initially placed on a string at different frets. The string is plucked to produce the higher tone then the left hand finger is lifted off the string to produce the lower tone'. http://openaccess.city.ac.uk/7610/1/Melodic_improvisation_on_a_twelve_bar_blues_model__an_investigation_of_physical_and_historical_aspects_and_their_contribution_to_performance_-_vol1.pdf [Accessed 2 July 2019].

Ex. 2.6 *Parjanya-Vata*, bb. 114–125, with suggested fingerings (see Sound File A2Parjanya-Vata: 6′)



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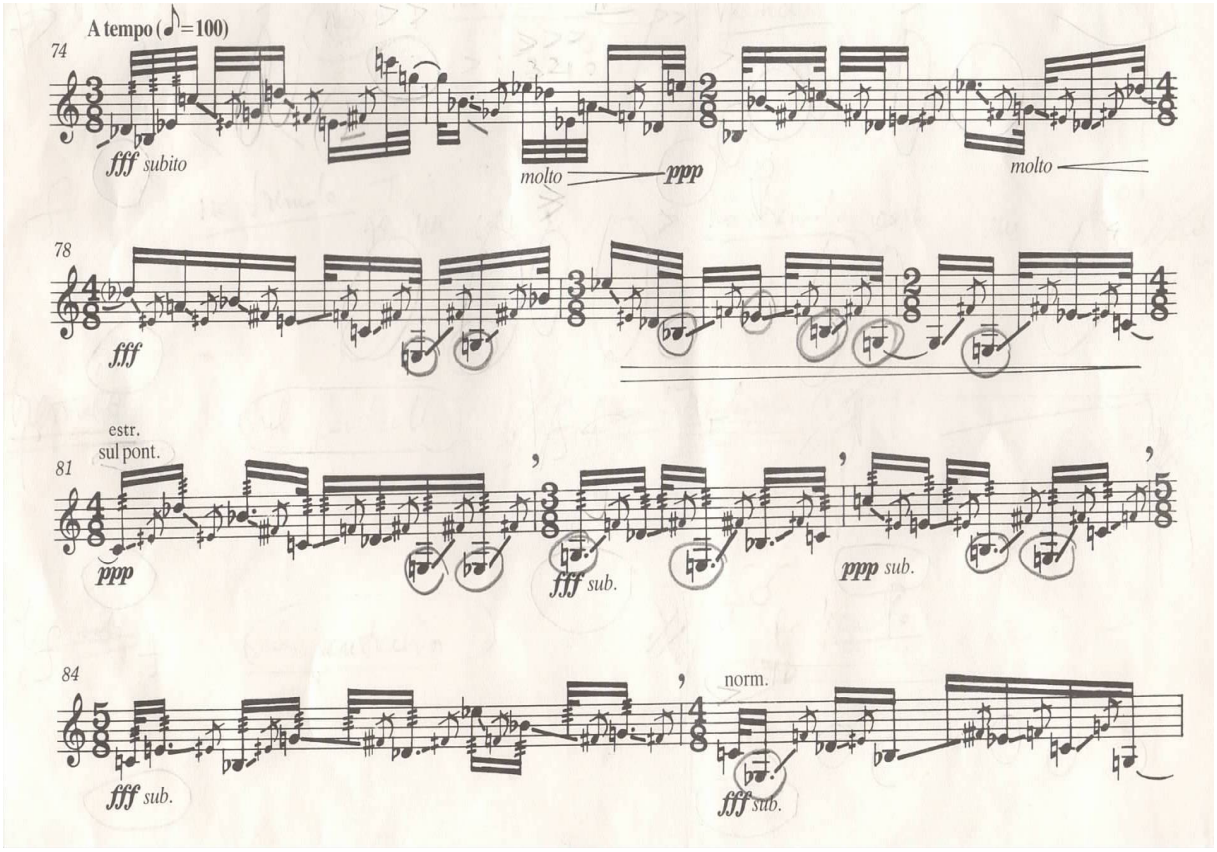
2.1.3 Indian Music

The references to a particular style of classical Indian music might be identified in Section B (Ex. 2.7, bars 74–90) in the general ‘feel’ of this part of the piece, suggesting the sound of Carnatic violin and tabla – the two instruments engaging in a dialogue unfolding within the intricate rhythm/pitches fluctuations. The tabla sonorities are transmitted by the lower register pitches, echoing the particular tabla technique of striking the note and then raising the pitch by pressing the palm into the drum skin (notably in bars 78–90), within an irregular rhythmical pattern.

Ex. 2.7 *Parjanya-Vata*, bb. 74–85 (see Sound File A2Parjanya-Vata: 3′47″)



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Carnatic style of violin playing involves a sophisticated system of expression employing a various types of ornaments including *glissandi*/-slides (*gamakas*):

> The violin's unfretted fingerboard and player's relaxed left-hand hold seem ideal for executing the various gliding wavering gamaka(s) (ornaments) which characterize Carnatic rāga [...] In particular, the three broad classes of modern South Indian gamaka – slides, deflections, and fingered stresses – correspond to the three types of left-hand movement which are intrinsic to the violin: shift, oscillation, and fingerfall.[21]

Elucidating on the subject, Gordon N. Swift quotes Shankar:

> The gamakas, or grace notes – the many different ways of sounding, embellishing, and resolving notes – are the subtle shadings of a tone, delicate nuances and inflections around a note that please and inspire the listener....The ornaments are not arbitrarily attached to a melody; rather, they seem to grow out of it. (Shankar 1968:23).[22]

[21] Gordon N. Swift, 'South Indian "Gamaka" and the Violin', *Asian Music*, 21. 2 (1990), 71–89 (p. 71).
[22] Ibid., p. 72.

The description of the left-hand technical approaches in the analysis of the South Indian violin style techniques for articulating *gamakas* – the short *glissandi*-slides in the quote above (e.g. the reference to the 'relaxed left-hand' on unfretted fingerboard for 'executing the various gliding wavering ornaments') – helps to internalise the physical movements that are needed to sustain the continuous development and tension in this part of the piece. The influences of the composer's early musical environment and interests saturate and shape *Parjanya-Vata*'s effulgent soundscape – a musical tableau that embodies Dillon's extra-musical imagery explicitly stated in the Preface to the score.

2.2 Extra-musical Issues

A brief outline of the work's extra-musical content is given on the first page of the score:

> The title, in Sanskrit, refers to the combined powers of the rain and the wind. In the ancient Vedic hymns *parjanya* is the personification of the rain, and *vatu* (or *vayu*), the wind. Their combined powers are associated with Indra, the Hindu god of the firmament. The work forms one continuous movement which divides into five sections; A, B, C, D, E. Intensity builds from section to section, like the cumulative force of a turbulent storm.[23]

The Preface suggests a particular range of expressive tools and sound colours that are required to communicate Dillon's musical drama issuing from the fantastical imagery. In the Introduction to his later work for cello *Eos* (1999) the composer also includes an extra-musical evocation – that of the mythical goddess Eos and her significance as a symbol of 'knowledge' and 'knowing'. The idea of 'awakening' and return to the innate elemental knowledge could be Dillon's source of inspiration for the composition illustrated by this myth.

The interpretative space of *Parjanya-Vata* includes both the technical aspect, and equally importantly, the associative domain created by the performer through immersion into the composer's literary and philosophical references interwoven with his/her own intuitive associations, subjective impressions and experiences. Dillon's proclivity for making references to literature and philosophy (as well as exploring a link with the sciences that is mentioned in section 2.1.1) is common to the group of

[23] James Dillon, *Parjanya-Vata* (London: Edition Peters, 1987), Preface.

composers whose music has been categorised as 'New Complexity'.[24] An example of this tendency is given by Richard Toop in his analysis of the four selected British composers of the New Complexity that includes Richard Barrett, who 'for the most part, receives his "outside impulses" from painting and particularly from literature: Flaubert, Lautrémont, but above all, Beckett, quotations from whom are to be found at the beginning and/or end of almost every score'.[25]

In the period of my preparation for performance, a study of the various musical and extra-musical influences in Dillon's compositions stimulated experimentation with technical and expressive approaches and the refining of methods for combining the capacity of imagination with the physicality of playing. Researching the literature relating to Hindu philosophy and mythology contributed to the development of my personal associative approach to *Parjanya-Vata*. The 'programme notes' supplied by Dillon for his scores often allude to the philosophical concepts behind the mythological and poetic narrative – in *Parjanya-Vata*, consideration of a wider meaning beyond the exoticism of the Indian myths and a colourful depiction of the elemental forces enriches the performer's interpretative space. The title of the composition alludes to the intricate realm of the Hindu gods – which suggests the sound-colours and rhythmical pulse generally associated with Indian music and culture – preparing the listener for a particular musical experience. Although the title may not be easily recognisable by an audience unfamiliar with the Hindu culture, its esoteric connotations add to the listener's experience.[26] For the performer, the extra-musical imagery provides a brief explication of the two Hindu deities – their attributes and action, and how their combined power is manifest as a

[24] However, Dillon resists the idea of categorisation of his music in is discussion with Toronyilalic, *Theartesdesk Q&A: Composer James Dillon*, 2010: 'Complexity for me lies in other places. It's something to do with the depth of thinking behind something. Complexity is going to have an uncontrollable element. There's going to be a certain noise in any kind of complex system. It's one of the defining features of a complex system. It's non-linear. Noise is non-linear. If you take that to another level, there is also not a one-to-one correlation between the way you think and the music that you produce. Because that's also non-linear. One goes through a labyrinthine process to create it'.

[25] Richard Toop, 'Four Facets of the New Complexity', p. 7.

[26] Jerrold Levinson, 'Titles', *The Journal of Aesthetics and Art Criticism,* 44.1 (1985), 29–39, (p.29), asserts: 'What a work of art is titled [...] has a significant effect on the aesthetic face it presents and on the qualities we correctly perceive in it'. In his analysis of *paratext*, James Hepokoski, 'Program music', in *Aesthetics of Music: Musicological Perspectives*, ed. by Stephen Downes (New York and London: Routledge, 2014), pp. 62–83 (p. 67), quotes Levinson: 'Title of artworks are often *integral parts* of them, constitutive of what such works are...[They] are plausibly *essential properties* of them, in many cases...The *title slot* for a work of art is never devoid of *aesthetic potential*; *how* it is filled, or that is *not* filled, is always aesthetically relevant. (A work differently titled will invariably be aesthetically different.)...[Titles] serve as presumptive guides to perception of certain sort'.

ferocious storm. Dillon mentions the Vedic hymns without quoting from these philosophical/religious texts, setting up the frame for the performer to initiate his/her research into the 'other' world. Dillon supplies a number of his important compositions with quotations from philosophical sources, poems and utterances. For example, in the score of the vocal trilogy consisting of the songs *Who do you love* (1980) and *A Roaring Flame* (1981–1982), Dillon offers a short poem by Nietzsche, a verse by Derrida, and a poem by Kierkegaard for *Come live with me* (1981).[27] In the Preface to the score of *A Roaring Flame*, Dillon comments on the compositional concepts developed in *Parjanya-Vata* (completed in the same period) as well as pointing to the common theme of the Triptych, asserting that 'each of these love songs are an invocation where the portents of power and violence, inherent in all relationships, infuse the surface':

> The work is organised according to principles derived from my works *Spleen* and *Parjanya-Vata*, pitch being directly generated via 'sieves' into grids, and statistically distributed/directed within restricted parameters [...]. The common theme is the quest for unity, as symbolized through a 'conjugal knot', each work being a stage or level in the process: love = marriage = death.[28]

In *Parjanya-Vata*, the composer explores the 'power and violence' in the 'marriage' of the elemental forces embodied by the awe-inspiring gods – the chimerical entities that infuse the cosmic existence interwoven with life and death in the human realm. The ancient Indian text *The Vedas*, the composer's source of inspiration, represents a complex body of sacred texts that pertains to the multitudes of Hindu gods and their relationships between themselves and the humans:

> The real wind gods of the Rigveda are Vāyu and Vāta, who differ however quite distinctly in character and in importance. [...] The former is the more anthropomorphized of the two gods; hence he is joined with Indra, while Vāta is associated with Parjanya, who in comparison with Indra is elemental deity. [...] Vāyu is beautiful, touching the sky, thousand-eyed [...] Vāta is merely the wind in its power, sweeping along great clouds of dust, shattering and thundering: his form cannot be seen by the mortal eye, though his roaring is heard, nor is the place of his birth known. [...] Vāta is said to produce ruddy lights and to make the dawns to shine.

[27] Another example is the cycle *Nine Rivers* (1985–1996), in which the movements are connected by the quotations from *Le Bateau Ivre* by Arthur Rimbaud.
[28] *A Roaring Flame* (London: Edition Peters), Preface.

> His roaring is often alluded to, and he is credited with healing power, doubtless from the purifying effect of his blasts.[29]

Meera Baindur elucidates the Hindu cosmogony and the complex relationships within the 'web of creation':

> One of the dominating influences on Indian thought has been the body of the literature known as the Vedas, and subsidiary texts called the purāṇas. These texts are based on a complex understanding of the cosmos and its structure. They construct a story of a universe in which human beings occupy a place within the web of creation and are not separate from it. [...] One could say that that it is possible to look at nature as a vision of an interconnected "cosmos" in the Vedas. [...] It is interesting to note that these metaphysical and experiential components, like the nature gods in the Vedas are amorphous, lending themselves to multi-level interpretation.[30]

From this perspective, the playful deities depicted in *Parjanya-Vata* are the part of the ubiquitous universal grid of the space and time, outside the temporality of human existence. The span of the mythical gods' imagined space of action is beyond human range – this image of the wildly oscillating elemental forces between the macro and micro dimensions of sound translates into the movements of the left hand 'leaping' across the fingerboard to the opposite extremes of the registers, contrasting with the microtonal alterations within and between the pitches. Thinking in terms of an enlarged 'territory' of sound – in the dynamic and pitch spectra – helps to internalise and normalise the 'enlarged' technical approaches.[31]

The Vedic deities Parjanya and Vatu (rain and wind) are uncontrollable forces of nature that are destructive and creative at the same time: life giving (breath and moisture) and life destroying, inspiring fear and devotion. The composition does not simply illustrate the deities' spectacular manifestations, but expresses the power of the universal drama of the continuing cycle of all existence. An awareness of the mythological context of the composition will animate the performer's expressive tools and physical gestures: for example, differentiation between the sound-colours for depiction of rain (Parjanya) and (air/wind) Vatu, and between the anthropomorphised

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[29] Arthur Berriedale Keith, *The Religion and Philosophy of the Veda and Upanishads* (Delhi: Motilal Banarsidass Publishers Pvt. Ltd., 1989), pp.139–140.

[30] Meera Baindur, *Nature in Indian Philosophy and Cultural Traditions*, Sophia Studies in Cross-cultural Philosophy of Traditions and Cultures 12 (New Delhi: Springer 2015), p. 139 [Accessed 12 March 2019].

[31] I will discuss the technical aspects of 'leaping' left-hand movements and rapid shifts, as one of the unique and most challenging technical problems of the composition, in Part 2.5 'Extended and Extreme Techniques'.

element (Vayu), and the primitive element ('sweeping along clods and dust' – Vata), will be communicated through the overall shape, tonal richness and intensity of live performance. The structure's horizontal plane is the forward motion of the five consecutive sections that increase in power 'like the cumulative force of a turbulent storm'; to sustain this flow, the focus on each vertical moment-event must be held and balanced within the large frame of the horizontal programmatic development of the piece. From the technical perspective, the depiction of a relentless escalation of the elemental powers requires a broad tonal range and precision in the bow strokes for articulating the extremes of dynamics – from silences and almost imperceptible 'breaths' of the awakening deities to the apogee of their wild dance expressed by the whirlwind of 'leaps', irregular rhythmical patterns and percussive timbres. The dichotomy between the 'uncontrollable' primordial energies and a carefully balanced and controlled technical apparatus required for the realisation of the work proves to be one of the performative difficulties of *Parjanya-Vata*.

The five-fold structure (A-B-C-D-E) might be interpreted as a reference to the mystical symbolism of the number 5 in the Vedic tradition, i.e. the concept of a 'five-staged journey of the self after death':

> On leaving this world, the selves [...] consisting of food, breath, thought, knowledge, and bliss are attained in succession. [...] In another important upanisad, [...] declares 'this sacrifice is fivefold [...], the sacrificial animal is fivefold, a person [...] is fivefold, all this world, whatever there is, is fivefold. He who knows this, attains this.' And Aitareya- upanisad [...] defines the *atman* not only as Brahma, Prajapati, Indra, and all the gods, but also as the five great elements- earth, air, space (*akasa*), water, and light.[32]

David Knipe elaborates on the significance of the number five in the ancient teaching of the Vedas:

> Centuries earlier the brahmanas had made statements concerning the 'fivefold' [...] nature of man [...], his cosmic correspondences [...] with the pentadic winds (*vata*-), vital breaths (*prana*-), regions or directions (*dis*-), seasons (*rtu*-), the sacrifice (*yajna*), meters or syllables (e.g., the painkti meter), etc., on to the very five layers (dhatu-) or forms (*rupa*-) of the cosmos itself. [33]

[32] David M. Knipe, 'One Fire, Three Fires, Five Fires: Vedic Symbols in Transition.' *History of Religions*, 12. 1 (1972), 28–41(p.29).
[33] Ibid., p. 30.

Viewed as a starting point, rather than a programmatic device, the Preface activates the cellist's imagination and the impetus for developing distinctive approaches to performance. For example, as a part of the composition's associative domain, the symbolism of the number Five can be explored by employing the imaginary allusion to the five elements –'earth, air, space, water and light' – to refine the sound palette, the technical execution of each section of the work and physical gestures. M.G. Prasad and B. Rajavel note that 'the commonly referred five basic elements in Vedic literature namely space, air, fire, water and earth are related to corresponding senses of perception' presenting the table of 'the subtle to gross order of correspondence'.[34]

Table 2.1 M.G. Prasad and B. Rajavel: the five basic elements in Vedic literature

Space	Sound
Air	Touch and Sound
Fire	Form, Touch and Sound
Water	Taste, Form, Touch and Sound
Earth	Smell, Taste, Form, Touch and Sound

The many senses involved in the associative space of *Parjanya-Vata* foment an impression and, to some extent, experience akin to synaesthesia. Considering Dillon's tendency for employing literary and philosophical sources in developing his musical ideas, the interpretation of his works might be enriched by looking into the expressive domain of poetry where a synaesthetic element is often vividly present. June E. Downey discusses this subject in relation to some French and English poets – Rimbaud, Poe, William Blake and Shelley, among others:

> Shelley's synesthetic fragments, with a few exceptions, are exceedingly pleasant. The French exponents of literary synesthesia are fond of quoting a celebrated passage from Shelley as evidence of the translation in his mind of music into odor. It reads, ". . .music so delicate, soft, and intense, It was felt like an odor within the sense." And in another place he sings, " Thine old wild songs which in the air/ Like homeless odours floated". Not only is music translated into language, but also, in turn,

[34] M.G. Prasad and B. Rajavel, 'Acoustical Studies of Worship Spaces in Hindu Temple', *Vedic Traditions for Education and Learning*, in Proceedings of WAVES 2018, the 13th International Conference of the World Association for Vedic Studies, Dallas, Texas, USA, 2–5 August 2018, p. 3, http://www.globindian.com/WAVES2018/Papers/WAVES2018Paper23.pdf [Accessed 6 January 2019].

> described in visual terms. Thus the odors that lie visibly above the flowers suggest the vision of tiny clouds that carry the perfumed incense of flower and forest.[35]

In his conversation with Toop, Dillon seems to refer to a synaesthetic quality in his compositional process: 'And this notion of a piece I'm talking about: I feel it in every part of my body. I taste it, I have a kind of tactile feeling of it'.[36] The senses of touch and hearing can be linked to the tactility of polychrome *glissandi*, textural density/sparsity attained by of the bow pressure – *sul ponticello*, *sul tasto*, *normale* – enhanced by extreme dynamic fluctuations. Exploring this intimate correlation of the composer's extra-musical images to the sensorium – the spatial awareness (the 'expanses' of the fingerboard) and the particular (extended) techniques, proves to be a rewarding method of working on the piece.

Table 2.2 *Parjanya-Vata*, some types of subjective correlations

Space	sounds of 'bells', movement of timbres and sounds	*Pizzicati*, harmonics, *sul tasto*
Air	'wind/storm', 'breeze/breath'	*Glissandi*
Fire	dynamic and rhythmical intensity	Dense textures, abrupt changes of registers
Water	'raindrops', various stages of rainfall	*Pizzicati*, *glissandi*
Earth	'solid' objects, noises	*Battuto*, percussive strokes/*pizzicati*, *sul ponticello*

One of the characteristics of Dillon's music is his frequent reference to the sound of bells – a sound commonly associated with mysterious places and rituals.[37] Prasad and Rajavel affirm the significance of the sound generally and the bells as an important part of the Hindu religious ritual:

> Sound plays a very important role in Hindu worship spaces. [...] The Vedic chants and prayers are recited and the sacred instruments such as shankhas, ghantas, and

[35] June E. Downey, 'Literary Synesthesia', *The Journal of Philosophy, Psychology and Scientific Methods*, 9.18 (1912), 490–498 (p. 496).
[36] Toop, 'Four Facets of the New Complexity', p. 40.
[37] Michael Cherlin, 'Ritual and Eros in James Dillon's *Come live with me'*, in *Transformations of Musical Modernism* (Cambridge: Cambridge University Press, 2015), pp. 119–144 (p. 121), highlights this aspect in Dillon's compositions for solo piano the *Book of Elements*, and the cycle *Nine Rivers* for mixed ensemble, noting that ' the bell tones are also fundamental to the acoustical and ritualistic properties of *Come live with me*'. Cherlin observes that Dillon was raised in Catholic faith and in his youth served as an altar boy, and 'a fascination with the sounds and structures of ritual, together with a deeper sense of the unfathomable expanse and mystery of the cosmos and of being human within it, remain fundamental to his musical imagination [...] Bell tones have remained an important part of his musical imagination ever since'.

> jaagatas are played in these chambers. The sounds from these acoustically well designed instruments are used during worship. These sacred sounds help devotees in their concentration during worship.[38] .

In the introduction to the piece, Dillon employs expressions for indicating the scope of the tonal colours that he wishes to evoke in *Parjanya-Vata*: 'distant and alluring', 'extremely quiet', 'extremely loud', 'slightly vulgar', 'some strange primitive instrument'. It is evident that the extra-musical aspect of the piece must be an important part in the performer's involvement with the work; the composer's comments and instructions in the score are intended to guide towards a fuller understanding and realisation of the expressive range and the intensity of performance that he wishes to elicit from the cellist.

