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Music of Sustained Tones

Richard James Glover

A portfolio of compositions and commentary submitted to the
University of Huddersfield in partial fulfilment of the
requirements for the degree of Doctor of Philosophy

October 2010

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Abstract

This thesis accompanies the portfolio of compositions written between 2006 and 2010 and discusses both the overall theoretical concepts, and the specific musical tools, that lie behind their construction. Chapter 1 presents theories of perceptual grouping mechanisms and temporality in reductive music, and applies these to the transformational surface layer from the sustained tones in my music. The use of repetition and gradual process in my music is explored, leading to the application of a decentralised approach towards my structural models. The notion of a 'closure spectrum' contextualises my own music with others, and facilitates a discussion of the teleological nature of my music. Chapter 2 describes the tools which are used in the application of these concepts; in particular, the use of harmony, glissando, duration, use of instruments and notation are reviewed. The individual portfolio pieces are discussed in chapter 3, detailing the various employments of the these tools in different instrumental contexts. This chapter also demonstrates the overall refinement in my compositional approach which took place throughout the doctoral course: my gradual shift towards simpler processes, indeterminacy in notation, and extended note-duration. Less