2.3 Dillon's Views on Performance

Investigation of the composer's outlook on performance (in general, and in respect of a particular work) constitutes a part of the interpretative space and has the capacity to influence the expressive and technical approaches. In Chapter 1, I considered Xenakis's attitude to performing his music that is centred on the performer's artistic position in his/her approach to his compositions, which, at the time, presented an array of extreme challenges. For Xenakis, the technical (physical) complexities might be transcended and the 'unplayability' of a piece can be resolved through the power and energies of 'intent' and the attitude of 'striving' – this spirit will be transmitted to the listener. Dillon's attitude to performance (expressed mostly in his interviews) is chiefly concerned with the classical music performer being able to connect to the essence of (his) works through broadening their outlook on performance styles in classical and non-classical genres, as a search for the authentic artistic presence – the quality that he describes as 'intensity' and 'engagement'.[39] Dillon's background in non-classical music and his many interests in various subjects (esoteric writing, philosophy, mystical poetry and alchemy) partly determine the way in which he perceives classically trained performers' limitations of expression:

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[38] Prasad and Rajavel, 'Acoustical Studies of Worship Spaces in Hindu Temple', p. 1. The bell instruments mentioned in the article are: shankha – a conch-shell, ghanta – a ritual bell.

[39] Dillon's expectation from the performer of his music is encapsulated in his statement: 'I was looking for an endless intensity'. Toronyilalic, *Theartsdesk Q&A: Composer James Dillon*, 2010.

> I was fascinated by the act of performance as a visual spectacle in itself.
> Not in the sense of the camp, heavy-metal spectacle, wiggling your bum in the air and all that. In the sense of the intensity of a situation. I've felt a lot of contemporary performances have lacked a certain real tension in the air.[40]

Dillon questions the notion of accessibility of contemporary classical music, emphasising the performer's active role in every aspect of creating a convincing interpretation, and in the act of performance itself. Authenticity in this case refers to the result of an ongoing process of developing a relationship with the work through the analytical, technical and intuitive channels investigating the interpretative space as an indirect collaboration with the composer. Dillon values authenticity, an intimate affinity with the 'root' of the composition and the visceral intensity in live performance, in all music genres. In the composer's view, this quality transcends the nature of contemporary classical and the 'naive', direct expression in folk, rock and world musics:

> Most of my family are from Scotland and that's why I defy to accept this notion of what's accessible or not. For them it's as strange a world as listening to Mongolian music or the music of the bushmen of Kalahari. But they sense when something's authentic. They sense when there's an authenticity about the performance itself. There's an intensity. There's an engagement. Even if they don't understand the language, they like the noise it makes.[41]

Exploring non-classical expression indirectly influences the performer's interpretive approach to Dillon's compositions by introducing an additional reference to his/her individual performance style. Alexander elaborates on Dillon's attitude to performance in this respect, quoting the composer:

> Contrasting with many of his conservatory-trained contemporaries Dillon's exposure to informal music-making brought together his rationale for and fascination with the manipulation of sound through process in an environment of ongoing performance: shrill searing noise, the happenstance of bold rhythmic and melodic folk heterophony, shaman-like intoxication and ecstasy. Not surprisingly Jimi Hendrix is referred to, perhaps more surprisingly alongside such classical interpreters as Arthur Schnabel, Glenn Gould and Ali Akbar Khan: 'all of them iconoclasts, have developed a vertiginous quality in their playing, which somehow emerges from "critical" readings constructed from *within* a tradition – what is always in question is their "relation between belonging and breaking out" – a conflation of contradictory factors.'[42]

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[40] Ibid.
[41] Ibid.
[42] Michael J. Alexander, 'The changing states of James Dillon', *Contemporary Music Review*, 66–67.

The notion of 'critical' reading pertains to the sense of continuity that transcends the dichotomy of the notions of technique and expression, extended and traditional techniques, 'historical' and contemporary styles, innovation and tradition. Ali Akbar Khan, a sitar virtuoso, for example, represents this integrated creative practice; as noted by Farrell:

> Indian classical music is one of the most individual musical arts...but simultaneously, this individualism is contained and bounded by the sense of the musician's wider relationship to a tradition greater and far more enduring than any individual player's contribution. [...] it is a complicated, even troubled relationship, where innovation and tradition sometimes co-exist in a distinctly uneasy balance.[43]

This state of being on 'edge', seeking an 'uneasy balance' within a conflation of the tradition (roots) and innovation (individualistic 'wandering') is a distinctive feature in Dillon's music. In relation to Glenn Gould, a performer regarded highly by Dillon, Edward Said observes the pianist's predisposition to 'overstepping boundaries', to free himself from 'confining restraints, thereby [...] *confirming* the performance space itself'.[44] Said recalls listening to Gould's performances and being struck 'by how Gould could apparently disappear as a performer into the work's long complications, thereby providing an instance of the *ecstasy* he characterized as the state of standing outside time and within an integral artistic structure.'[45] Perhaps Dillon, a composer known for his interdisciplinary background and approach to composition, values Gould's references to the broad cultural phenomena in his interpretation and performance, perceiving 'intellectual virtuosity' as an ideal quality for the performer of his music.

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[43] Gerry Farrell, 'The Senia Style of Sitar Playing in Contemporary India', *British Journal of Ethnomusicology*, 11. 2 (2002), 29–60 [Accessed 2 April 2018].

[44] Said also dedicates a chapter to Gould 'The Virtuoso as Intellectual' in his book *On Late Style* (London: Bloomsbury, 2006), as well as commenting on Gould's playing, interpretation, technique and ideological position in *The World, the Text, and the Critic* (Cambridge, Massachusetts: Harvard University Press, 1984), pp. 31–33. See also *Music at the Limits* (London: Bloomsbury, 2009), '*Reflections on Exile: And Other Literary and Cultural Essays* (London: Granta Books, 2012), pp. 216–229.

[45] Edward Said, *Musical Elaborations*, p. 31. For in-depth analysis of Gould's performance philosophy and practice see: Tim Page (ed.) *The Glenn Gould Reader* (New York: Knopf, 1984); Friedrich Otto, *Glenn Gould: A Life and Variations* (London: Lime Tree, 1990); Peter F. Ostwald, *Glenn Gould: The Ecstasy and Tragedy of Genius*, (New York: W.W. Norton & Company, 1998); Kevin Bazzana, *Glenn Gould: The Performer in the Work, A Study in Performance Practice* (Oxford: Clarendon Press, 1997).

2.4 Sound and Structure

Parjanya-Vata is composed for cello solo without the use of any special adjustments for broadening the range of its registers, e.g. *scordatura* or a pre-record. In contrast to my experience of performing *Nomos alpha* on electric cello as one of the possible solutions for the practical problem of de-tuning and as a way of exploration of a distinctive sound space offered by the electric cello, performing *Parjanya-Vata* on a non-acoustic instrument did not result in a convincing realisation. The sound in Dillon's composition relates to the 'organic' textures, 'grainy' tone, the traces of unevenness and unpredictability in the response of the strings to the bow – as a part of its expressive space and in a sense of the direct source of the sound; the unmediated connection between the sound and the performer's actions, which are visible, is an important feature in live performance. Discussing the chamber work *Come live with me*, Cherlin observes the particular characteristic of Dillon's approach to sound:

> While found-object-as-musical-instrument is unique to this work in Dillon's catalogue, the idea of defining sound in a more encompassing sense than is suggested by conventional notions of pitch and timbre is another fundamental and pervasive element of Dillon's music. The 'grain of sound', the rosined bow scraping against the strings, the interaction of breath, oral cavity and musical wind instrument and sound as complex spectrum rather than fundamental frequency, is basic to James Dillon's way of thinking about music.[46]

Dillon uses the cello as a direct source of a complex tonal spectrum, 'a found object' that produces vibrations – in this regard, performance on the electric cello with an exterior source of sound, neutralises this organic connection.

Listening to *Come live with me*[47] (one of Dillon's vocal compositions of the same period) invigorated my instrumental approach to the extended techniques and sound in *Parjanya-Vata*. As Cherlin notes, *Come live with me* relays an ecstatic state where the sexual and spiritual aspects are unified, 'bringing a concept of Eros that interconnects carnal with supernal.'[48] He also discerns the contrast between the voice that 'although nearly overwhelmed, holds firmly against the world's hubbub', and the

[46] Michael Cherlin, 'Ritual and Eros in James Dillon's *Come live with me*', p.122.
[47] *Come live with me* (text from the Song of Solomon), 1981, for female voice, flute (piccolo, alto-flute), oboe (oboe d'amore, English horn), percussion and piano. According to Cherlin, ibid., 'The ritualistic aspect of the work, bell ringing in combination with other aspects of formal design, vie for pre-eminence with the work's other most salient aspect, that is, Eros'. This is the second piece in the triptych that explores Eros; the other two are: *Who do you love*, 1980, for female voice, flute (piccolo, bass flute), clarinet, violin (viola), cello, percussion and *A Roaring Flame*, (texts by Alexander Carmichael, Clara d'Anduza) 1982, for female voice and double bass.
[48] Ibid., p.132.

'nearly chaotic activity' in the instrumental sounds.[49] The way the tension between the *organised* and *chaotic* is expressed in this chamber composition, stimulates my understanding of *Parjanya-Vata*'s textural layering where the forward direction of development within a 'chaos' of the living world – a process of 'birth' and formation of the natural phenomena of wind and rain personified by the Hindu deities – leads inexorably to a 'turbulent storm'.[50] This process is communicated by establishing the forward motion throughout the five consecutive sections of the piece – the flow unperturbed by the physicality of the techniques – with sustaining attention to their tonal characteristics and articulation. The use of sound colours in *Come live with me* (produced by the combined forces of voice with the array of instruments) brought into focus the question of how the expressive potential of the various extended techniques in *Pajanya-Vata* might be developed and employed to create the intensely rich soundscape through the medium of solo cello.

The second part of the Preface clarifies the structural development and the transitional junctures between its sections, as well as giving directions to expression and technique. The work consists of five sections that flow forward in one movement, each part growing in intensity:

> Bars 20–22 and 110–113 (glissando harmonics) are 'inserts' to the main structure, linking respectively A with B and C with D. These bars should be approached freely, *molto rubato*, and should sound distant and alluring. The tempo indications at these points are approximate. Throughout B there is one long crescendo; it is important to begin extremely quietly (so the music is barely audible), and not to allow the dynamic level to increase too quickly. At the climax (the end of bar 55), the sound should be extremely loud, slightly vulgar, and should match the quality of attack in the descending glissando, which follows dramatically after a very short but perceptible pause. From bar 211 to 215, a 'grinding' effect (*molto premuto*) is to be attained by playing close to the bridge. The resultant sound should be rich in overtones, giving a sense of tonal instability, like some strange primitive stringed instruments.'Gradual transition' (between *sul ponticello*, *sul tasto* and *normale*) is indicated throughout by arrows placed as appropriate.[51]

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[49] Ibid., p.133.

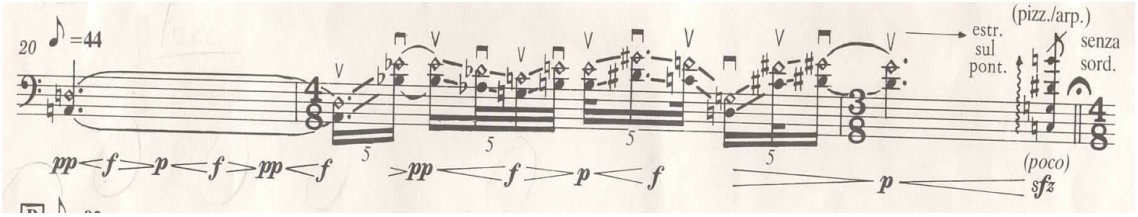
[50] In his discussion on the notion of systematic and disruptive in German and French poetry, Dillon offers an image of a flower as a metaphor of the state in between stability and process: 'It's rather like seeing one of those slow-motion films of flowers opening, where you become incredibly aware that the flower is not about 'this' or 'that', but something in between: it's this kind of moment where things are in between 'order' and disorder'. Toop, 'Four Facets of the New Complexity', 41.

[51] *Parjanya-Vata*, Preface.

To create a sense of forward flow, the performer needs to have an awareness of the direction in each section, building the tension unceasingly toward the ending, even though each part has its own climatic instance. For example, the gradual dynamic upsurge in Section B is concluded by its highest point in bars 55–57 – the dramatic 'perceptible' pause intensifies the effect of the 'screaming' downward glissando; in my performance I also amplify this junction with a brief pause (see my recording at 2′58″) before the Toccata-like Section C that follows, which is structured in three parts. The culmination of this section ensues in the middle 'Gamaka' part (bars 74-90), where the increasingly restless 'air' element (Vata) is encircled by the 'dancing' 'earth' and 'fire' elements in parts 1 and 3 (bars 58–74 and bars 91–109).

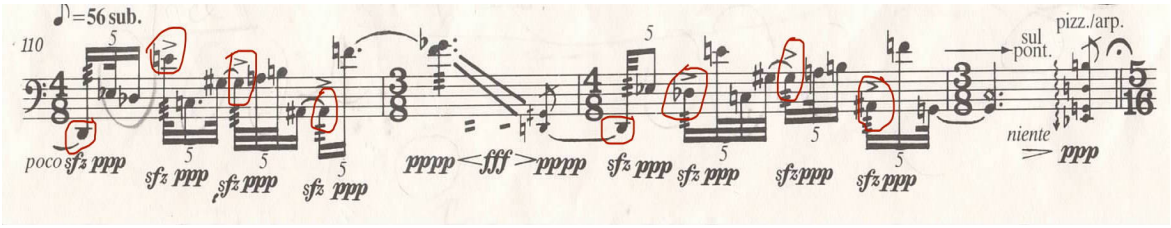
The transitions, or 'inserts' that link sections A and B and C (Ex. 2.8, bars 20–22) and D (Ex. 2.9, bars 110–113) function as short interludes – moments of repose and 'hesitation' before the next stage of the capricious interplay of the primal forces.

Ex. 2.8 *Parjanya-Vata*, bb. 20–22 (see Sound File A2Parjanya-Vata: 1′26″)



James Dillon: *Parjanya-Vata*, Edition Peters No. 7247 © 1982 by Peters Edition Limited, London. Reproduced by permission.

Ex. 2.9 *Parjanya-Vata*, bb. 110–113 (see Sound File A2Parjanya-Vata: 5′11″)

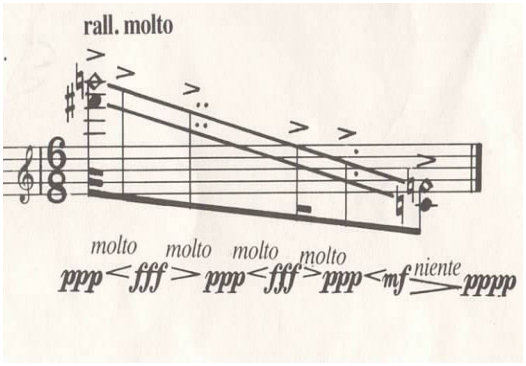


James Dillon: *Parjanya-Vata*, Edition Peters No. 7247 © 1982 by Peters Edition Limited, London. Reproduced by permission.

The second interlude consists of the two short 'phrases' (rhythmical variations of the same motif (bar 110 and bars 112–113) connected by the inner 'interlude' (bar 111 – a 'swelling' *glissando* tremolo). The *sforzandi tremolo* notes (marked in red) shape the contours of the section punctuating the 'eerie' ambience of the insert that might be perceived as a fragmented version of the first link's 'enticing' *glissando* line (Ex. 2.8). In the first transition highlighted by Dillon (bars 20–23), the sensual *glissando*

line (described by the composer as ‘alluring’) depicts the appearance of the entity formed from within the ‘air’ and ‘water’ elements and the beginning of the unfoldment of their powers, corresponding to the ‘jagged’ harmonic *glissando* at the end of the piece (Ex. 2.10) – the uncanny moment of the elementals evanescing into the nothingness (*pppp*) as if folded back into cosmic existence.

Ex. 2.10 *Parjanya-Vata*, b. 247



James Dillon: *Parjanya-Vata*, Edition Peters No. 7247 © 1982 by Peters Edition Limited, London. Reproduced by permission.

In addition to the comments by the composer in the Preface, transitional intersections occur in various moments of development: bars 56–57 (B), bar 69 (C), bars 132, 143 and 193–194 (D). In my experience of working on the piece, this imagery and other subjective associations expanded my instrumental approaches by releasing the additional technical resources and shaping and invigorating the composition’s interpretative space.

2.5 Extended and Extreme Techniques

In Dillon’s composition the sonorities and some modifications of these techniques are featured to depict and intensify the composer’s extra-musical frame. The technical elements employed in *Parjanya-Vata* that pertain to the expressive content of the work encompass:

1. Changing registers – often at a fast rate within a rhythmical unit.
2. *Glissandi* – a variety of textures, pulses and speeds
3. Dynamics – extreme range combined with a fast rate of register changes and other elements.

4. Microtones – combined with extreme rate of register changes and other elements.
5. *Pizzicati* – a subtle variety of timbres within the *piano* dynamics range.
6. Extremely fast rate of changes between *sul tasto*, *normale*, *sul ponticello*.

Table 2.3 *Parjanya-Vata*, main techniques in each section

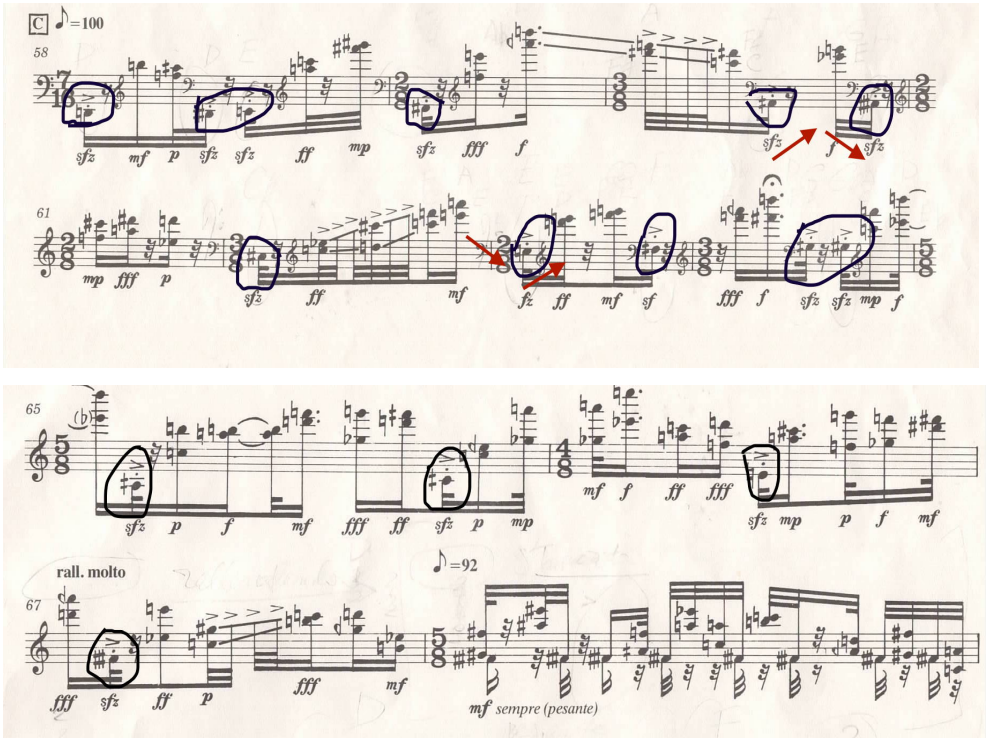
Sections	Bars in total	Main techniques
A	22 (1–22)	*Pizzicato*, extreme dynamics (within the *piano* range)
B	34 (23–57)	Changing registers
C	55 (58–113)	Changing registers combined with extreme dynamics and *glissandi*
D	49 (114–163)	Microtones combined with extreme dynamics and the rate of changing bow pressure
E	82 (165–247)	Combination of all techniques

I will examine some of these main techniques that are notable features of the composition.

2.5.1 Changing Registers

The rapid change of the registers is one of the most challenging technical issues in *Parjanya-Vata*. It involves large 'leaps' across the fingerboard frequently combined with other techniques – extreme dynamic changes, double stops, artificial harmonics, and rhythmical patterns – at an alacritous fast rate. The oscillations of registers occur within a group of notes and, in several instances, as a rapid shift upwards for just one or two notes in the pattern (as in bars 60, 63 and 104-105 marked by the red arrows). These can be mentally condensed within the short patterns or assembled into longer phrases connected by the *glissandi* or played with the *staccato* bowings (Exx. 2.11 and 2.13).

Ex. 2.11 *Parjanya-Vata*, bb. 58–67 (see Sound File A2Parjanya-Vata: 2′59″)



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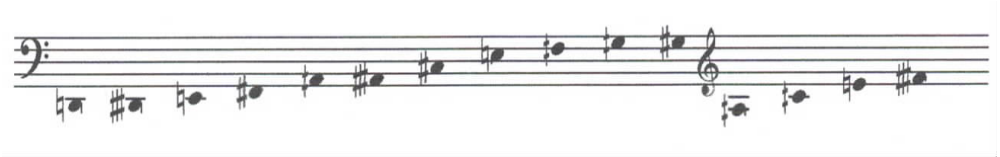
To practise this difficult section, I divide the sequences into two layers:

1. Scalic sequences moving upwards/downwards in the low register (Exx. 2.12 and 2.14).
2. Dynamically and rhythmically irregular patterns in double stops in the high register and the *saltando* bowings in the low register.

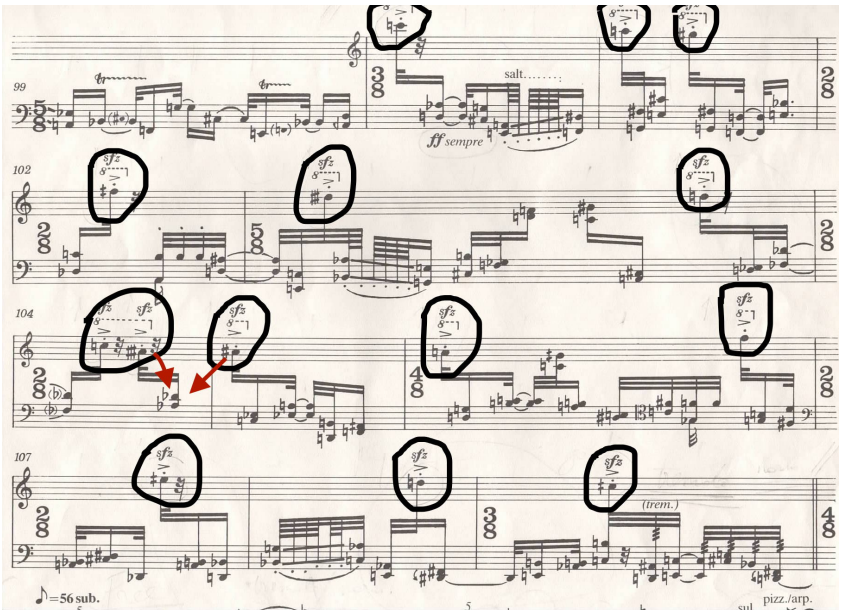
Mental clarity of this contrapuntal progression embedded into the dense textures triggers the intuitive muscle adaptation to attain the appropriately economic movements in the left hand's wide shifts across the fingerboard. Diverting focus from the 'geographical' distances between pitches to the development of the two layers expands the field of attention (that encompasses both listening and physical action) to realise the effect of the two lines moving independently. The microtonal sequence in the lower line approached as the foundation for the upper construction (Ex. 2.12), delineates the base for the 'geographical' coherence, mentally unifying seemingly fragmented textures.

Ex. 2.12 The upward progression, bb. 58–67



In part three of Section C (bars 100–109) the spaces generated by a *saltando* bow stroke in the lower layer can be utilised for momentary release in both hands (Ex. 2.13). In this part, the 'leaping' textures mirror part 1 in reverse, with the descending scale (Ex. 2.14).

Ex. 2.13 *Parjanya-Vata*, bb. 100–109 (see Sound File A2Parjanya-Vata: 4′46″)



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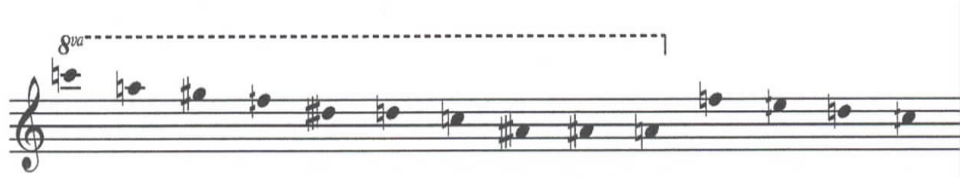
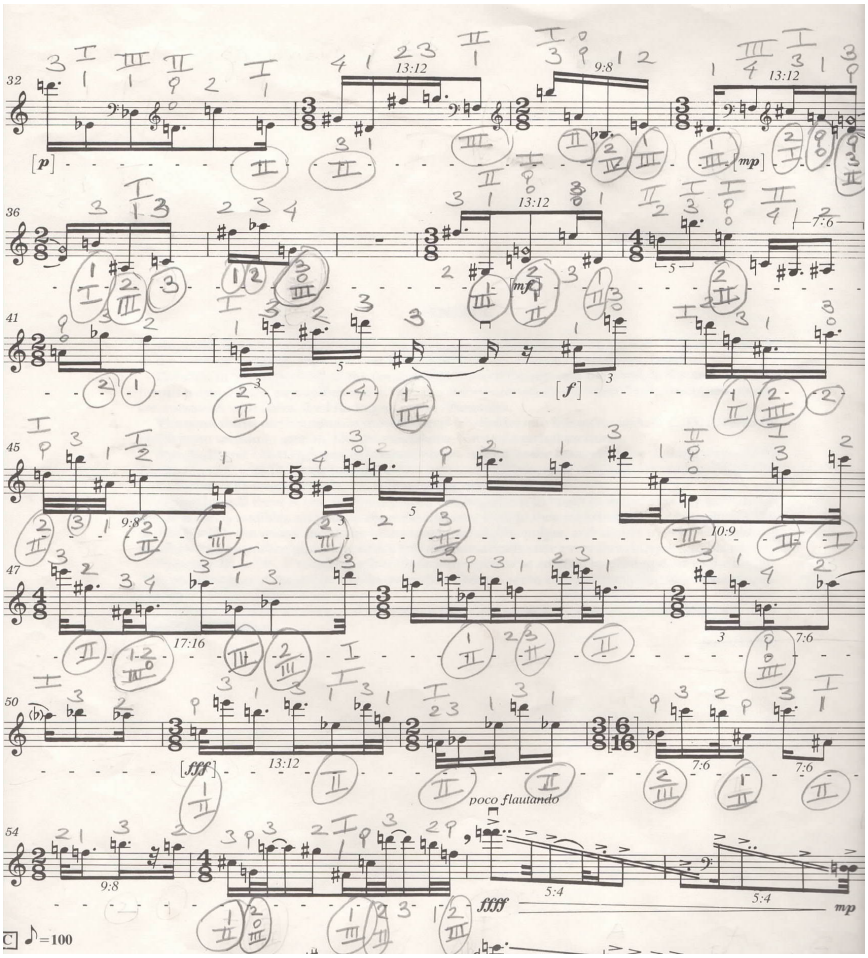
Ex. 2.14 The downward progression, bb. 100–109



To execute the 'leaps' in widely spaced registers, I experimented with the range of creative solutions for fingerings and bow placements, using the parallel positions to 'anchor' the left hand, and if that is not practical, finding the most stable position on the fingerboard in preparation for the long shifts (See Ex. 2.15). The choice of fingerings is determined by the artistic decision regarding the colour and timbral

qualities of the slowly unfolding material (in bars 32–57) that could be played either ‘vertically’ (mostly on the A string) or ‘horizontally’ (using thumb positions on the D, G and C strings). The first version involves rapid shifts along the A string, which establishes the spatial parameters delineated by the irregularly placed intervals with the uniform tonal colour. The visual effect of this rapid motion of the left hand will visually transmit the span and ferocity of the soundscape depicting the elemental forces. In both versions, the use of *vibrato* should be carefully considered. Although Dillon does not indicate preference for non-*vibrato*, the ‘pure’, non-vocal sound quality can be employed to express the interplay of non-human entities – for this end, the *vibrato* should be used sparingly for articulation and colour. In my interpretation, my preference lies in the ‘horizontal’ fingerings using the thumb and natural harmonics for effortlessly sounding ‘leaps’ with a clarinet-like timbral effect and evenness in the gradual c*rescendo* spanning twenty-four bars (Ex. 2.15).

Example 2.15 *Parjanya-Vata*, bb. 32–55
The ‘vertical’ and the ‘horizontal’ fingerings are indicated above and under the stave.



2.5.2 *Glissandi*

Glissandi (187 in total) are combined with a variety of other techniques: *sul ponticello*, *sul tasto*, artificial harmonics, *tremolandi*, trills, double stops, s*altando*; accented ('pulsing' *glissandi*) and with rapid changes of dynamics; integrated into a longer line and as a short embellishment feature; and also as a part of the rhythmical patterns and as a transition between the pitches, double stops accented, *saltando*, single note accented, *tremolo*, with a trill combined with artificial harmonics, *sul ponticello*, *sul tasto*. Based on the main characteristics or the extended technique used, *glissandi* in *Parjanya-Vata* can be broadly grouped into five types (Table 2.4). From the perspective of their function one can discern two types of glissandi (Table 2.5).

Table 2.4 Variety of *glissandi* employed in *Parjanya-Vata*

1. Textured/Accented (some are rhythmically articulated)	bb. 56–57, 60, 62, 67, 91, 94, 98, 100, 103, 108, 247
2. Trilled	bb. 2, 69, 132, 148
3. *Tremolando* (*pizzicato*/*arco*)	bb. 19, 69, 73, 111, 148, 183–184, 202–204, 210, 233–234
4. *Sul ponticello*/*Sul tasto* (*pizzicato*/*arco*)	bb. 13, 15, 168–169, 173, 175, 180, 183–184, 197–198, 211, 215–217, 219, 225–227
5. Artificial harmonics	bb. 21, 144–145, 247.

Table 2.5 *Parjanya-Vata*, two types of *glissandi*

1. Melodic/Connective	bb. 21, 73, 156, 169, 210
2. Embellishments	bb. 9, 13, 15, 24, 74–90, 132, 148, 168, 173, 175, 183–184, 202–204, 215–219, 225–227, 233–234

Parjanya-Vata, overview of *glissandi* in each section (Table 2.6 a/b/c/d/e):

Table 2.6 (a) Section A (bb. 1–22)

Trilled b. 2 (extreme dynamic 'swelling' in the downward motion createing a sense of irregular rhythm)
Short embellishments b. 9 (*pizzicato*), 13 (*pizzicato sul tasto*), 15 (*pizzicato sul tasto*)
Tremolo b.19 with extreme dynamics *pppp*: this device creates a moment of pause ('breath') marked with a double line, before the three-bars phrase
Melodic *glissando* in artificial harmonics bb. 21–22 concludes the Section as an introduction to the main part of the piece with an improvisatory character

Table 2.6 (b) Section B (bb. 23–57)

A textured (accented) descending *glissando*
bb. 56–57 the sliding unison spanning the range of over three octaves rhythmically articulated

Table 2.6 (c) Section C (bb. 58–113)

Textured – ascending and descending	bb. 60, 62, 67, 91, 94, 98
Saltando in double stops	bb. 100, 103, 108
Double stops	bb. 59–60, 62, 91
Short embellishments	bb. 74–90
Connective *tremolo*	b. 73
Tremolo	b. 69 (slow trill), b.111 (extreme dynamics)

Table 2.6 (d) Section D (bb. 114–163)

Trilled embellishments	bb. 132, 148
Connective	b. 156 (extreme dynamic marking *ffffff*)
Artificial harmonics	bb. 144–145 (extreme dynamics *fff-pp-fff-p-fff*)

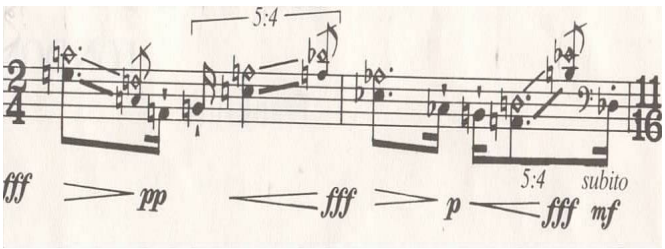
Table 2.6 (e) Section E (bb. 165–247)

Embellishments *glissandi* b.168 (*sul tasto*), b.173 (*sul ponticello*), b.175 (*sul ponticello*), bb.183–184 (*tremolo sultasto/sul ponticello*), bb.195–198 (*tremolo* in b.198), bb.202–204 (*tremolo* accented), bb.215–219 (extreme dynamics, *sul ponticello-normale-sul ponticello*), bb.225–227 (*sul ponticello*), bb.233–234 (*tremolo*)
Connective *glissandi* bb.169 and 180 (*sul ponticello*), b.210 (*tremolo sul tasto*, extreme dynamics)
Textured rhythmically articulate artificial harmonics *glissando* b. 247 (extreme dynamics *ppp-fff-ppp-fff-ppp-mf-pppp*).

Below are some examples of the five types of *glissandi* (Exx. 2.16–2.20):

Ex. 2.16 *Parjanya-Vata*, artificial harmonics, bb.144–145

(Tenor clef)



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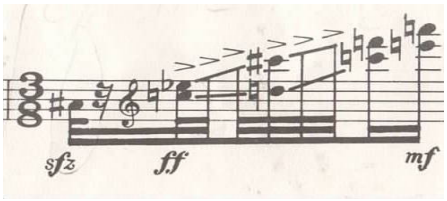
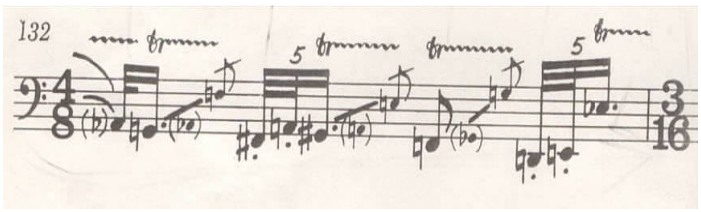
Ex. 2.17 *Parjanya-Vata*, textured *glissandi* (with rhythmical element), b. 62

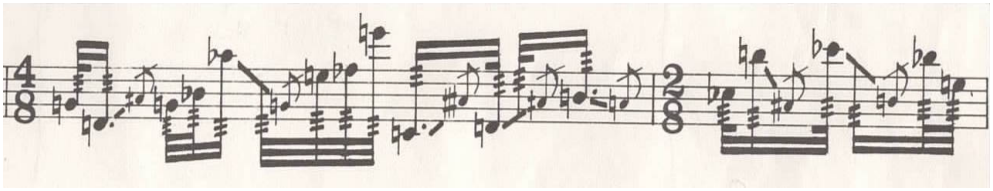


Ex. 2.18 *Parjanya-Vata*, trilled *glissandi*, b.132 (see my recording: 6′31″)



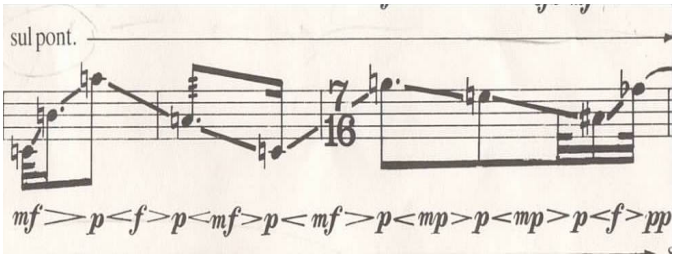
Ex. 2.19 *Parjanya-Vata*, *tremolando glissandi*, bb. 233–234 (see my recording: 10′04″)

(Bass clef)



Ex. 2.20 *Parjanya-Vata*, *sul ponticello glissandi,* bb. 225–227 (see my recording: 9′10″)

(Treble clef)



The type of *glissandi* broadly described as ‘gamaka’ (see above 2.7) is prominently featured in Section C, bars 74–90.[52] In this type of *glissandi*, the cellist has to

[52] The description pertains to the sound and the colour of this type of *glissando* technique – to help to find the best technical solutions and animate the performance – rather than depicting precise characteristics of a particular style of Indian music.

consider the following elements in expression and technical methods: the fingerings; speed and pressure of the glissando in relation to the bow distribution and pressure; phrasing and patterns; articulation and direction in the longer and shorter slides and interrelation within the dynamics and *sul ponticello* (overpressure).

2.5.3 Dynamics

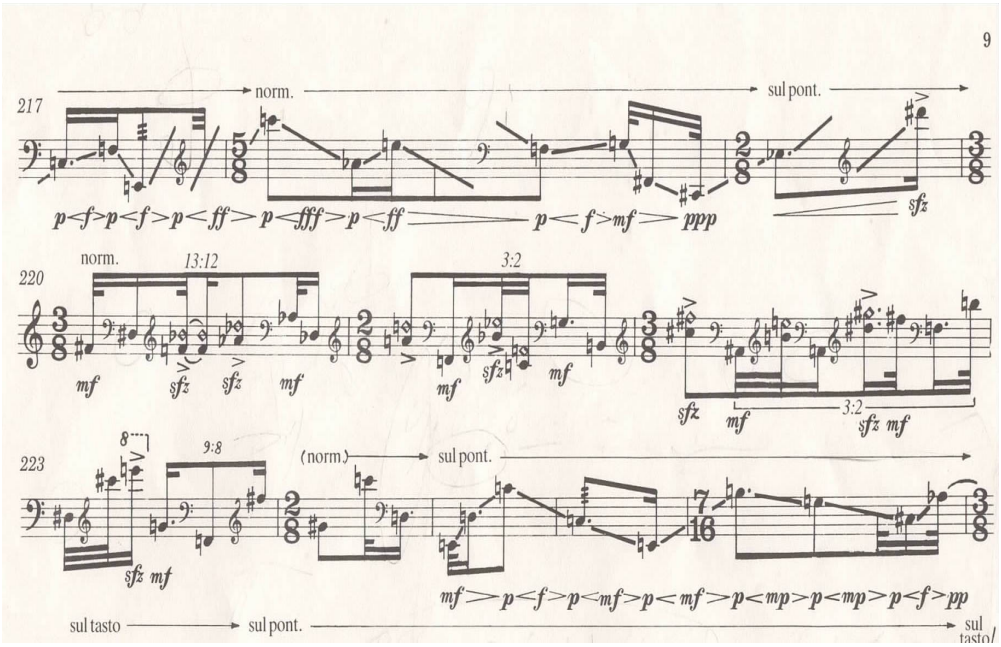
The difficulties of position changes are complicated by the extreme range and speed of dynamic fluctuations (Table 2.7).

Table 2.7 *Parjanya-Vata*, extreme dynamic changes

A	bb. 20–21
B	gradual *crescendo* from *pppp* (b. 23) to *ffff* (b. 55)
C	bb. 58–67 and 110–112
D	throughout the section, including the highest dynamic level – *ffffff* (bb. 133–136, 156)
E	bb. 166–172, 195–198, 215–227, 247

The three types of dynamic fluctuations require a high degree of bow control: gradual, 'pulsing' and 'sweeping'. An example of the first type is Section B (as discussed in 2.2.1), where the technical difficulty of building up the dynamic level combined with frequent register changes concerns all aspects of the tone production: bow placement between the fingerboard and the bridge, and bow distribution and pressure. Dynamic fluctuations of the second type occur throughout all sections – the energies of a 'pulsing' (undulating) bow must be well judged to attain the maximum precision in timing and coordination with the left-hand techniques, i.e. *glissandi*, *sul ponticello* and artificial harmonics (Ex. 2.21, bars 217–218 and 225–227. See also, Ex. 2.8).

Ex. 2.21 *Parjanya-Vata*, bb. 217–227 (see Sound File A2Parjanya-Vata: 8′56″)



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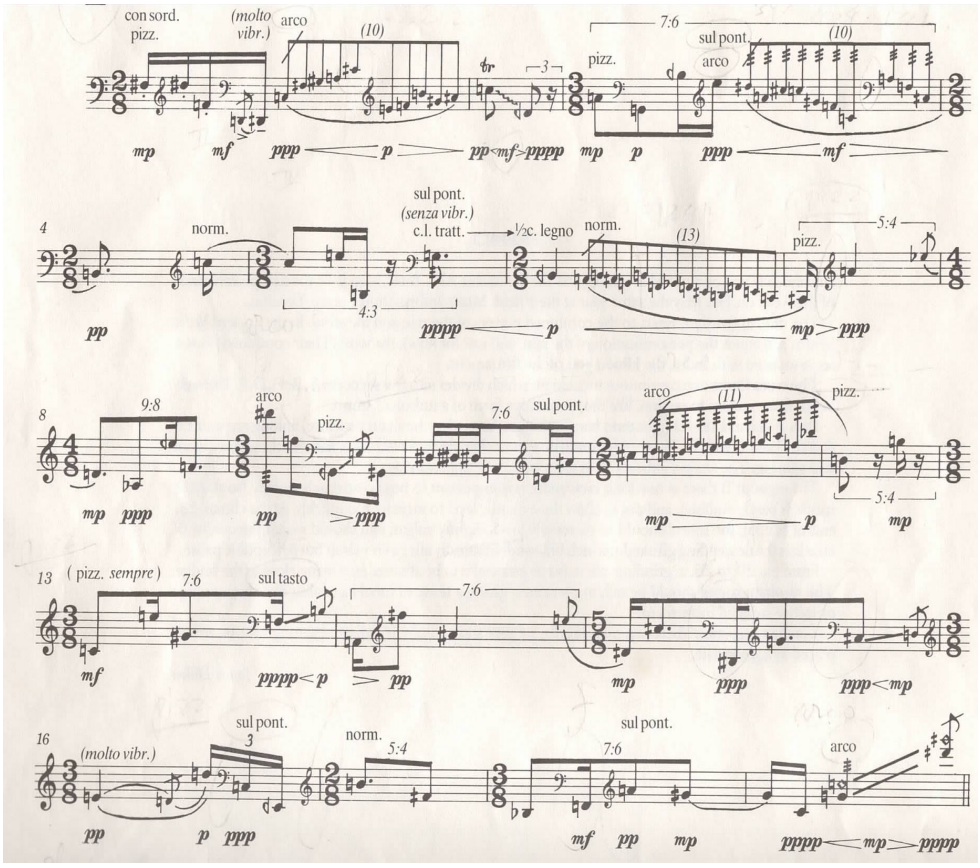
The third type, which I describe as 'sweeping' dynamic fluctuations, corresponds in some ways to the bow technique employed by Liza Lim in *Invisibility* for solo cello, which she describes as 'lateral movement along the length of the string between bridge and fingerboard'.[53] The rapid 'sweeping' motion can be employed within the extremely condensed textures, as in bars 114–125 (Ex. 2.6), 110–113 (Ex. 2. 9) and 247 (Ex. 2.10).

2.5.4 *Pizzicati*

The *pizzicati* in the opening section of *Parjanya-Vata* create the sonorities associated with the extra-musical imagery – a mystical space coloured with the sound of chimes and delicate noises, suggesting a presence of the 'elementals' (Ex.2.22). An extended, seductively undulating *glissando*-phrase (bar 21) abruptly concludes with a *pizzicato* 'snap' – an upward *arpeggiato* chord *sul ponticello*, *sforzando*. A similar *pizzicato* effect (but in reverse – a downward *arpeggiato*, *pianississimo*) concludes Section C. *Pizzicato* techniques involve *staccato pizzicati* played *secco* non-*vibrato*, *molto vibrato*, with an expressive slide (bb. 1, 9, 15, 16), *pizzicati sul ponticello* and *sul tasto* (bb. 10, 13).

[53] Liza Lim, *Invisibility* for cello with two bows (Munich: Recordi, 2009), 'Timbral indications', Preface.

Ex. 2.22 *Parjanya-Vata*, bb. 1–15



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Dillon's extra-musical imagery suggests an unfolding event depicting the play of the elemental forces that create 'a turbulent storm'; the pauses in the score may be viewed as a part of this relentless motion. The pauses within the quasi-improvisatory Section A – the instances of silences that shape *rubato* phrasing – create an ambience of an enchanted place. As the inexorable escalation of the storm progresses, the texture develops into a consistent flow punctuated by a few condensed breaks. I differentiate the pauses by their expressive functions (see Table 2.9).

Table 2.8 *Parjanya-Vata*, expressive functions of the pauses

silences and *spaces*	bb. 2, 5, 12
extensions	*fermatas* in bb. 22, 64, 246
punctuations	bb. 58–64, 67–68, 70–71, 150
transition	b. 90

In live performance, the pauses are enhanced by physical gestures, which articulate the subtle tension within the textures, as an integral part of the current of the unfolding drama.

As a performer, I consider *Parjanya-Vata* to be one of the most technically demanding twentieth-century works for solo cello in the way that it develops and expands traditional instrumental virtuosity to its limits. The characteristics of the composition pertaining to its virtuosic aspect can be summarised as follows:

1. The extreme techniques are precisely indicated in the traditionally notated score demanding exactitude that is particularly problematic in the widely spaced pitches, often in extremely high registers.
2. The rapid register changes occur within the complex rhythmical patterns changing at a fast pace.
3. Microtonal tuning is required in the irregularly spaced patterns and scalic sequences.
4. The cellist must foreground the expressive aspect of the extended techniques (that encompass a broad spectrum of dimensions, i.e. extreme dynamic contrasts and tonal colours) that actualise the extra-musical content of the work.

Parjanya-Vata differs from other highly complex works composed broadly in the same period such as, for example, Brian Ferneyhough's *Time and Motion Study* II (1973–1976) for vocalising cellist and live electronics, where the performer is engaged in non-instrumental expressive gestures merged with electronic sound modifications.[54] The conceptual nature of the work and the theatrical element in performance offer opportunity and artistic space for experimentations with individual expression – the physicality of manipulating the body of the instrument and the sonic environment generated during the process of performance. In contrast, the conventional virtuosity of the cellist is the basis for a convincing interpretation of

[54] See Martin Iddon, 'On the entropy circuit: Brian Ferneyhough's *Time and Motion Study II*', *Contemporary Music Review*, 25.1-2 (2006), 93–105, for discussion on the 'relationship between the vocalising cellist and live electronics', and Cristian Utz, 'Time-Space Experience in Works for Solo Cello by Lachenmann, Xenakis and Ferneyhough: a Performance-Sensitive Approach to Morphosyntactic Musical Analysis', *Music Analysis*, 36.2 (2017), 216–256, for exploration of the 'perceptual experience of temporality' in the cello compositions of the 1960s and 1970s.

Parjanya-Vata; indeed, it is the traditional nature of the composition that makes it exceptionally demanding in live performance. In the process of working on the technical challenges presented by *Parjanya-Vata*, my immersion into the associative domain – the composer's literary, mythological and philosophical references and his various musical influences – facilitated the establishment of a broader platform that brought a variety of benefits such as a more productive re-distribution of the physical and mental tension, a stonger sense of structure and an enhanced capacity to trust the intuitve responses of the muscles in the spontaneous interplay of tension and release. Although many of these benefits have been obtained from working on the specific techniques and sound in *Nomos alpha*, I can identify an additional facet in developing cello technique in *Parjanya-Vata* as a type of traditional virtuosity in which the instrumental 'athletisism' demands a correspondingly sophisticated practice method. As touched on in the preceding Chapter, in *Nomos alpha*, each singular event (on the micro- and macro- planes) can be defined as a structure with its own centre – the pivoting function of these nexus within the events and their clusters can be utilised for organising the momentary configuration of the muscles in the arms, torso and hands. In contrast, *Pajanya-Vata* unfolds in a linear mode with clearly defined stages of the programmatic development in which each section demands continuity on the level of intensity and a strong sense of forward direction.

Discussing the issue of playability of the complex scores, Orning argues:

> The score has a different function in the complex music, as the composers are not expecting an exact and "true" reproduction of the notation. Several of the composers associated with the New Complexity speak of performers as filters, as resonators, or as being given tasks of destructuring the scores.[55]

Dillon's highly complex score, however, must be 'reproduced' as truly as is instrumentally possible in order to fully express the scope of *Parjanya-Vata*'s interpretative space – its particular pulse and sound colours. Although the approximation of the required pitches and rhythmical formations in some parts of the score might be unavoidable in live performance due to the density of the textures and the demand for extreme velocity in the highest registers combined with the 'utopian' tempi, the spirit of rigorousness will be transmitted to the listener.

[55] Orning, 'Polyphonic Performer', p.37, f.83.

Dillon explores the expressive potential of each technical device as a tool in his programmatic setting described as an exuberant play of the elementals, which evokes distinctive images within the singular soundscape. The relentless pace and escalating intensity that comprise the work's interpretative space truly challenge the cellist's instrumental ingenuity, thus propelling the established tradition of playing the cello towards a new stratum of contemporary virtuosity.

Chapter 3

Liza Lim: *Invisibility* for solo cello

Invisibility for solo cello with two bows (2009) was composed for the French cellist Séverine Ballon and premiered by her at the Huddersfield Contemporary Music Festival on 26 November 2009. The composition is one of the rare examples of using a so-called guiro bow together with a traditional one, each consecutive section played with a particular bow; in the final part both are combined by holding the guiro bow with the left hand.[1] Lim wrote another solo work for Ballon – *an ocean beyond earth* (2016), set up in an installation prepared with thread and violin. The solo cello works are part of Lim's extensive catalogue for a variety of solo instruments that shows her interest in experimenting with sounds and textures of a single instrument (listed in Table 3.1).

Listening to Lim's repertoire of solo compositions opens a broader view of the composer's intentions and the way she uses extended techniques (often with an additional source of sound) by inviting the performer to contribute to the work through his/her distinctive interpretation and physical approach. Indeed, the collaborative approach is a significant aspect of Lim's compositional philosophy – this is apparent in her working methods that involve the performer in the process of shaping the sound, and in her openness in communicating this intention in her writings and interviews. *Invisibility* exemplifies this approach by utilising the dynamics of creative exchanges between the performer and composer.

Lim's choice of instruments shows the scope of her interest in exploring and expanding the new possibilities for sound, in some cases with an additional layer of sound textures produced by the performer's own voice or as a part of installation.

[1] In another rare example of a two bows cello composition, *Dark ages* (1987–1990) by Richard Barrett (the ninth work in the series *Fictions)*, both (traditional) bows are held in one hand, which makes it possible to use the left hand. The work was premiered by Frances-Marie Uitti in 1990, who developed this particular technique. I will discuss the properties and the technical/conceptual aspects of the guiro bow in the piece in Part 3.3 'Expressive Tools'.

Table 3.1 The solo works by Liza Lim (up to 2020)

Instrument	Work
Viola	*Amulet* (1992)
Koto & voice (1 performer)	*Burning House* (1995)
Violin (scordatura) [or Hardanger fiddle]	*Philtre* (1997)
Cello	*Spirit Weapons* I (1999-2000)
Tenor Ganassi recorder	*The long forgetting* (2007)
Alto Ganassi recorder	*Weaver of fictions* (2007)
Trumpet	*Wild Winged One* (2007)
B flat clarinet	*Sonorous Body* (2008)
Piano	*The Four Seasons* (2008)
Alto trombone	*Well of Dreams* (2008)
Cello and two bows	*Invisibility* (2009)
Oboe	*Gyfu (gift)* (2011)
Hand drum	*Love Letter* (2011)
Bassoon	*Axis Mundi* (2012-13)
Double bell euphonium (or double bell trombone)	*The Green Lion Eats the Sun* (2014)
1/4-tone flugelhorn	*The Window* (2014/2017)
Harp	*Rug Music* (2015)
Cello (prepared with thread and violin)	*an ocean beyond earth* (2016)
Wood block	*An Elemental Thing* (2017)
Trumpet	*Roda – The living circle* (2017)
Violin	*The Su Song Star Map* (2017)
Double bass (with voice & preparation with thread)	*The Table of Knowledge* (2017)
Flute	*bioluminescence* (2018)

Another strong characteristic of Lim's compositional style and conceptual framework is an extra-musical aspect, which stimulates the performer to research the context of the work through immersion into non-musical sources (i.e. anthropology, ecophilosophy, non-western art and literature) to understand the cultural implications

within the interpretative space of her compositions. This aspect informs Lim's choices of instrumental timbres and the range of the extended techniques – in *Invisibility*, the ubiquitous use of harmonics combined with multiphonics and a guiro bow is a prominent feature of the piece. The four parts of this Chapter investigate these inter–related elements of the work, as well as the problems of live performance.

3.1 Collaboration

3.1.1 Collaboration as Practice and Research

In recent decades the subject of creative collaboration has been closely investigated by researchers and performers involved in the wide range of art genres and pedagogy. In relation to pedagogical practice, interrogating the questions of how to 'learn to collaborate' and 'collaborate to learn', S.M. Rojas-Drummond, C.D. Albarrán1 and K. S. Littleton assert:

> In any area of research, ideas develop through collective as well as individual efforts. It is through joint engagement that ideas are argued over, contested, borrowed and shared as our understanding is advanced. Such understanding is a dialogical phenomenon, and its achievement a fundamentally social and collaborative process. [...] there is a substantial body of empirical evidence demonstrating that, whilst not an educational panacea, there can be positive effects of social interaction for learning and problem-solving. Subsequently, however, interest shifted away from considering just the outcomes and products of collaborative work, towards analysing the interactions themselves.[2]

In contemporary classical music, collaborative work has become an important field in research and practice where both interactions between the participants and the outcome are considered to be part of an integral whole.[3]

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[2] Sylvia Rojas-Drummond, Albarrán, C. D. and Karen Littleton, 'Collaboration, creativity and the coconstruction of oral and written texts', *Thinking Skills and Creativity*, 3.3 (2008), 177–191. Open Research Online, p. 2, https://doi.org/10.1016/j.tsc.2008.09.008. [Accessed 12 September 2020].

[3] Some examples from recent research on this subject: Paul Roe, 'A Phenomenology of Collaboration in Contemporary Composition and Performance' (PhD Thesis, The University of York, 2007);

Sam Hayden and Luke Windsor have investigated the notion of collaboration, delineating the three main types of collaborative practices:

> 1. Directive, in which the composer provides 'instructions' for the performer through notation, and where 'traditional hierarchy is maintained'.
> 2. Interactive – in which the process is more 'discursive and reflective', with the performer involved in shaping the work to a greater degree. (In this category the composer, ultimately, retains the authorship although 'some aspects of the performance are more "open" determined by a score').
> 3. Collaborative, where 'the development of the music is achieved by a group through a collective decision-making process'.[4]

Hayden and Windsor maintain that these categories might overlap, each one containing 'aspects of more than one category'. How these categories relate to Lim's practice will be discussed below.

The current research in this field encompasses studies undertaken by musicologists, composers and performers, who in some instances collaborate in their investigations that 'demonstrate methodological diversity'.[5] The direct experiences of the increasing number of cellists actively involved in contemporary music performance and practice-led research contribute to the discussion from the performer's perspective. For example, the contemporary cellist Neil Heyde conveys

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Marlou Peruzzolo Vieira, 'The collaborative process from the performer's perspective: A case study of non-guitarist composers' (PhD Thesis, Universidade de Aveiro, 2017); Luke Styles 'Handspun, The Role of Collaboration and Embodiment as Compositional Process–A Transdisciplinary Perspective, *Contemporary Music Review*, 35.6 (2016), 612–629; Zubin Kanga and David Gorton, 'Risky Business: negotiating virtuosity in the collaborative creation of *Orfordness* for solo piano', in Lauren Redhead and Vanessa Hawes (eds), *Music and/as Process* (Cambridge: Cambridge Scholars, 2016) 97–115; Zubin Kanga, 'Inside the Collaborative Process: Realising New Works for Piano' (PhD Thesis, Royal Academy of Music, 2014). In electro-acoustic music collaborative work between a composer and a musical assistant (or live electronic designer) is also part of the research. Carl Faia, 'Collaborative Computer Music Composition and the Emergence of the Computer Music Designer', (PhD Thesis, College of Business, Arts and Social Sciences, Brunel University, 2014), p.8, affirms: 'Computer Music Designers not only collaborate in the creation of new work but also generate new resources for computer-based music and new creative paradigms'. Faia and Zack Settle collaborated with James Dillon at IRCAM working on the composition *Introitus* for strings and electronics (1989–90). See also, Laura Zattra, 'Symmetrical Collaborations. Jonathan Harvey and his computer music designers', Jonathan Harvey – 2, edited by Candida Felici and Stefano Lombardi Vallauri, in *Nuove Musiche*, 4, 2018 (Pisa: Pisa University Press, 2019).

[4] Sam Hayden and Luke Windsor, 'Collaboration and the Composer: Case Studies from the End of the 20th Century', *Tempo*, 61. 240 (2007), 28–39 (p.33).

[5] See Eric Clarke, Mark Doffman and Lisa Lim, 'Distributed Creativity and Ecological Dynamics: A Case Study of Liza Lim's 'Tongue of the Invisible', *Music and Letters*, 94. 4 (2013), 628–663 (pp. 631–632) for examples of collaborative research.

his insights into the thought-provoking collaborative experience with composer Fabrice Fitch, as dialogic and inventive by nature:

> In a musical culture that has understood the performer's role primarily as mediator between composer/piece and audience, very little attention has been paid to the performer's potentially significant mediation between composer and piece. When the latter interpretation of the role is brought into play early in the conception, the performer may take a vital, inventive stance in which 'problems' (musical ideas) are formulated and reformulated in tandem with their 'solutions'. The composer–performer collaboration may thus become a site for the playing out of the dialogic aspects of artistic creation.[6]

Margaret Barrett highlights the problem of a popular view of the composer as an independent artist, who creates music in isolation that, according to Alan Taylor, 'still affects thinking today':

> The image of the composer as a lone seeker of creative inspiration is embedded in popular views of the creative artist. This isolationist view ignores the 'thought communities' on which composers draw in their development as musicians...[7]

Taylor argues that

> This individualistic view of the process of composing music is at variance with the view of artistic creation taking place in dialogue with previous work and external influences. I will describe that view as dialogic artistic creation. It originated in the early twentieth century with Bakhtin.[8]

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[6] Fabrice Fitch and Neil, Heyde, '"Recercar" – The Collaborative Process as Invention', *Twentieth-Century Music*, 4.1 (2007), 71-95 (p.72). For the performer's view on the subject of collaboration, see also the comments from the Finnish cellist Anssi Karttunen, who worked with many leading composers, notably with Kaija Anneli Saariaho: Anssi Karttunen, 'Anssi Karttunen: Discovering the music around myself ', *Finnish Music Quarterly*, *From The Archives*, (1999), https://fmq.fi/articles/anssi-karttunen-discovering-the-music-around-myself [Accessed 22 May 2019].

[7] Margaret Barrett, '"Creative collaboration": An "eminence" study of teaching and learning in music composition', *Psychology of Music*, 34 (2006), 195–218 (195), quoted in Alan Taylor, '"Collaboration" in Contemporary Music: A Theoretical View', *Contemporary Music Review*, 35,6 (2016), 562–578 (p.563).

[8] Alan Taylor, '"Collaboration" in Contemporary Music: A Theoretical View', 563. Taylor points to Bakhtin's influential work *The dialogic imagination* (Austin: University of Texas Press, 1981). Rojas-Drummond, et al., 'Collaboration, creativity and the coconstruction of oral and written texts', p.5, also make references to Bakhtin's thought as a valuable source in research on collaborative practice: 'It is through discursive interactions that knowledge is co-constructed and meanings are negotiated and re-negotiated, a process which involves the sharing and consideration of multiple perspectives, involving the inter-animation of voices (Wertsch, 1991) and the emergence of 'heteroglossia' (Bakhtin, 1981)'.

As a composer who developed her creative method and style through continuing interactions and personal affinities with particular performers (ELISION) and within the rich context of cross-cultural references, Lim made a substantial contribution to the research on the subject of collaboration both theoretically and in her compositional practice. In *Invisibility*, Lim articulates the dialogic aspect on multiple levels – between the composser and performer, performer and instrument, and within the 'instrument building' process. This aspect is explored through the use of the expressive tool – the guiro bow, and the dialogical tension between the two bows and *within* the materiality of the guiro bow.[9] As pointed out above, the important element in Lim's collaborative practice is shaped by her artistic bond with a particular performer:

> [W[riting solo pieces is like a laboratory. It's a chance to really go in depth, studying that particular world. Most solo pieces I write are connected to a specific performer, so there's usually a sense of an ongoing conversation with the performer, a collaboration.'[10]

In addition, the composer's creative collaborations are nourished by her interdisciplinary multicultural outlook.

3.1.2 Lim's Collaborative Practice

Lim's distinctive method of collaboration is based on her interest in nature, ecosystems, anthropology and indigenous cultures. She articulates her views on the subject and its philosophical context in her writings, interviews and lectures.[11] Lim's main idea that underpins her collaborative work with the performers is the kind of distribution of creative energies between the participants that she associates with the

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[9] I investigate this aspect in 'Interpreting *Invisibility* for violoncello with two bows by Liza Lim from the perspective of Mikhail Bakhtin's theory of the novel'.

[10] Liza Lim and Martina Seeber, 'Farewell to Humans', *Divergence Press*, 28 November 2019. http://divergencepress.net/2019/11/28/farewell-to-humans-an-interview-with-liza-lim/ [Accessed 15 July 2020]. See Parts 3.1.2 and 3.1.3 for discussion on these issues.

[11] See, for example, video: 'Liza Lim – How Forests Think', 2017. https://youtu.be/WN_2IU429Zc [Accessed 14 January, 2019], and Lim's writings: 'Intervention: Knots and other forms of entanglement', in Eric F. Clarke and Mark Doffman (eds.), *Distributed Creativity: Collaboration and Improvisation in Contemporary Music* (New York: Oxford University Press, 2017) pp.207–213; 'A mycelial model for understanding distributed creativity: collaborative partnership in the making of 'Axis Mundi' (2013) for solo bassoon', in *CMPCP Performance Studies Network Conference,* Cambridge, 4–7 April 2013, University of Huddersfield Repository, http://eprints.hud.ac.uk/id/eprint/17973/1/PSN2013_Lim.pdf; James Saunders, 'Interview with Liza Lim', 1999, *james-saunders.com* http://www.james-saunders.com/interview-with-liza-lim/ [Accessed 1 February 2019]; Tim Rutherford-Johnson, 'Patterns of Shimmer: Liza Lim's Compositional Ethnography', *Tempo*, 65. 258 (2011), 2–9 (p.2).

'mycelial' model. Influenced by the ideas of the ecological anthropologist Tim Ingold, Lim explores this model as a metaphor for collaborative practice:

> A consideration of the structure of fungal mycelia systems with their complex meshwork of catalytic transformation and an active distribution of nutrients, leads to potentially new ways of thinking about distributed creativity beyond a more mechanistic modelling of creativity as a hierarchy of levels and cogs, or even as the distributed model of a rhizomatic morphology of branching connections and nodes.[12]

For Lim, the organic model of distribution of the nutrients that occur in the natural environment activates her imagination and thinking, providing the basis for collaborative work with performers that aims

> to shift the view of a structure of creative exchange apportioned or pre-determined via a role (performer offers techniques; composer acts upon these to make a piece), towards an understanding of collaboration as the current that carries the participants into an intertwining world of practice in which materials themselves become the tools of perception'.[13]

Lim elucidates the parallel with the mycelial distribution processes in her discussion about her work *How Forests Think* (2016) commissioned by ELISION for the ensemble's thirtieth anniversary. She describes the work as being 'in part a story of that collaboration [her longstanding collaboration with the ensemble] as well as the story about ecological connection'.[14] Lim extends the notion of collaboration beyond the composer–performer complex, into the multidimensional territory where 'the distribution of the nutrients' ensues between the players of the ensemble simultaneously with the 'mycelial' exchanges between the performers and their instruments, and within the performers' bodies to attain the stage where music 'listens to itself':

> At the end of the work the musicians use the awareness of their breathing to pace how they play their sounds, it becomes very meditative, the score becomes more open; it's very invitational, [...] by the end you have a music that is listening to itself, [...] time becomes something that is breathing, and emerging, it's present and it's growing.[15]

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[12] Lim, 'A mycelial model', Abstract, p.1.
[13] Ibid.
[14] 'Liza Lim – How Forests Think', at 25″.
[15] Ibid., at 6′07″.

The source of inspiration behind the composition and its title is the book *How Forests Think* by Eduardo Kohn, which is 'about anthropology beyond the human' – the ecosystem where the humans are just a part of this web of connection.[16] Lim makes an important point that helps us to understand her approach to collaboration:

> my musical work is also about playing with this idea of the living thought of things, the dreams of things [...], communication between objects, the air, instruments, bodies and voices [...] I take this rather biotic approach to working with the ensemble – the outbreath of one musician is coordinated with, triggers the in breath of another, so you have this exchange of respirations across the group.[17]

Lim's affiliation with ELISION that began in 1986 resulted in a number of important works in which one can trace the development of her individual compositional language. [18] The ensemble, consisting of sixteen virtuoso instrumentalists, has been active on the contemporary music scene for over thirty years, commissioning over two hundred new works. ELISION extends its ethos of collaboration as the dynamic interrelations both 'vertically'– working with composers on the new projects, and 'horizontally'– co-commissioning with other groups and organisations, such as Ensemble Intercontemporain, Ensemble Modern (Frankfurt), CIKADA (Oslo), Line Upon Line (Austin) and MusikFabrik (Köln) and Festival d'Automne à Paris. Lim's many significant compositional ideas and methods evolved in the context of her artistic closeness to the particular performers and her interest in the physicality of their playing. As noted by Tim Rutherford-Johnson, a close working relationship with ELISION has given her the platform for experimenting with a variety of textures refining 'a precise sonic intention', at the same time offering creative space to the performers for finding solutions to technical and expressive demands.[19] Lim's highly productive collaborative method in this context shaped her creative output.

In her continuing relationship with ELISION, Lim has established a particular collaborative environment in which the participants sustain a balanced and flexible framework. This type of collaborative process may be described as 'interactive' (as

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[16] Eduardo Kohn, *How Forests Think: Toward an Anthropology Beyond the Human* (Berkeley: University of California Press, 2013).
[17] 'Liza Lim – How Forests Think', at 53″.
[18] Rutherford-Johnson, 'Patterns of Shimmer', p.2.
[19] Ibid.

one of the collaborative models suggested by Hayden and Windsor) as it involves a degree of interpretative freedom. In her conversation with Saunders, Lim emphasises a subtle distinction in her approach to collaborative work with the performers:

> I don't think of collaboration as necessarily meaning working towards a common goal. In fact, all the projects that I've done with other artists have evolved through working side by side rather than focussing on a pre-determined outcome. The resultant work, I think, has been more complex, more fluid and polyphonic in its possible meanings than if we had imagined some kind of 'gesamtkunstwerk'. This way, each artist has the space to make their own work without compromise – the frictions and contradictions that come out of the process are also given space to resonate.[20]

Lim's longstanding relationship and resulting detailed knowledge of the ensemble members' technical and expressive characteristics played a substantial role in her compositional decisions. Rutherford-Johnson notes the significance of such creative balance, suggesting that there is a 'tension between specificity and freedom' that 'energizes her music',[21] which is rooted in a particular quality of trust and shared artistic values – the ensemble's aesthetics, performance philosophy and practice. This attitude is also significant in relation to the scope of the expressive range in Lim's instrumental writing and her expectation of the performer. ELISION is known for the high level of virtuosity of each member and their interest in challenging new techniques.[22] Louis Garrick highlights this quality: 'The ensemble's aesthetic lies at the complex and virtuosic end of the contemporary classical spectrum, resolutely international in focus.'[23]

The aspect of instrumental virtuosity in Lim's affiliation with ELISION is reflected in her solo works in which she freely experiments and stretches expressive possibilities; therefore the artistic individuality and technical style of the composition's dedicatee Séverine Ballon represents a significant issue in any

[20] Saunders, 'Interview with Liza Lim'.
[21] Rutherford-Johnson, 'Patterns of Shimmer', p.2.
[22] The ensemble's website describes its artistic identity: 'ELISION has been celebrated for its unique instrumentarium, close and longterm artistic relationships with composers, its virtuosity, and the ability and deep commitment of its musicians to renegotiate and re-invent performance practice and technique', http://www.elision.org.au [Accessed 12 March 2019].
[23] Louis Garrick, 'ELISION: nomads on an aesthetic journey', *Resonate Magazine*, 13 March 2014, https://www.australianmusiccentre.com.au/article/elision-nomads-on-an-aesthetic-journey [Accessed 20 March 2019].

investigation of the interpretative space of *Invisibility*.[24] Lim expounds her collaboration experiences with the members of ELISION elucidating some important outcomes for her development as a composer in her interview with Saunders, for example, in the area of notation and silences. Based on her improvisation/ installation projects in 1994–1996, Lim points to the three ways of 'offering spaces' within the notated scores:

> [1] Using silences not as points of repose but as moments of heightened attention. Another kind of silence is when an ensemble falls silent to listen to a single instrument.
> [2] The use of sounds in a state of continuous transformation is another way of accessing this listening state – very delicately shaded timbres or highly fluctuating sounds require a certain kind of attentive engagement from the player because the limits of the sound are not clearly delineated and require the musician to really work with nuances in or against the 'grain' of the sound.
> [3] Different kinds of tuning strategies, applying to both pitch and rhythm, ie [*sic*.]: the convergence or divergence of these elements.[25]

Lim affirms the prerequisite for such productive collaborative relationship stating 'it wasn't the kind of thing that I could have embarked on with people with whom I had no relationship of trust'.[26]

3.1.3 *Invisibility*: the Composer and Performer

A deeply rooted collaborative relationship between Lim and Ballon – both the performer's artistic individuality and the cello as a material channel for creating the piece's distinctive soundscape – determines the compositional outcome. These two aspects overlap during the collaborative process – the composer investigates the possibilities of sound through the dynamic interaction with the particular instrumentalist whose technical style and qualities of musicianship will inevitably influence the resulting piece, and the cellist's relationship with her instrument.

Lim elucidates the necessity of collaborative exchange for finding the means of expressing her compositional ideas:

> Because of the non-standardised nature of the sounds I use (often focussed on fluctuating, morphing qualities) and the unusual techniques required to produce them,

[24] This will be discussed in Part 3.1.3 '*Invisibility*: the composer and performer'.
[25] Saunders, 'Interview with Liza Lim'.
[26] Ibid.

> my work does often necessitate close collaboration with performers. This process of collaboration to explore so-called 'extended techniques' has become quite standard practice since the mid-twentieth century.[27]

Through this dynamic process, the cello transforms its established 'image' and amplifies its expressive range. In their collaborative study, Clarke, Doffman and Lim expand on the idea of 'building the instrument' in a conceptual, material and collaborative sense:

> And another, particularly relevant to the music discussed in this essay, is the idea of composition as a species of instrument-building, an approach central to the work of the composer Helmut Lachenmann and developed to interesting effect by the composer Fabrice Fitch and cellist Neil Heyde. Fitch's work with Heyde involves a kind of mutual tuning of the instrument and performer – both literally in terms of the exploration of a particular scordatura, and more metaphorically in terms of the discovery and development of playing techniques. But more than that, the 'instrument' that is built forms a bridge between Fitch and Heyde's roles as composer and performer.[28]

Michael Hooper evaluates the practical and philosophical processes in the 'dynamic musical ecosystem'[29] created through the three-dimensional collaborative process, which includes the instrument that 'becomes a significant source of new possibilities':

> The Ker-Redgate-oboe collaboration demonstrates the non-hierarchical relationship between instrument, composer, and performer through the vitality of the oboe in the oboe-performer assemblage, downplays instrumental technique as a mediator between composer and sound, and moves away from considering the oboe as a tool.[30]

Hooper views the collaborative process as a complex network that includes not only the composer and performer with their personal histories and personalities, but also the instrument and its repertoire, 'past practice, obsolete mechanism, new keywork and much else besides.'[31] Writing about her collaborative experience with the performer Alban Wesly, Lim echoes this concept: 'The musical world of Axis Mundi enmeshes aspects of my being, my dream states and sensibilities as a composer with Alban Wesly's being, performative history, and sensitivities to and imagination of

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[27] Lim,'A mycelial model', p.6.
[28] Clarke, Doffman and Lim, p.632.
[29] This term is used by Clarke, Doffman and Lim, ibid., p.663.
[30] Michael Hooper, 'The Start of Performance, or, Does Collaboration Matter?', *Tempo*, 66. 261 (2012), 26–36 (p.35).
[31] Ibid., p.36.

musical culture.'[32] Lim 're-invents' the cello by implementing singular methods for sound production and introducing the additional tools in her compositions, such as a guiro bow, an additional instrument (violin) or an object (a thread), or approaching the cello as an assemblage, a flexible apparatus with movable parts and properties. In *Invisibility*, Lim captures an evanescent quality of susurrating and percussive noises produced by the prepared (guiro) bow, and by the traditional bow's particular techniques of moving across the fingerboard in rapid sweeps, zigzags and circles. The resulting sonorities are enriched by the tactile textures of the left-hand techniques: harmonics, multiphonics and *glissandi*. In her second composition for Ballon, *an ocean beyond earth*, Lim externalises the cello sound, stretching its boundaries through the use of an additional source – a violin connected to the cello by an 'umbilical chord' (a thread).

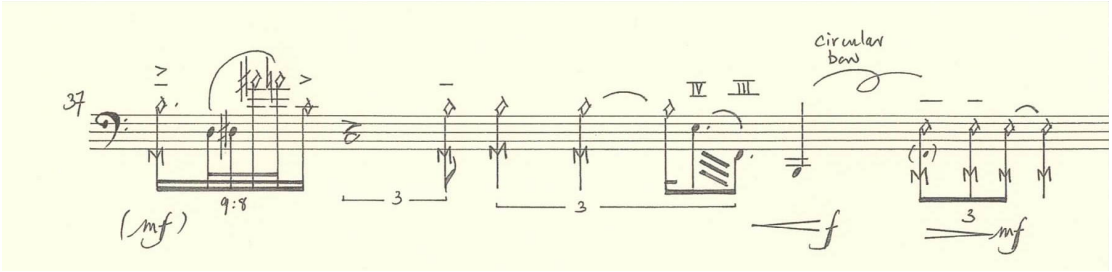
As a cellist specialising in the late twentieth- and twenty-first-century repertoire, who studied with Siegfried Palm, Pierre Strauch and Rohan de Saram, Ballon is familiar with the concepts of 'instrument-building' and the sound world of the 'extended' cello. She is an experienced collaborator (she also worked with composers Helmut Lachenmann, Chaya Czernowin and Rebecca Saunders), who has developed and refined the art of 'mutual tuning of the instrument and performer' and 'tuning in' the composer's intentions. Her collaborative practice in its various dimensions and degrees of involvement combined with her artistic personality, renders an organic quality and natural fluency to her work with Lim. Ballon's musical identity is strongly defined by her association with Lim's music and in particular, *Invisibility*. The composer highlights this connection in her interview: 'Séverine has played the work about 70 times, recorded it twice for CD and continues to play it regularly and from memory'.[33]

Ballon's stage presence is marked by the way that she 'embraces' the cello as if 'enveloping' the world of sound with the totality of her body. She is immersed in the process of 'building' the cello through a particular physicality of playing that also involves her emotional responses to the unfolding 'story'. Ballon's knowledge of the extended techniques vocabulary and a highly developed virtuosity in communicating the complex sonorities are part of the piece's 'mycelial' network within *Invisibility*'s

[32] Lim,'A mycelial model', p.12.
[33] Anni Heino,'Liza Lim's Tree of Codes and the ephemerality of life', *Resonate Magazine*, 16 March 2016, https://www.australianmusiccentre.com.au/article/liza-lim-s-tree-of-codes-and-the-ephemerality-of-life [Accessed 14 June 2019].

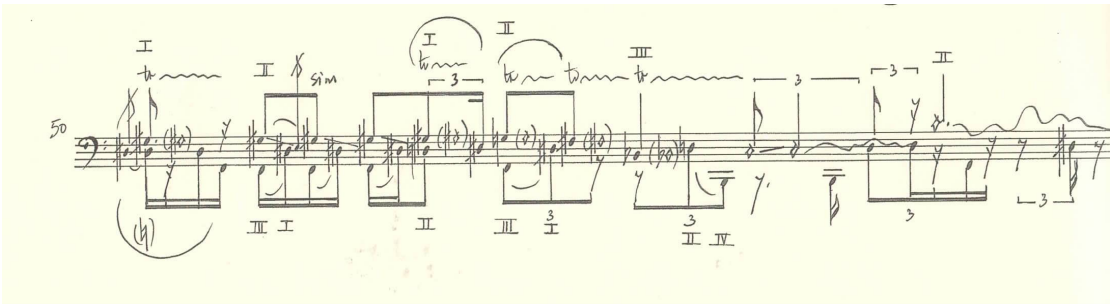
system; this physical link with the cello's pathways and currents is clearly discernable. The knowledge of the positions gained from a close collaboration with a cellist saturates the score, making the work playable and performable (after the initial adjustment to the notation of the pitches as the *scordatura* radically changes the fingerboard's 'geography'). As shown in Examples 3.1 and 3.2, the richness of the textures is provided by the economical use of the left-hand positioning to create resonant sonorities in string crossings.

Ex. 3.1 *Invisibility*, b. 37



In this example the B harmonic is played on the G string closely positioned to the A and A sharp harmonics on the A and D strings, followed by a *tremolando* on E (on the C string) and F (on the open G string).

Ex. 3.2 *Invisibility*, b. 50



The sonorities of the open strings (de-tuned A and G) are combined with the trilled harmonics and slides on the D string.

Lim is known as a composer with a strong interest in the new sources of sound through experimentation with the traditional classical instruments as well as incorporating non-Western instruments from Asia, Australia and China into her

compositions.[34] For the performer, this aspect of Lim's compositional thinking stimulates a fresh way of listening and refines the sense of 'occupying' the cello's voluminous sound space.

Performing *Invisibility* involves intuitive physicality and associative imagination nourished by the sources outside the purely musical domain (visual art, ecology, movement, non-western cultural traditions and philosophy).[35] The interpretative space of the piece contains the awareness of the sources of the compositional ideas and their connotations in selecting and refining the expressive means. As expounded in Lim's writing, the core concept of *Invisibility* is formed by the notion of *shimmer* that carries the symbolic power in Yolngu Art; this concept and its cultural significance is discussed in the following part (3.2), as an important context for the technical and performative issues presented by the composition.

3.2 Inter-cultural Perspectives and Yolngu Art

The Yolngu art and the Australian Aboriginal spiritual tradition have been extensively investigated by the anthropologist Howard Morphy.[36] One of the distinctive elements of Yolngu paintings is the concept of *shimmer* (*bir'yun*), a particular visual effect achieved by creating a geometrical pattern of crossing lines. Lim refers to Morphy's studies as an important source for her compositional method and sound in the number of her works including *Invisibility*. Indeed, as noted by Rutherford-Johnson,

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[34] Among the world instruments that appear in Lim's works are: Sheng (Chinese mouth organ), Qin (Chinese zither), Er-hu (Chinese violin), Chinese gongs, Koto (Japanese string instrument that belongs to the Asian zither family), Hardanger fiddle (Norwegian traditional fiddle), didgeridoo (a wind instrument, or drone pipe, developed by the Aboriginal peoples of Northern Australia).

[35] I use the expression *associative imagination* as part of my Associative Method – which I refer to in Chapter 6, 'Performing *Nomos alpha* by Iannis Xenakis: reflections on interpretative space', in Alfia Nakipbekova (ed.), *Exploring Xenakis*, pp. 89–107 – not in a sense of one of the three kinds of imagination developed by John Ruskin. See for example, Robert Hewison Chapter Four: Ruskin and the Imagination, 'John Ruskin: the argument of the eye', 2014, *Victorian Web*, http://www.victorianweb.org/authors/ruskin/hewison/4.html [Accessed 20 May 2019]. Lim, 'A mycelial model', pp.11–12, refers to Ruskin in her discussion about mycelial systems in the way it relates to Finnish architect Juhani Pallasmaa's ideas of 'errors' and imperfections: 'Ruskin's description which recognises the beauty of imperfection and irregularity as signs of life could well be applied to a mycelial system – one thinks of the role of fungi in processes of decay as well as renewal and even bio-remediation (removing pollutants from an environment)'.

[36] See, for example, Howard Morphy, 'Too many meanings: an analysis of the artistic system of the Yolngu of Northeast Arnhem land' (PhD Thesis, The Australian National University, 2011), https://openresearch-repository.anu.edu.au/handle/1885/8038 [Accessed 30 June 2019]; 'From Dull to Brilliant: The Aesthetics of Spiritual Power Among the Yolngu', *Man*, 24.1(1989), 21–40; *Becoming Art: Exploring Cross-cultural Categories* (Oxford/New York: Berg Publishing 2007); *Aboriginal Art* (London: Phaidon, 1998).

Invisibility demonstrates 'one of the most thorough explorations of this pattern'.[37] Equally, the composer integrates her own experience of participating in the Yolngu rituals (attending the final part of funeral ceremonies), observing their spiritual and cultural attitudes.[38] This direct experience stimulated Lim's interest in 'vertical' structures and the dynamics of 'hiddenness' and 'revelation', among a number of other ideas and creative approaches, which she is continuing to explore through her compositions. In this section, the notion and expressive scope of shimmer will be discussed as the central aspect of *Invisibility* in its conceptual, compositional and performative aspects.

3.2.1 Shimmer

The Yolngu are the indigenous people living in North-eastern Arnhem Land (in what is now known as the Northern Territory of Australia) whose art conveys the Aboriginal ancient spiritual tradition. Morphy indicates the key feature in the Yolngu Art as the *bir'yun* (brilliance) – the effect achieved by the fine cross-hatching (drawing two crossing layers of fine lines on the surface to create a particular optical effect) that covers the painting at the final stage of its making. The completed painting is considered to be a part of universal existence as a process and ritual rather than being a static material object – a flowing living experience in the consciousness of those who share this ritual. Morphy underlines the spiritual dimension in the Yolngu culture that perceives the paintings as the entities embodying ancestral power, often inaccessible to the uninitiated and too powerful to confront with a direct gaze:

> Although the majority of paintings are done in contexts that are only semi-restricted, where they could be observed by anyone who tried to look, people tend to avert their eyes. Hence much of people's experience of painting consists of images fleetingly glimpsed through the corner of their eyes.[39]

He continues: 'As applied to paintings bir'yun is the flash of light, the sensation of light one gets and carries away in one's mind's eye, from a glance at *likanpuy miny'tji*.'[40] The notion of indirect gaze and fleeting images correlates to the soundscape of *Invisibility* in the way of the audial perception of its shimmering

[37] Rutherford-Johnson, 'Patterns of Shimmer', p.7.
[38] Liza Lim, 'Patterns of Ecstasy', in *Darmstadt contributions to new music*. Schott Musik, 2012, 27–43, http://eprints.hud.ac.uk/id/eprint/14454/ [Accessed 10 May 2019].
[39] Morphy, 'From Dull to Brilliant', p.26.
[40] Ibid., p. 28. 'Likapuy Miny'tji' is the term that refers to the sacred painting.

textures. Lim composed a number of important works based on the expressive potential of the shimmer (Table 3.2).[41]

Table 3.2 A list of compositions that explore *shimmer* as an expressive tool

Shimmer (2005)	Solo oboe
Songs found in dream (2005)	Ob, cl/bass blc, sax, tpt, 2 perc, vc, dbass
In the Shadow's Light (2005)	String quartet
Shimmer Songs (2006)	3 perc, harp, string quartet
The Compass (2006)	Large orchestra with flute and didgeridoo soloists
Ochred String (2008)	Oboe, viola, vc, dbass
Invisibility (2009)	Solo vc
Pearl, Ochre, Hair String (2009)	Orchestra

Rutherford-Johnson discusses Morphy's ideas on shimmer in relation to Lim's compositions in various ways: as the manifold possibilities for interpretation and as an integral part in her compositional thinking enriched by the multivalent nature of Yolngu culture – its 'processual, experiential quality of meaning-formation; and the intense radiance of the shimmer aesthetic'.[42] He asserts that the composer's intent of employing this expressive tool beyond the reference to a particular cultural tradition (as an orientalist approach) is in many ways instigated by its aesthetical value –'the sheer beauty of shimmer effects'.[43] For the composer, these 'effects' are tools in her artistic search for expression of beauty and a path to attaining the *intensity* of experience:

> My focus on this 'pattern language' level of Aboriginal culture is my way of approaching a knowledge system which utterly fascinates me but of which I clearly am not a part. Yet beyond cultural specifics, on an intuitive level, I am able to appreciate the sheer beauty of shimmer effects and the intensity of Aboriginal art, music, and performance. This intensity is something I want to bring to my work.[44]

[41] Lim, 'Staging an Aesthetics of Presence', *SEARCH Journal for New Music and Culture*, 6 (2009), p.4, http://www.searchnewmusic.org/lim.pdf [Accessed 2 June, 2019], states: 'I have written a series of compositions in which I have tried to explore aspects of these ideas, especially in regard to the aesthetics of shimmer and the shimmer effect that arises from the interactivity of vertical layers'.
[42] Rutherford-Johnson, 'Patterns of Shimmer', p.3.
[43] Lim discusses this in 'Staging an Aesthetics of Presence', p.4.
[44] Ibid., p.4. In my research and performance I came to understand the multivalent dimension in Lim's music and its expression of 'beauty' independently of any cultural reference. For example, I hear the repeated rhythmic motif of harmonics connected by short *glissandi* (bb. 42–43) as the sound very closely associated with the well known Aboriginal instrument – didgeridoo; however, I employ this textures' expressive potential for the particular sound effect and as a manifestation of *intensity*, rather

The preface to the score contains the composer's explanation of the notational signs related to the timbral effects and a brief reference to Australian Aboriginal aesthetics of 'revealing and concealing'. From the score's opening page the performer is directed towards the interdisciplinary dimension of the genesis of *Invisibility* and the chain of the complex associations embedded in the fabric of the piece:

Invisibility, Preface to the score:

> Timbral indication
> *Invisibility* is part of my ongoing investigation into an Australian Aboriginal 'aesthetics of presence' in which shimmering effects both reveal and hide the presence of numinous. The work is a study in flickering modulations between states of relative opacity/dullness and transparency/brightness, between resistance (noise, multiphonics and other distorted sounds) and ease of flow (harmonics, clear sonorities). Striated, shimmer effects are created in the interaction between the competing planes of tension held in the retuned strings as they are affected by fingers and the varied playing surfaces of the two bows travelling at changing speeds, pressure and position.

The core intent in Yolngu paintings is to re-create the sacred design that is the property of a clan – this is realised through the ritual that endows the painting with spiritual power. [45] The title of the piece might refer to the design made invisible after being completed; the 'hidden' design might be subjectively associated with some recurring textural confluences: the 'flashes' of its contours 'breaking through' the pulsing cross-hatching patterns (Ex. 3.3 a/b/c/d/e). The rapid string-crossing formations of various durations are elaborated with rasping half-pressed harmonics, accents, trills and 'noise' produced by the circular bow technique that destabilises the rhythmical pulse.

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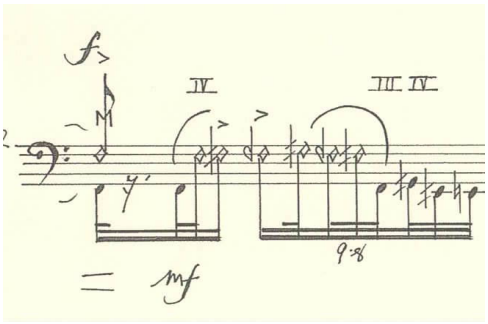
than emulating the 'Aboriginal' music. In this focus on intensity in artistic expression and performance, Lim shares a common ground with James Dillon (see Chapter 2.3 'Dillon's views on performance').

[45] Morphy, 'From Dull to Brilliant', p.26.

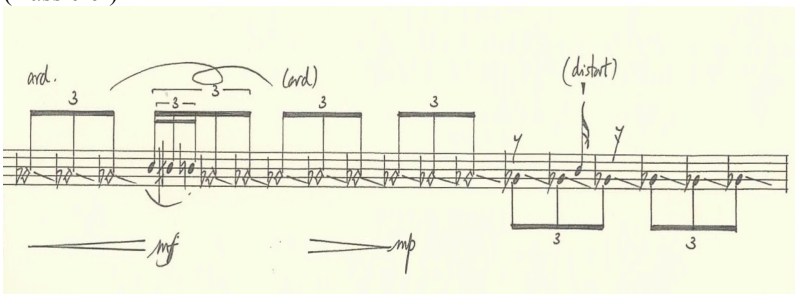
Ex. 3.3 a/b/c/d/e, *Invisibility*: the pulsing cross-hatching patterns

Ex. 3.3 (a), b. 2

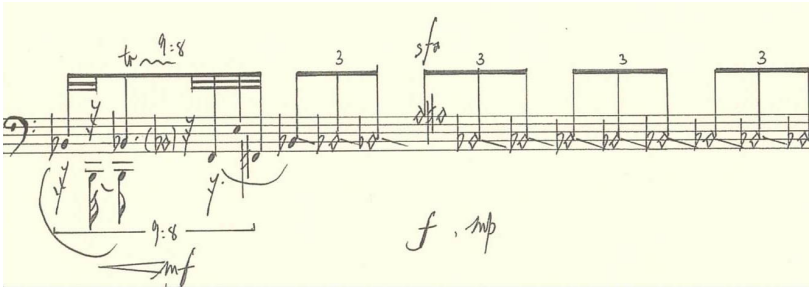


Ex. 3.3 (b) *Invisibility*, b. 42

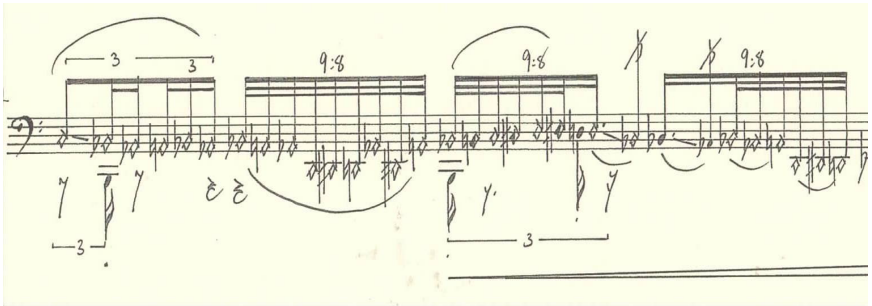
(Bass clef)



Ex. 3.3 (c) *Invisibility*, b. 43

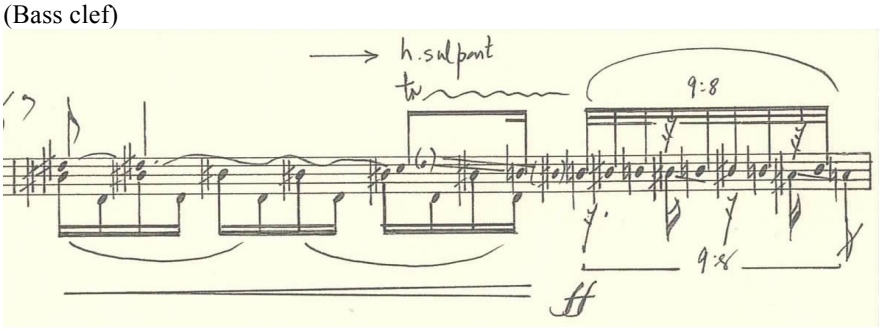


Ex. 3.3 (d) *Invisibility*, b. 44



Ex. 3.3 (e) *Invisibility*, b. 47

(Bass clef)



In the composer's words, 'the "invisibility" of the title of the piece is not about silence, for the work is full of sounds. Rather [...] I am working with an idea of the invisible or latent forces of the physical set-up of the instrument'[46] – in the same way as the process of creating paintings employing the cross-hatching techniques aims to achieve the effect of shimmering surfaces; in this process, the material forces and spiritual intensity are integrated to provoke and utilise the dynamics of transformation.

3.2.2 The Concept of Indirect Gaze and Transformation

The fluctuating sound in the first two parts of *Invisibility* enacted by the guiro bow and the traditional bow's unstable motion creates contrapuntal textures wrought by cross-hatching and 'hidden' patterns. The overlaying mesh obscures the body of the main design diffusing the 'gaze' – the listener's audial perception of the complete 'painting':

> In Aboriginal visual arts, iridescence, optical effects [...] and shiny, bright hues are valued for their suggestion of power and in that suggestion also provides a veil against the full force of that power. The shimmer both reveals and conceals. At the same time, these effects are also often ritually obscured, veiled, or made dull in order to further protect onlookers from those same forces.[47]

Cross-hatching technique in Yolngu paintings is the tool for transformation of the 'dull' object into a vibrant entity endowed with the Ancestral power, which enables transfiguration of the state of consciousness into the heightened, ecstatic state: when 'the excitement of ritual performance creates energies and emotions that in turn

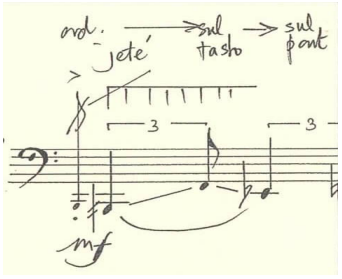
[46] Lim,'Staging an Aesthetics of Presence', p.4.
[47] Ibid., p.2.

reinforce the power of the ancestors'.[48] The technique of cross-hatching must be precise and fluent so the paintings are seen to combine 'a sense of vibrant surface movement with clarity of form [...] Forms emerge with clarity but then shift with the movement of the eye.'[49] Performing *Invisibility* involves the technical agility combined with the intense focus on shifting forms (patterns hidden within the flow).

In the process of mastering the work, I have become attuned to this heightened state of audial and kinesthetic awareness and the exigency of following the emerging patterns that dissolve with 'the movement of the eye'. When working away from the instrument with the score, I discern the recurring shapes and their variations (Ex. 3.4).

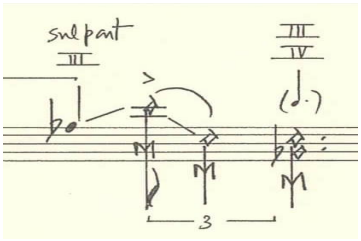
Ex. 3.4 *Invisibility*: the recurring shapes and their variations in bb. 3, 5, 12, 14, 34, 59

b. 3



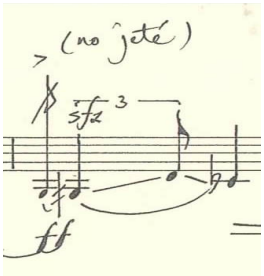
b. 5

(Bass clef)



b. 12

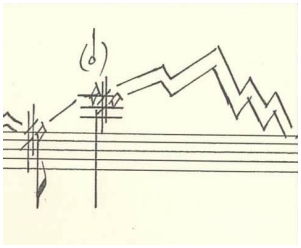
(Bass clef)



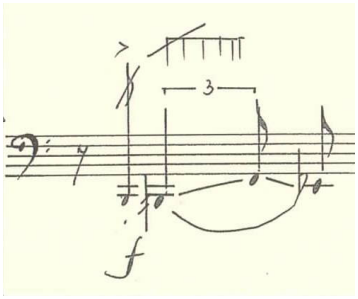
[48] Morphy, *Aboriginal Art*, p.5.
[49] Ibid., pp.184–185.

b. 14

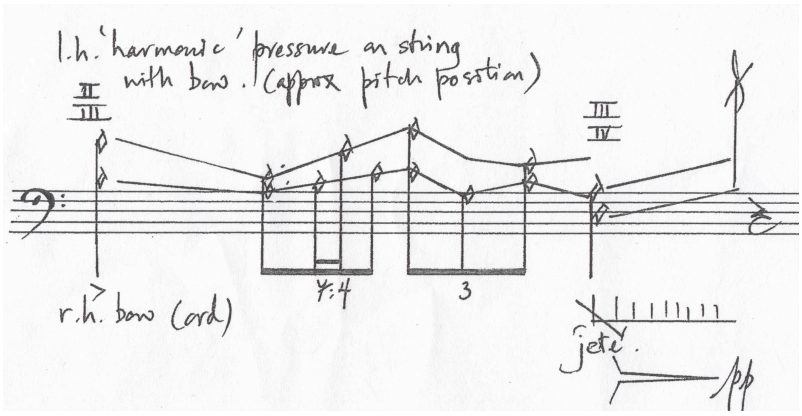
(Bass clef)



b. 34



b. 59 (a 'memory' of the shape invoked by the two bows)



A quest for staging a 'pure presence' is the core idea of the composition – for the performer it means to direct the effort towards the freer and more interactive physical relationship with the cello, searching for the sound, physical gestures and the quality of *liveness* within the interpretative space. Drawing on the cross-hatching as a part of a ritual, rhythm, repetition and patterns evoke the ritualistic character of the piece. However, in performance these patterns 'evade' the direct gaze, as, by nature, they inhabit the transitional dimension – the state that is determined by the invisible processes. In this sense, *invisibility* and *visibility* might be understood as both state and action. In relation to the score, the *shimmer* might be thought of as the agency in the score-performer relationship: between the written score as a direction for

performance and the idea of creating and re-creating the 'ritual' as intended by the composer, in which the score is 'invisible' and live performance functions as the 'cross-hatching' process.

Knowledge is not static but shifting, always provisional; as noted by the composer, 'the cultural knowledge, whether expressed in language, in art, or in ritual has a highly multivalent structure of "surfaces" and "depths"'.[50] *Invisibility* is part of exploration of these depths, which is approached not as an orientalist enterprise, but as an aesthetical and philosophical quest through the medium of the cello.

3.3 Expressive tools

3. 3.1 Extended Techniques

In *Invisibility*, the range of the extended techniques corresponds to the concepts of flux and shimmer. Among the technical tools, the most prominent are the guiro bow and the array of harmonics/multiphonics that embody the interplay between the transparent and opaque tone qualities (Table 3.3). Another notable feature is the simultaneous use of the two bows; the final part presents a particular challenge of holding the guiro bow in the left hand and co-ordination between the two bows.

Table 3.3 *Invisibility*: the extended techniques

Bow hand(s)	**Left hand**
Guiro bow	Harmonics (natural and artificial)
Two bow technique	Multiphonics
'Sweeps' – lateral and tremolo	Microtones
'Circular' bow	*Glissandi*
Sul ponticello and *h.sul ponticello*	Trills
Sul tasto	Combined techniques

The work is written for the unusual *scordatura* B flat-F-D-D sharp. This *scordatura* is, in itself, problematic as the tension of the A string tuned down a diminished fifth (to the D sharp) is drastically altered which demands adjustment in bow action (pressure, distribution and speed) in string crossing. Additionally, the unorthodox tuning is complicated by an unpredictable quality of response of the

[50] Lim, 'Staging an Aesthetics of Presence', p. 3.

strings to the guiro bow – in the composer's words, this creates 'an irregular "topology"' for the performer.[51] Through this new topology

> a more interactive playing surface is created where the cello is not just an instrument that is somehow passively acted upon but has torque, has lines of forces that direct how it is to be played. In a real sense, the cello also plays the musician and governs the shaping of the musical sounds in a very direct way.[52]

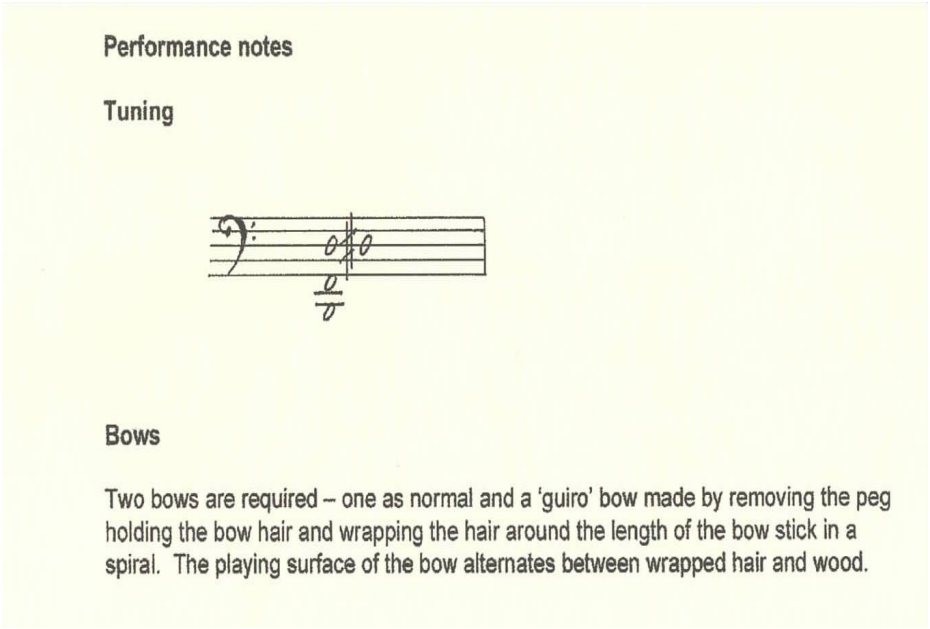
The idea of the instrument 'leading the player' is an important concept in Lim's musical thinking that challenges the performer to (re) consider his/her physical, instrumental/technical and the emotional aspects of playing. For Lim, the timbre and structure are embedded organically into the totality of the composition and performance process. Giving the examples of some of her chamber works, Lim stresses this point:

> In my short solo/duo pieces, 'Amulet' (viola), 'Philtre' (violin or hardanger fiddle), 'Inguz' (clarinet & 'cello) & also the pieces for koto, the timbre and the tuning of the instrument is the musical material itself. The pieces are simply a stroking/resonating of the instrument (as if it were a complex kind of gong) as well as an exploration of the bodily relationship between player and instrument. 'Amulet' in particular, because of some more unusual bodily actions (wiggly bowing for instance), accentuates the impression that it's the instrument playing/ acting on the musician rather than the other way round.[53]

In this sense, in *Invisibility*, the guiro bow is 'acting' on the cellist as a catalyst in the morphologies of the sound and kinaesthetic awareness. The composer's notes explain the *scordatura* requirement, the graphic indications for various types of harmonics and bow actions (Exx. 3.5 and 3.6)

[51] Lim, 'A mycelial model', p.5.
[52] Lim, 'Staging an Aesthetics of Presence', p.4.
[53] Saunders, 'Interview with Liza Lim'.

Ex. 3.5 *Invisibility*, Performance notes: *scordatura* and two bows

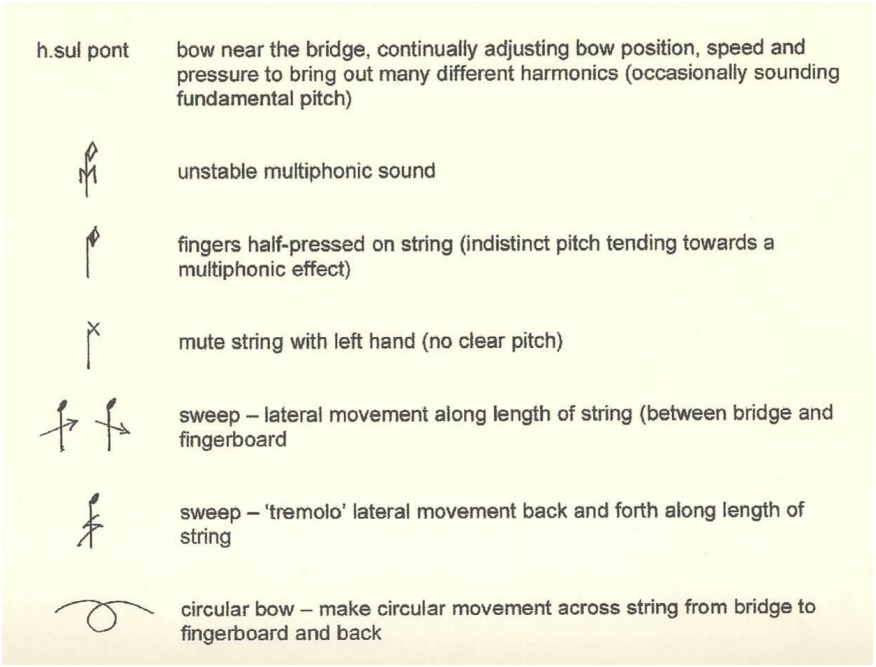


The new 'topology' consists of the two elements – *scordatura* and two bows, which enlarge the area of technical complexity at the levels of attention, sensitivity and technical agility in both hands. The cellist has to 'de-tune' his/her kinaesthetic sense of the bows' weight in the first two sections (bars 1–30 and 31–53), the balance between them in the final part (bars 54–61) and the unanticipated frequencies of the strings' vibrations in response to their actions. The guiro bow itself will be discussed in Part 3.3.2 – in this part I will examine harmonics and multiphonics from technical and performative perspectives.

As described by Ellen Fallowfield, 'a multiphonic is the simultaneous sounding of two or more harmonics on one string. The component tones of multiphonics can be difficult to predict, but with practice their reliability can be improved'.[54]

[54] See the detailed discussion on the subject in Ellen Fallowfield, 'Cello map: a handbook of Cello technique for performers and composers'. (PhD Thesis, University of Birmingham, 2010). Also, for the current information and comments, see the website 'The Cello Map', http://www.cellomap.com/meta/about.html [Accessed 2 June 2019].

Ex.3.6 *Invisibility*, Performance notes: timbral notifications



The graphic signs above relate to the left- and right-hand techniques: *h.sul pont*, multiphonics of various densities and colours, and the sound without a clear pitch. The gradations between the stopped tone and harmonics, and between the pure harmonics and multiphonics are produced by varying the degrees of pressure of the left fingers on the string – in the case of multiphonics, on the non-harmonic nodes.

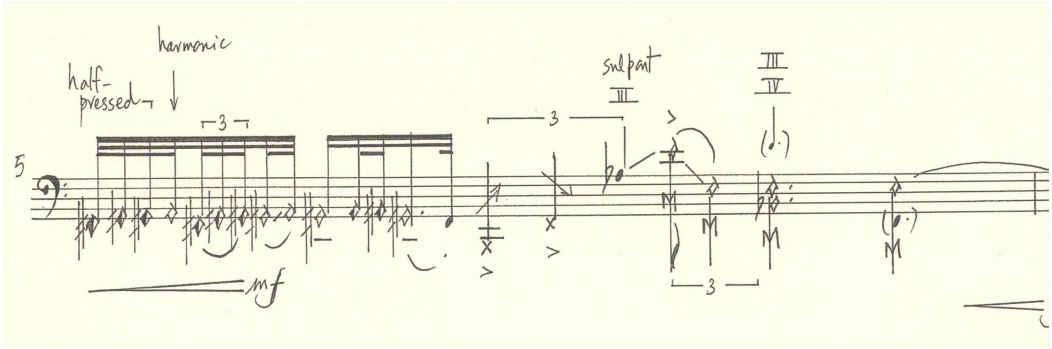
Valerie Welbanks divides the stopping pressure in harmonics into four categories: high, medium, low and very low pressure harmonics: 'Finger pressure will affect the timbre of a harmonic. As it increases, so the harmonic's pitch sharpens because of the increase in string tension [...], and the overtone content weakens'.[55] The '*h.sul pont*' refers to the multiphonics produced by the bow. A similar method is described by Welbanks as 'overpressure harmonics':

> An increase in bow pressure while maintaining bow speed and point of contact will create a distortion in the sound quality. While there are endless subtleties to this, it is a worthy experiment to determine for an individual cello and bow how much pressure can be added before the bow sticks to the string in an irregular manner.[56]

[55] Valerie Welbanks, 'Foundations of Modern Cello Technique. Creating the Basis for a Pedagogical Method'(PhD Thesis, Department of Music Goldsmiths College, University of London, 2016), p.51.
[56] Ibid, p.97.

Lim's compositional method is marked by her strong focus on the sound and its fluctuating, permeable and tactual properties: 'Central to my compositional language has been a concern to work with the grain of materials in a close listening to the "inner world" of sounds and to compose in a way that emphasises the tactile and haptic.'[57] Harmonics and multiphonics are the main type of the left-hand techniques that require fluidity and a heightened sense of tactility for navigating the scintillating 'patches' of pure and impure harmonics, where the natural harmonics provide the reference points on the fingerboard. The bow techniques mirror this fluidity in producing variations of the 'pure' and 'impure' sound at the same time, responding and continually adjusting to the occasional 'accidents' and 'slippages' in the harmonics. Within this subtly coordinated body of sound, the 'map' of the piece is drawn with the ornamented motifs that generate the rhythmical patterns throughout the score (Ex. 3.7).

Ex. 3.7 *Invisibility*, b. 5

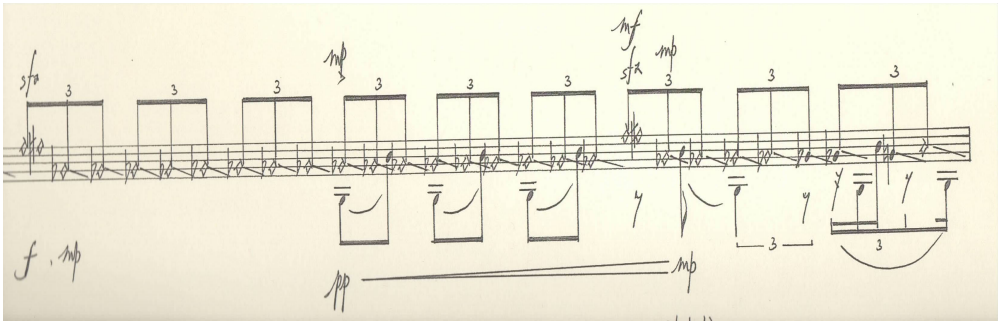


As an organic part of the texture, *glissandi* and trills are employed throughout the piece to intensify the shimmering sonorities as embellishments and rhythmic pulse. The repeated short slides in bars 42–45 (Ex. 3.8) and bar 48 establish a regular pulse; with increasing intensity the material is moving towards the final part where the two bows 'meet'.

[57] Lim, 'A mycelial model', p.5.

Ex. 3.8 *Invisibility*, b. 43

(Bass clef)



The physicality of friction between the left fingers and the strings in this section and its visible pattern mirrors the fricative nature of the action of the guiro bow in the preceding part – this notion of friction and the erotic quality of its expressive capacity is explored by the composer in *Invisibility* and her other works. The longer *glissandi* that are mostly played in harmonics impart the 'liquid' constituent to the sonorities. The variety of these techniques is shown in Table 3.4.

Table. 3.4 *Invisibility*: the three types of *glissandi*

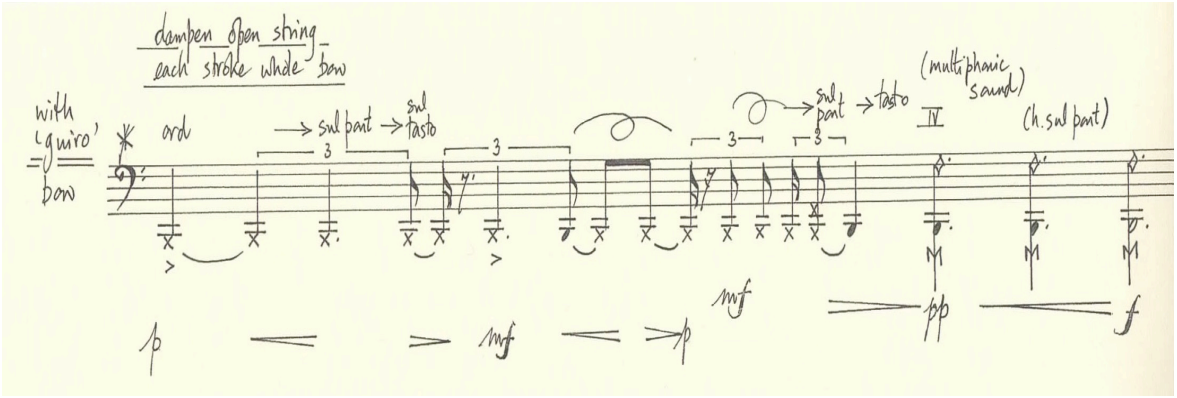
Jeté	bb. 3, 34
On the string	bb. 5,15, 32 (*sul pont*); 12, 13 (*sul tasto*); 12,18,19, 20, 30, 34 (*ordinario*)
Combinatorial	bb. 15 (with trill and *tremolando*); 20, 34 (with *tremolando*); 58, 59 (two bows: *jeté*, *col legno*, *sul ponticello*, *sul tasto*)

In creating the interpretative space, both the composer's philosophy and the style of notation have to be considered as part of the unified approach. Following the composer's instructions closely, particularly in the context of the 'serrated' guiro bow, I discovered the 'secret' spaces within the score's 'map'. Rutherford-Johnson comments on this aspect of Lim's music: 'beneath what the analyst can read on the page, Lim's notation contains something secret that can only be accessed through *doing*.'[58] In each performance, the sound was strikingly individual with some unexpected colours, clusters of noises and shifts in articulation – the shapes and patterns made 'visible' within the layers of shimmering textures in the moments of 'suddenness': 'There is a phenomenon of suddenness in which invisible forces spill into an embodied visibility, a tangible erotic quality that attends these moments of

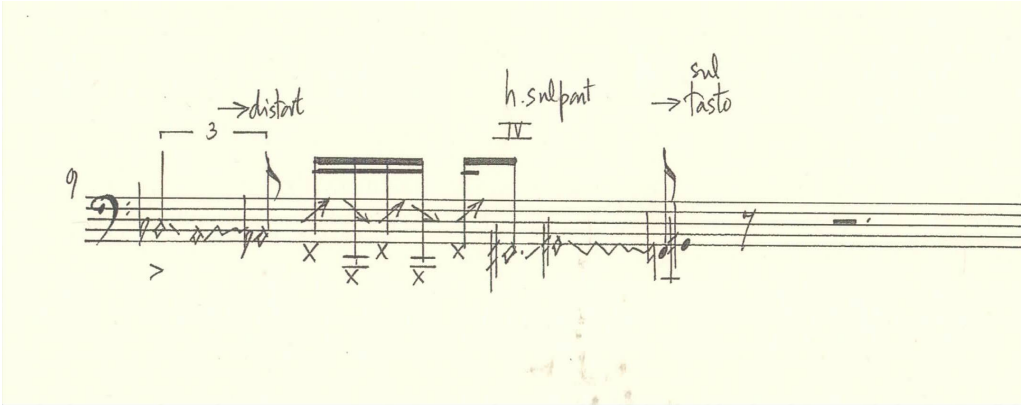
[58] Rutherford-Johnson,'Patterns of Shimmer', p.9.

intensification and resonance.'[59] The singularity of these secret spaces that are revealed and experienced in the moments of transitions between the states of visible and invisible are elucidated by Lim: 'Qualities of 'shimmer', 'brightness' and 'iridescence' which both veil and point to the presence of a timeless spiritual reality'.[60] The high degree of opacity is achieved by muting strings to produce the sound without a clear pitch. 'Muted' sounds occur in bars 1, 5–7, 9, 20, 21, 25, 29, 30 – in all cases except bar 6, they are combined with the 'circular' bow motion or 'sweeps' (Exx. 3.9 and 3.10).

Ex. 3.9 *Invisibility*, b. 1 (circular bow)



Ex. 3.10 *Invisibility*, b. 9 ('sweeps')



Lim describes the actions for achieving the desired effect – knowledge that can only be acquired from close collaboration with a particular performer:

[59] Lim, 'Staging an Aesthetics of Presence', p.1.
[60] Lim, 'Pearl, Ochre, Hair String', *lizalimcomposer.com*, 2019, https://lizalimcomposer.com/pearl-ochre-hair-string/ [Accessed 3 June 2019].

> At the most muted end of the timbral scale, the palm of the left hand is employed to radically dampen the strings so that one hears the dry brushing of bow strokes with only barest suggestion of pitch. The right hand that wields the bow is also calibrated to bring the different gradations of weight or distortions to the string both vertically and in a lateral direction.[61]

From my own experience, the left palm must be positioned and *half-pressed* at any point on the fingerboard, avoiding stopping the string completely. The bow pressure has to be coordinated with the left- hand pressure in order to elicit the pitchless tone. In these variations of sound – the degrees of brightness and dullness, densities, vibrations, macro and micro fluctuations in dynamics – the left and bow hands are continually engaged in the finely tuned actions, interchanging their traditional functions. For example, the bow produces harmonics (*h. sul pont*) and the left hand is involved in drawing the (guiro) bow. Lim articulates this reversal of 'roles':

> The standard bow is in the right hand and the guiro bow in the left, its surface replacing the left hand's role in articulating steps in string tension. The guiro bow is used to touch the strings, sliding in repeated glissandi which mimic the repetitive sliding motions in the left hand heard earlier. The guiro bow replaces fingers whilst the standard bow takes on the character of the serrated surface transitioning from hair to wood as it is bounced and then quickly rubbed along the string between the bridge and the fingerboard.[62]

This fluid interaction and cooperative nature of exchange between the opposite forces – the traditional and guiro bows – might be interpreted in the light of the concept of Yin and Yang in the Taoist philosophy.[63] Kim Chow-Morris examines the process of balancing the energies of Yin and Yang in the traditional ensemble practice Jiangnan Sizhu, as a creative interaction between the musicians within the flow of performance:

> Foremost in this learning process is the development of an understanding of the 'yin-yang' techniques oijiahua and ranglu that allow each musician to have yudi (creative latitude) in their interpretation of a piece. The yang technique jiahua can be translated literally as 'adding flowers', and describes the process of ornamenting and melodically or rhythmically activating the gugan yin, or skeletal melody. The yin technique ranglu, conversely, maybe translated as 'giving way', and is the technique

[61] Lim,'Patterns of Ecstasy', p.32.
[62] Ibid., p.35.
[63] For the analysis of the Taoist conceptual framework see for example, Angus Charles Graham, *Yin-Yang and the Nature of Correlative Thinking* (Singapore: Institute of East Asian Philosophies, 1986).

> of simplifying the melody so as to allow another musician's more ornate version to come forward in the musical texture.[64]

This principle might be extended to the totality of the score's main elements and physicality of performance that is expressed by:

1. Independent but harmoniously balanced movements of the left and bow hands often moving in the opposite directions in the instances of the bow 'sweeping' upwards with the left hand moving in a downward direction on the fingerboard, as the two bows collaborate in creating the 'slippages' in the textures.
2. Interactions between the two bows (the standard bow leading a melodic line 'gives' the way to the guiro bow executing the 'ornaments').
3. Coordinated motions between the left-hand fingers (in playing natural harmonics, half-pressed harmonics and multiphonics).

'Sweeps' and circular bow movements feel 'unnatural', as the traditional bow technique aims to sustain a stable position of the bow at a precise angle to the string, and in parallel to the curved bridge. This requirement is crucial for producing a clear, full tone; however, for most of the time, playing *Invisibility* demands the opposite approach, which at the beginning feels counter-intuitive, going against the grain of what has been absorbed in any traditional training. The traditional bow is 'staging' the guiro bow's character and movements, thus the 'natural' traditional methods and the notion of instrumental technical stability are questioned. At the same time, the bow technique is enhanced by the new level of sensitivity and responsiveness, and a quality of 'mycelial aliveness':

> In this second section, the element of repetition or iteration brought to the music by the bumpy surface of the guiro bow is gradually magnified. The action of the standard bow stroke is also disturbed by sudden lateral sweeping movements in a 'staging' or magnification of the tendency to slippage and distortion observed in the guiro bow.[65]

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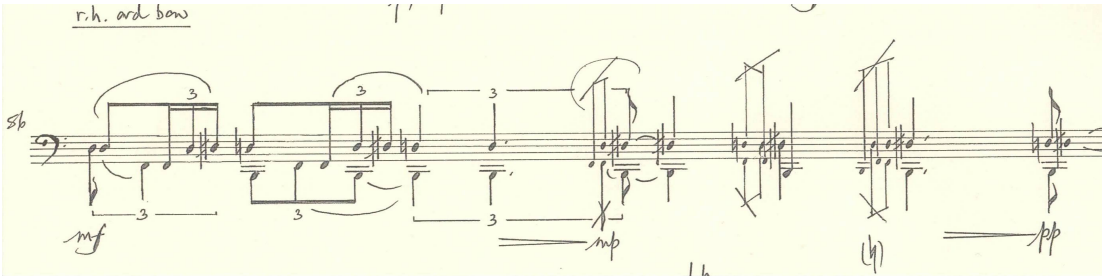
[64] Kim Chow-Morris, 'Going with the Flow: Embracing the "Tao" of China's "Jiangnan Sizhu"', *Asian Music*, 41.2 (2010), 59–87 (p.73).
[65] Lim, 'Patterns of Ecstasy', p.34.

In the final part the two bows' differences are reconciled as their individual qualities fuse into a delicately ornamented statement. The main technical issue in this section is coordinating and positioning the bows in relation to each other in the space between the fingerboard and bridge so the guiro bow is interposed in the openings within the 'mesh' of the inter-woven textures (Ex. 3.11).

Ex. 3.11 *Invisibility*, b. 56



In her writings and interviews, Lim explicates the core of her compositional philosophy and practice:

> Central to my compositional language has been a concern to work with the grain of materials in a close listening to the 'inner world' of sounds and to compose in a way that emphasises the tactile and haptic. The kinaesthetic dimension of the performer's touch on the instrument is a key part of the musical information for it is through the haptic sense that one comes into contact with the grain of the sound.
> This aspect of a primacy of the kinaesthetic level in the music can be seen quite clearly in the solo 'cello work, *Invisibility*.[66]

As discussed earlier, Lim's musical ideas are nourished by her multi-disciplinary research. Her music reflects the tendency to integrate into her compositional practice the ideas, images and associations from various disciplines such as biology, ecology and architecture. The architectural ideas and vision of Pallasmaa, for example, are employed to elucidate her approach rooted in the tactile and sensuous relationship with the instrument that resonates with the Finnish architect's idea of the primary importance of the touch in our interactions with the environment:

[66] Lim, 'A mycelial model', p.5.

> The eyes want to collaborate with other senses. All the senses, including vision, can be regarded as extensions of the sense of touch – as specialisations of the skin [...]. Even the eye touches; the gaze implies an unconscious touch, bodily mimesis and identification.[67]

This notion of realignment of senses calls for a more refined interaction with the score of *Invisibility* (which is printed in a hand-written format – the style is expressive, generously spaced and clear); 'touching' the written text with eyes intensifies the tactile and audial senses.

3.3.2 Guiro Bow

The guiro bow was developed and introduced into contemporary performance as an additional tool of expression by the Australian multi-instrumentalist and composer John Rodgers (b. 1962). Rodgers composed and collaborated with a number of prominent contemporary and experimental music performers and ensembles, including ELISION, for whom he wrote *Places in Hell* (2000), *Inferno* (2000) and *TULP: The Body Public* (2003–2004). The bow can be made by circumvolving the screw to loosen the hair and removing the frog from the nest; the hair is then wrapped around the bow stick and the frog secured with a ribbon (Ex. 3.12).

Ex. 3.12 My traditional bow and guiro bow

The guiro bow might be associated with the painting brush (marwat) especially produced for cross–hatching. As described by Morphy, 'The marwat is made by tying a length of human hair to a short stick [...]. The hair is bound firmly to the lower part

[67] Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses* (Chichester: John Wiley & Sons. 2nd Edition, 2005), p. 42. Lim quotes the Finnish architect, who 'celebrated a fragile architecture of imperfections, differences and discontinuities over one of unifying logic' in 'A mycelial model', p. 11.

of the stick by winding a length of string around it.'[68] The significance of the cross-hatching technique is highlighted by the qualities required from this special brush, which is referred to as a living entity. Morphy quotes the expressions used by the artists: 'I use my marwat to think with' and 'my marwat is clever.'[69] The appearance and attributes of an individually assembled guiro bow are determined by the degree of tightness of the hair around the stick and the density of the spiral – the spaces between the hair and wooden surface. Although this will be limited by the length of the hair ribbon there is some scope for experimenting with the proportional variants and elasticity of the two materials – the hair and the wood. The guiro bow is a dynamic entity that 'lives' through the cycle of performances and 'matures' as a material object and as a part of the interpretative space; its morphing properties of looseness and breakages continually affect the sound and articulation. The bow hair is in the state of constant transformation changing in texture and thickness 'growing' the additional layers. Interaction between these layers on various planes within the guiro bow itself (between the stick and the hair), within the hair and the degree of looseness and accumulation of the torn strands bring in the unpredictable tonal and rhythmical detail (Exx. 3.13 and 3.14).

Ex. 3.13 My guiro bow at the first stage of working on the piece

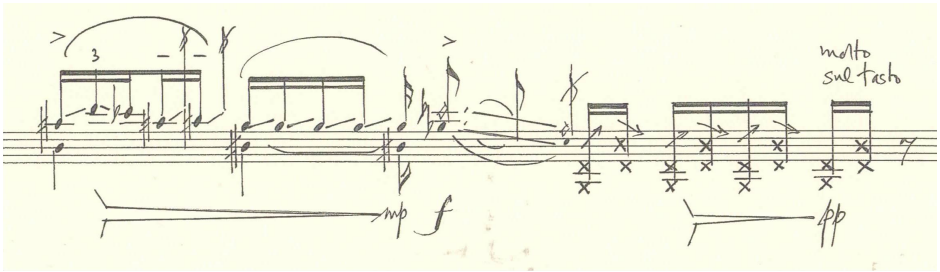
[68] Morphy,'Too many meanings', p.183.
[69] Ibid., p.186.

Ex. 3.14 The condition of the bow after three months of practice and two performances

The bow responds to the cellist's individual performance style and intentions, physicality of playing and tactile awareness. For example, the dynamic contrasts executed with the guiro bow in the first part of *Invisibility* require some adjustments, in the way of the action (speed and pressure) and weight distribution, in playing *p*, *pp*, *f*, *mf* and *ff*, *sforzandi* and the abrupt and gradual transitions in the dynamic levels: the resulting sound will differ in each performance (Ex. 3.15).

Ex. 3.15 *Invisibility*, b. 30

(Bass clef)



The guiro bow's percussive qualities and graininess of sound are prominently featured in Lim's orchestral work *Pearl, Ochre, Hair String* (2009-2010). In this work, which begins with the quotation of a short passage from *Invisibility* played with the guiro bow, the composer extends the guiro sound to the double bass with added percussions comprised of various guiro instruments: 'bamboo guiros, reco-recos (the Brazilian samba instrument made out of metal spring-coils that are scraped), Thai wooden 'frog' scrapers and a barbeque grill.'[70] Lim highlights the 'fricative' aspect as

[70] Lim,'Patterns of Ecstasy', p.38.

one of the essential characteristics of the guiro family, and the way it infuses the global sonorities of the piece:

> The fricative qualities of this kind of sound production made up of both 'solid' and 'liquid' elements – distorted noises and granulated effects contained within a flow of sound – also make their way into how the other instruments of the orchestra are employed.[71]

The guiro cello bow combines these two opposing elements – the fricative action of the hair and the smooth surface of the polished wooden stick that slides along the metal string with an almost imperceptible sound. In two instances (bars 14 and 22) the composer instructs the cellist to play with 'slow bow (emphasise gritty hair noise)' – this requires robust fricative action of the bow pressed into the string.

Originating in South America, the percussive instrument the Guiro belongs to the family of idiophones and is classified by Hornbostel and Sachs as a 'scraped idiophone'.[72] The scraped idiophone is described in the revised Hornbostel-Sachs Classification of Musical Instruments:

> The player causes a scraping movement directly or indirectly: a non-sonorous object moves along the notched surface of a sonorous object, to be alternately lifted off the teeth and flicked against them; or an elastic sonorous object moves along the surface of a notched non-sonorous object to cause a series of impacts.[73]

The type of guiro that is described as the gourd giiayo, has a long shape and two holes, with parallel incisions – an object is drawn rhythmically across the cuts to make a scraping noise (Ex. 3.16).[74] The body of the instrument is the 'bow' and the object is the 'string'.

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[71] Ibid.
[72] John M. Schechter, James Blades and James Holland, 'Güiro', 2001, in *Grove Music Online* http://www.oxfordmusiconline.com/subscriber/article/grove/music/12008?q=guiro&search=quick&source=omo_gmo&pos=1&_start=1#firsthit [Accessed 16 June 2019].
[73] Revision of the Hornbostel-Sachs Classification of Musical Instruments by the MIMO Consortium http://network.icom.museum/fileadmin/user_upload/minisites/cimcim/documents/H-S_20classification_20final_20version_20_282013_29_20without_20editorial_20markings-2.pdf [Accessed 18 June 2019].
[74] Harold Courlander, 'Musical Instruments of Cuba', *The Musical Quarterly*, 28. 2 (1942), 227–240 (p.239).

Ex. 3.16 Gourd giiayo

©2001 Carla R. González Photography, courtesy of the Grinnell College Musical Instrument Collection <https://omeka1.grinnell.edu/MusicalInstruments/>

The simplicity of the design allows for variations in shapes, materials and sizes of the guiro; however, the central characteristic of the instrument is the fricative action:

> The performer holds the *güiro* in the palm of one hand; depending on the design, the vessel rests in the palm, or has a couple of holes in its wall for the thumb and a finger, or has a handle to be grasped. The beater is held in the other hand and swept across the textured surface with a brushing-like motion, usually in two directions against the grain of the ridges. The instrument is typically scraped rhythmically and its dry sound usually interlocks with rhythms played on other idiophone and membranophone instruments to produce recognizable grooves for dances.[75]

For Lim, *friction* is a conceptual category in her compositional philosophy as well as the material tool for 'peeling' of the layers of sound. As a tool, the guiro bow's frictional property enriches the sound palette opening possibilities for discovering Pallasmaa's image of 'fragile architecture of imperfections'.[76] The composer articulates the notion of friction: 'In exploring these layered shifting structures, I have particularly focussed on the materiality of sound and the notion of friction as action of repetition as a way of both uncovering and covering up patterns'.[77] Talking about her work for an ensemble of nine musicians *Winding Bodies: 3 Knots*, she further states: 'In my work, I focus on states of high-static friction by applying fluctuating levels of bow pressure against different transverse

[75] Grinnell College Musical Instrument Collection online, Roger Vetter (Compiler); Mike Conner (Site Developer), https://omeka1.grinnell.edu/MusicalInstruments/items/show/390 [Accessed 12 June 2019].
[76] Lim discusses Pallasmaa's ideas of 'haptic, sensuous architecture' in her article 'A mycelial model', pp.11–12.
[77] Lim, 'Patterns of Ecstasy', p.32.

movements to create a vocabulary of noises and glitches'.[78] In Lim's compositional philosophy, the notion of *knots* might be understood as a contributive factor to the collaborative process, part of the texture and as a subjective structural tool. Although the three elements are intertwined and overlap one might differentiate their functions by looking into Lim's references to this notion. As a part of the fluctuating textures of the composition, the physical knot that I made to tie the torn strands of the bow hair just before one of my performances, presented an opportunity for experiencing a discrete dimension of the 'mycelial aliveness' within *Inivisibility*'s sound processes as they unfold in live performance (Ex. 3.17).

Ex. 3.17 My guiro bow with a knot

In this instance, within the 'complex creative ecosystem' [79] of the performer/cello/guiro bow, the knot represented physical manifestation of the idea of 'intentional uncertainties'. Referring to her work *Tongue of the Invisible* Lim suggests: 'The embedding of intentional uncertainties into the work, and their negotiation by the musicians [...] perform a "mode of becoming" in which these deliberately bewildering elements call upon the collaborative creativity of the group'.[80] In *Invisibility*, the '"embedment" of intentional uncertainties' involves the performer in the collaborative creativity with the guiro bow, which expresses a particular attitude 'as a framework for interacting with another, whether a person, an environment, an artwork or whatever'.[81] In a material sense, the knot that I had to make as the emergency response to the torn guiro bow hair was spontaneously

[78] Lim, 'Intervention. Knots and other forms of entanglement', in *Distributed Creativity*, p.209.
[79] Clarke, Doffman and Lim, 'Distributed Creativity and Ecological Dynamics: A Case Study of Liza Lim's 'Tongue of the Invisible', p.659.
[80] Ibid.
[81] Saunders, 'Interview with Liza Lim'.

integrated into the musical fabric of the composition and the performative gestures. As an additional obstacle in drawing the bow the knot provoked the new energies of resistance, until the moment of its unraveling into the two stands. The 'sprinkles' of individual hair randomly touching the strings and occasionally being entangled into the mesh creating the moments of resistance and breakages in the flow activated the delicate 'mycelia' in the composition's living architecture.

The process of mastering the work reveals the new paths to connecting to the instrument through the uniquely 'Limian' tactility and discovery of the cello's 'inner sound'. The composer acknowledges the importance of touch in her approach:

> I also like the sensual quality of the musician's touch on the instrument before and after a sound is made. For me, in those moments, the performer continues to contact the sound in the elusive zone from where sounds arise and then dissipate.[82]

At this still unexplored level of sensitivity of touch, coordination and pressure, listening *with*, *to* and *through* the fingers opens the new territories of the senses and physicality of playing. This intensely tactile approach is internalised as the cellist begins to finely tune his/her senses through close listening, studying the score, practising, performing and recording. Lim's openness to the performer's individual qualities in instrumental technique and ways of thinking establishes creative zones; their elastic boundaries are tested with the musician's material tools and artistic inquiry, imagining and re-imagining the dynamics and spaces for collaboration and expression. This is possible only through the cellist's own personal experience, so 'playing the piece is not just a matter of negotiating the notes on the score; it also involves renegotiating the physical relationship to one's instrument. Exactly how this feels is known only to the performer'.[83]

3.4 Performance

In this final section of the chapter I will discuss the three interconnected aspects pertaining to live performance of *Invisibility*:

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[82] Ibid.
[83] Rutherford-Johnson, 'Comment: Contemporary strings. 1-Liza-Lims-Invisibility', *The Amati Magazine,* 29 October, 2014, http://www.amati.com/magazine/author/tjohnson/ [Accessed 10 February 2019].

1. Mastering specific techniques
2. Structural clarity
3. Engagement with the 'Limian' expression of the Ecstatic

The technical issues discussed in the previous section are organically embedded in the totality of the composition's interpretative space. The guiro bow and other extended techniques embody the anthropologically inspired context within the intent of exploring the possibilities of sound produced by the cello. The composer employs the techniques to investigate the notion of *shimmer* and the idea of instability, fluctuation and 'glitches', therefore the physicality of performance must comprise the cellist's preparedness for improvised adjustments and a refined sense of the time that these occurrences inhabit. The kind of technical mastery that embraces the skills and level of awareness to sustain the stability-within-instability in live performance can be attained through the traditional and 'extended' instrumental practice using the associative method. *Invisibility* presents a rich source of visual imagery, subjective associations within the singular Aboriginal cultural context and knowledge system of the *Dreamtime*. Commenting on her work with the bassoonist Alban Wesly, Lim elaborates on the kind of instrumental approach that prioritises

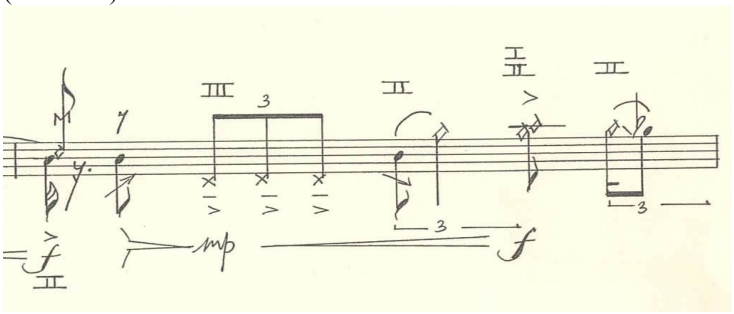
> the heterogeneous qualities of sonic materials, as opposed to the homogenizing impulse of 'classical' instrumental virtuosity. A different manner of virtuosity ensues as the performer negotiates more unfamiliar combinations of touch and breath to coax out a result. Close listening to so-called 'imperfections' where sounds catch, distort, break and breathe guides a sensual process of creating a music which has the fragile metamorphosing architecture of dream states.[84]

The 'mycelial virtuosity' is inexorably linked to the structure of *Invisibility*, which might be understood by looking at the 'hidden patterns', 'irregular repetitions' and the 'knots' (variations of the B-C motif). Rutherford-Johnson highlights the iterations of this recurring motif in bars 6, 10, 14, 18, 23 and 39, asserting that 'A certain amount of analysis of *Invisibility* is possible in terms of motivic developments, long-range structural connexions and so on.'[85] The B-C dyad appears for the first time in bar 6 (Ex. 3.18).

[84] Lim,'A mycelial model', p.12.
[85] Rutherford-Johnson, 'Patterns of Shimmer', p.7.

Ex. 3.18 *Invisibility*, b. 6

(Bass clef)



The direction within the piece is created by a particular pulse, which begins to emerge as the result of articulating the B-C motif as the elastic sonic 'knot' that expands and contracts through the variations in its shapes and duration. The fluctuating states of the motif diffuse the density of the textures and shimmering clusters, setting the subtle interplay of timbres and degrees of 'visibility' into a perceivable form.

Lim associates working with the sonic textures with the idea of weaving cloth – the metaphor for functionality and process in art and craft that applies to the creative framework of working with the hands in a particular rhythm responding to the living 'materials':

> If one imagines the vertical strings of the instrument as the 'warp' of the music, the horizontal bow movements weave an irregular 'weft' in which sonic knots of varied intensity and quality are literally 'caught by' and 'caught on' the strings through the interaction of actions that arise directly from the materiality of skin, bow hair, wood and tensile metal.[86]

The motivic 'knots' provide the reference points in the unfolding of the sound material. In addition to the instances of the B-C motif indicated by Rutherford-Johnson, it appears also in bars 8, 12, 23, 27, 38 (altogether in ten bars throughout the score, see Ex. 3.19) as harmonics, in single notes, double stops or as a slow tremolo. Rutherford-Johnson notes the subtle interactions within this 'zone' of the permutations:

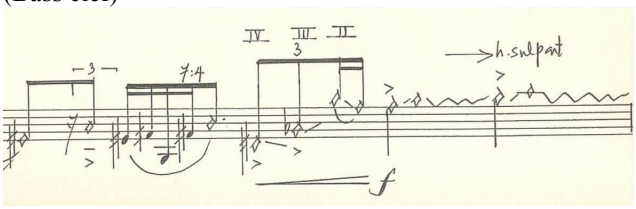
> The B–C motif [...] crosses D and A strings, and thus its development through the piece must be read not only as a series of permutations and transformations of the intervallic relationship, but also of the planes of tension between tight and loose strings.[87]

[86] Lim,'A mycelial model', p.6.
[87] Rutherford-Johnson,'Patterns of Shimmer', p.8.

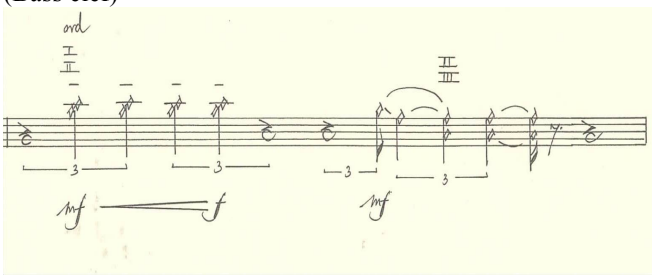
The eight motifs are played with the guiro bow and the two with the standard bow. Except bars 23 and 39, they are articulated with accents or strong *détaché* strokes.

Ex. 3.19 *Invisibility*: the B–C motif in bb. 8, 10, 12, 14, 18, 23, 27, 38, 39

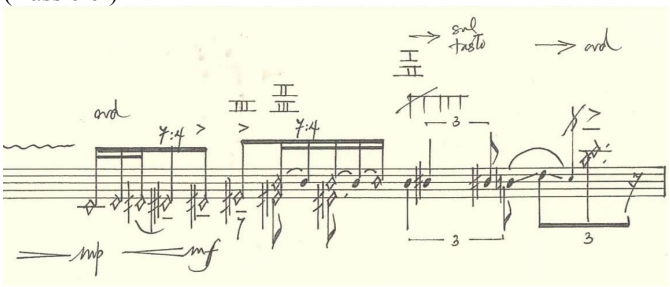
b. 8
(Bass clef)



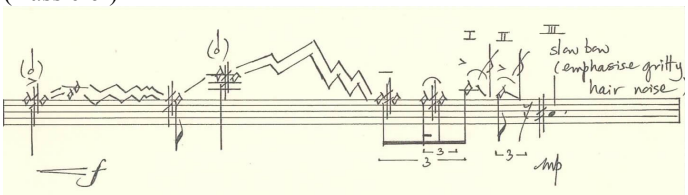
b. 10
(Bass clef)



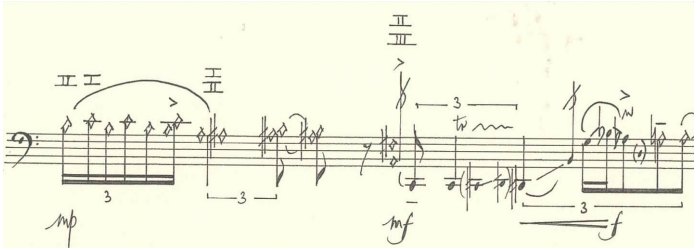
b. 12
(Bass clef)



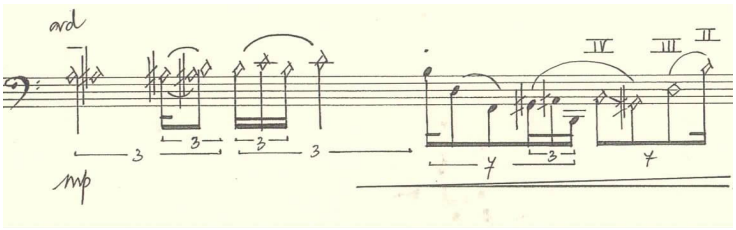
b. 14
(Bass clef)



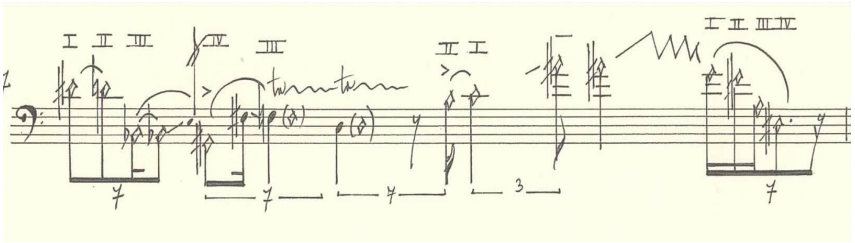
b. 18



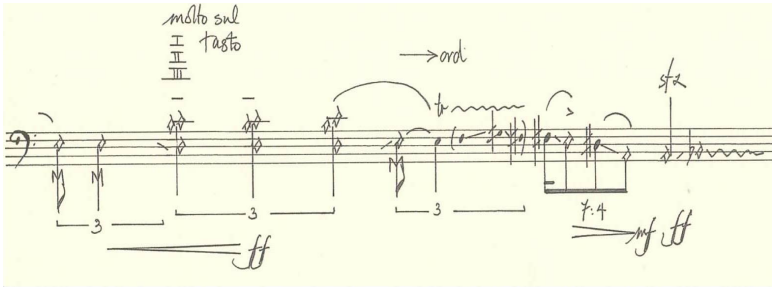
b. 23



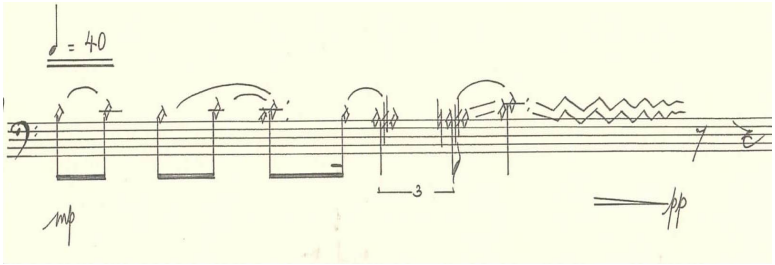
b. 27



b. 38



b. 39



The recurring ‘knot-motif’ might also be interpreted as an allusion to the temporal processes in live performance as articulated by Lim:

> I am really interested in irregular repetition when you pass through the same points in slightly different ways each time, and for me, this is an expression of how, I feel, one actually experiences time, not as something smooth, linear, unfolding, but something more glitchy and textured, [...] so it's much more unpredictable flow of time that I am interested in working with.[88]

By focusing on the 'irregular repetitions' of the B-C motif, the cellist can establish the sites across the meshwork of patterns and loops within the temporal process inexorably flowing towards the conclusion. In my performance, in these moments of 'passing through' the motif's irregular repetitions, I sense their 'hidden' meaning that in the Yolngu philosophy must remain secret reflecting the belief in the spiritual power that demands averting one's gaze. In performance this attitude is expressed by the interpretative gesture of 'glancing sideways' at these sonic entities avoiding any emphasis (i.e. slowing down), at the same time, acknowledging their significance on the structural plane.

At the beginning of working on *Invisibility*, I followed my artistic intuition; as my interpretation and a physical connection to the instrument through the particular techniques developed, I was in a better position to internalise Lim's sources of compositional ideas. In many ways my intuitive insight resonates with the composer's remark: 'What's important is the fact that there is a landscape in which there are these transitions happening, rather than it being about any particular state'.[89] The interpretative approach to *Invisibility* might be summarised by the following affirmation by the composer: 'The 'invisible' is given visible form whereby it can be dealt with, perhaps propitiated, acknowledged, examined, struggled with and momentarily integrated before being released again'.[90] The key expression, 'momentarily integrated before being released again', relates to the structural approach in performance – prioritising the overall shape by 'releasing' the events as they occur. The external aspects of performing *Invisibility* –unorthodox techniques, the guiro bow and the theatricality of playing with the two bows simultaneously – are simply the innovative tools for expression of the dialectical tension between 'visible' and invisible' and 'exploration of the unrepresentable', which is central to the

[88] 'Liza Lim – How Forests Think', at 3′42″.
[89] Lim, 'Patterns of Ecstasy', p.42.
[90] Ibid., p.28.

project.[91] Focusing on the permutations and transitions within the soundscape makes the performing and listening experience as powerful and spiritually invigorating as the composer envisaged. Lim draws parallels with the theatre in talking about a 'series of stage directions', illuminating the nature of intensity that is conveyed through performance:

> Something concealed is revealed; a curtain parts, a veil is suddenly lifted and in that lifting one also becomes aware of the frame, the stage. Through this framing, one begins to see divisions, patterns, and provisional orderings of the world. A play takes place: a play of raw forces in which the actors are invisible forces like time, gravity, magnetism – things which we can't grasp directly but which act on us, in us, through us. These unpredictable forces become perceptible to us through sensations of the body, through material qualities, through resonances, which offer not a representation of self (these cosmic forces are utterly nonhuman), but something at a more vital and primordial level–an intensification of being.[92]

The theatrical aspect of *Invisibility* therefore, might be realised through the intensity in performance ('intensification of being'), which will be in the state of consistent inconsistency in a sense of fluctuating and changing with each rendition, as a series of theatrical 'plays' of 'raw forces'. In his discussion of the 'sonic shimmer' and 'partitioning of the sound-continuum into an alternating on/off pattern' in relation to Lim's *Shimmer Songs* (2006), Rutherford-Johnson observes:

> When listening, the ear is in fact drawn to these surface effects, rather than the underlying rhythmic ground, which indeed is so obscured as to be almost inaudible. But it is there nevertheless, and constitutes part of the knowledge of the work, even if a knowledge accessed only by the performer or analyst.[93]

The underlying rhythmical ground in *Invisibility* can be accessed through the attention to the notated rhythm, even though the guiro bow 'obscures' the rhythmical clarity of some patterns. In my performances and recording, I aim to foreground the rhythmical liveliness and consistency of the pulse, which is most 'visible' in the section preceding the final part (bars 41–48, see my recording: 6′26″). My

[91] Cited in Lim, 'Staging an Aesthetics of Presence', p. 1: 'Painting is about rendering the invisible in visible form, and music about sounding the inaudible, each the expression and exploration of the unrepresentable'. Elisabeth Grosz, *Chaos, Territory, Art* (New York: Columbia University Press, 2009), p.22.
[92] Lim, 'Staging an Aesthetics of Presence', p 2.
[93] Rutherford-Johnson,'Patterns of Shimmer', p.5.

interpretation of the piece formed through my intuition and live performance experiences is supported by the composer's statement:

> Rather than 'writing pieces,' my work becomes more about creating ritual. One useful definition of ritual for me is that it is a mode whereby rhythmicized elements, moments of change, moments of transition towards and away from more unbounded states.[94]

The rhythmicised elements in this section intensify the development towards the revelation in the final part of *Invisibility* – the ecstatic 'chorale' played with the two bows – the expression of 'inexpressible'. Lim's poetic language enunciates the aspects of the erotic and ecstatic – the 'intensification of being':

> The two bows stroke the unsuppressed open strings, pushing and pulling across their surface, caressing the instrument from both sides in simple alternating movements. One hears the underlying template of the work laid out as a collection of instrumental resonances and friction sources'.[95]

She continues with the vivid imagery of this 'unbounded' state:

> And it is here that the work seems most ritualistic in performance. The simplicity of deep resonances imparts a monumental quality to the music whilst one becomes aware of the player's breathing body in the co-ordinated winglike movements of the bows crossing from both sides of the instrument.[96]

Playing with the two bows in this section becomes more 'natural' and technically precise by internalising Lim's image of the 'winglike' movements – the final scene that embodies the notion of the unity of the forces and energies of the mycelial processes in their perpetual cycles of living and decay.

Performing *Invisibility* is to experience a satisfying confluence of the particular instrumental physicality, intensity of expression and performative presence. The composition draws the cellist into its singular world of multi-hued sonorities, strikingly vivid images and associations evoked from within the depth of human cultural depository. At the same time, the composer imaginatively expands the technical resources of the cello by bringing together the various strands of the

[94] Lim, 'Staging an Aesthetics of Presence', p.5.
[95] Lim, 'Patterns of Ecstasy,' p.36.
[96] Ibid.

extended techniques, theatricality and physical fluidity into the sonic mycelium of the composition's interpretative space. In contrast with a sharp focus on the events in their kaleidoscopic play in *Nomos alpha*, in performing *Invisibility* I experience a sense of continuity – in the lacework of fluctuating textures – through the intense tactility and sensual closeness to the instrument and the sound evinced by the two bows. In live performances, this intensity is communicated to the audiences in an immediate, spontaneous manner. The composition's multi-directional mycelial liveness contrasts with the linearity of the programmatic development in Dillon's *Parjanya-Vata*. Moreover, the intensity is amplified by an additional layer of an extra-musical nature related to the particular problematic in *Invisibility* and, correspondently, the questions of 'appropriation' and 'authenticity'. The subject of Yolngu art and tradition is inextricably linked with the history of Australian colonisation; this inner layer of the interpretative space of the composition is revealed as the voices of 'others' that are concealed and, the same time, enduringly present.[97] The cellist's awareness and acknowledgment of this presence indirectly affects the performative energy extending and deepening the expressive power of the composition beyond the beauty of the sound and purely instrumental tactile virtuosity.

Invisibility is a multi-dimensional composition that provokes and fully engages the performer's tactile and audial sensorium expanding the interpretative space into the inter-linked territories of visual art, anthropology, modern history of indigenous cultures, spirituality and ritual. The imaginative use of the two bows for exploring the extensive gamut of sound offers interpretative freedom to the cellist in creating his/her version of Lim's vivid musical spaces and their liminal states of 'reality' and the world of anscestral spirit, within and beyond the anthropocentric universe.

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[97] In that sense, the title *Invisibility* might be subjectively associated with colonial ideology in relation to the indigenous culture and art, as articulated by Illana Seltzer Goldstein in the title of her article 'Visible art, invisible artists? the incorporation of aboriginal objects and knowledge in Australian museums', *Vibrant, Virtual Brazilian Anthropology*, 10.1, Jan./June 2013, https://doi.org/10.1590/S1809-43412013000100019 [Accessed 10 September 2020]. In colonial ideology the agency of 'invisibility' might be also seen in reverse operating on another level. As Ian McLean, **'**Being and Nothing: Figuring Aboriginality in Australian Art History', *Australian Academy of the Humanities*, Proceedings 23, 1998, states: 'According to Bhabha, colonial identities are always at a limit rather than a centre. Here there is always a 'dangerous indeterminacy'. The limit is set by the imperial ideology, which guarantees Western identity. In other words, in the colonies Western identity is, in Derrida's sense, already under erasure. The identifactory [*sic*] mechanisms of imperial ideology are, as always, invisible, unconscious'. (p.133).

Conclusion

This thesis has defined the interpretative space in performing contemporary cello music as part of the broad subject of interpretation and has investigated the extended and extreme techniques in relation to the compositions for solo cello: *Nomos alpha* by Iannis Xenakis, *Parjanya-Vata* by James Dillon and *Invisibility* by Liza Lim. My practice research was directed and shaped by my intention to expand the praxis of the cello technique utilising my experience of learning the selected repertoire.

Nomos alpha and other highly complex contemporary works require an imaginative approach to practice and performance. I elucidated some methods for studying and performing the piece – from a structural approach to the particular techniques such as *glissandi* and *pizzicati*, and the problem of transitions between the events and sections, employing a method of systemising the events and techniques as a practice strategy. I have emphasised the importance, both musically and technically, of grasping the global structure of the composition, and the necessity of internalising the physical actions through the method of repetition, with awareness of tension and release in both hands, correlating with the images of micro- and macro- units and patterns. In this regard, the rhythmical aspect of *Nomos alpha* – a sense of pulse within the 'grid' of the bar lines – becomes the principal factor in sustaining the forward motion, simultaneously providing flexible liminal spaces in the course of live performance. I also suggest that the awareness of reference points (which can be subjective) within the grid-flow configuration unifies the fragmented 'particles' inside the clearly delineated structural/temporal frame. Experiencing the multifarious range of technical procedures in performing *Parjanya-Vata* and *Invisibility* – that span from the robust instrumental athletisism to 'shimmering' physicality – re-activated my interest in the developmental properties of the cello techniques and the principle core of instrumental finesse.

My exploration of the parameters of interpretation and dynamics of creative forces that shape the interpretative space enhanced my understanding of the multi-dimensionality in performance and practice. I perceive the unfolding of the inner logic and relations ('the internal relationships' as expressed by Boulez) in parallel with the 'external relationships' – as a process that amalgamates all elements of playing into a fluid whole. This quality of perception, which developed during the period of my

research combining theoretical study and concert performances, is demonstrated in my recordings of the selected repertoire.

My involvement with the compositions by Xenakis, Dillon and Lim broadened my interpretative and technical perspectives on traditional cello repertoire – this point complements the experiences of some instrumentalists engaged in performing music of various styles and epochs. As noted for example by the Finnish cellist Anssi Kartunen with regards to his concert practice that embraces the full spectrum of cello repertoire – from baroque to new music, 'looking back and looking into the future is a constant two-way exercise that makes life much richer'.[98] Kartunen highlights the dynamic nature of the 'two-way exercise', which implies the benefit of the holistic approach to performing. This freer interaction, however, demands a greater flexibility in physicality of playing and boundaries of expression – a mark of a highly developed mastery of the cello that encompasses the totality of technique.

One of the consequential insights that emerged from my exploration of approaches to performance is a stronger sense of continuity and inter-relatedness of the technical styles in the development of the cello in the twentieth century. In juxtaposing the diametrical works by Popper and Xenakis, I bring into focus the overarching principles enfolding all aspects of cello technique and expression. One of the most pertinent principles in my research is centred on transitions, conception and utilisation of patterns (in objective structural and subjective performative ways) concurrent with the associative approach (research into musical and extra-musical influences of the composer and as a subjective associative space). The notion of patterns and 'in-betweenness' (liminal spaces and transitions) has expanded beyond the 'internal relationships' to encompass and absorb the dynamics of the 'external relationships'.

Considering the historical development as a vertical line of connections and transitions across the twentieth-century works for cello, the three compositions explored in the course of my research might be thought of as linked on a horizontal

[98] 'Anssi Karttunen: Discovering the music around myself', Anssi Karttunen, *FMQ Finnish Music Quarterly* 2, *From The Archives*, (1999) https://fmq.fi/articles/anssi-karttunen-discovering-the-music-around-myself [Accessed 22 May 2019].

plane and engaged in a 'conversation', evolving over the time as a 'trilogy' with its own broader interpretative space. In this new space, Xenakis's mathematical mode underlying the structural elaborations in *Nomos alpha* confronts the fierce play of elemental forces in *Parjanya-Vata* and the diffused soundscape of 'shimmering' shapes, images and archetypal memories in *Invisibility* – opening the new territories of expression and thought. At the same time, the works' unique characteristics intersect in their mycelial exchanges of musical 'nutrients' – the technicalities of each piece develop in counterpoint with and against the others enriching the cellist's quality of movement and intent. Edward Said's idea that relates to his interest in contrapuntal writing and form – 'the tying together of multiple voices in a kind of disciplined whole'[99] – encapsulates the nature of these exchanges within the expanded domain of interpretation. The vibrant unity of all aspects of performance is attained through the dynamic interactions between various currents, each one concomitantly developing its own trajectory. These 'multiple voices' comprise the elements both within the interpretative space of a particular composition and their interactivity on macro- and micro-levels.

The research generated further questions pointing to some unexplored areas in performance practice generally and specifically in the selected works and the composers involved in this study. As indicated in the Introduction and Chapter 3, some of these issues – such as capturing the 'accidental' noises, tonal colours and 'slippages' – pertain to recording contemporary music, which came to light during my experience of recording *Invisibility* and are relevant to other works where the textures and accidental sonorities are part of the interpretative space. This study has also identified several areas with potential for future research that relate to live performance, recording and technique that might include:

- The problem of memorisation of meta-complex works (relaying my own experience of memorising *Nomos alpha*).

[99] Bonnie Marranca and Edward Said, 'Criticism, Culture, and Performance: An Interview with Edward Said', *Performing Arts Journal*, 13.1 (1991), 21–42 (p.26), muse.jhu.edu/article/654687 [Accessed 12 February 2020].

- A sense of temporality and its link to spontaneous 'revelations' in live performance – intuitive grasp of the form during performance and the notion of 'inhabiting time'.[100]
- Theatricality – this includes physicality and 'choreography' of performance, stage presence, and usage of stage design (props, lighting, cinematic images, etc.), either as an explicit part of the composition or as an additional extra-musical device conceived by the performer.
- The audience's involvement in the interpretative space – as part of the broad question of communication with the audience and a cogent extension of the main question of the thesis.

In conclusion, the overarching theme that transpired in the process of my research is the issue of *responsibility* of the performer – in an ethical and artistic sense – to search for innovative and bold ways for the fullest realisation of contemporary and new works within the evolving mode and structures of the musical life of our epoch.

[100] Said, ibid., p.27, asserts the notion of 'inhabiting time' in performance, embodied in the style of the celebrated Arab singer Um Kulthum, as opposed to 'dominating time': 'Her forms are based upon an inhabiting of time, not trying to dominate it. It's a special relationship with temporality'.

Appendix

Recording Notes

All pieces, both the main and supporting works, were recorded in the same studio in London over a period of five years 2015–2019. In an attempt for audial clarity and transparency it was decided that rather than using large ambient auditorium a smaller space would be preferable — more akin to early studio recordings than the current trend (in the recording of classical music) for highly reflective spaces. The choice of microphone was a large diaphragm condenser AKG solid tube with preamp, which offered faithful reproduction of the Vincenzo Panormo (circa 1791) cello's frequency spectrum. The 'chain' was kept to a minimum to avoid as much change to the sound as possible – AKG to preamp – motu 800 digital audio interface – Logic Pro (24 bit 44.1khz). Once the favoured microphone position was established (a meter away from the cello) it was maintained throughout the recording sessions for consistency.
The various tracks were mastered using no EQ or compression. At the final stage a convolution reverb was added.

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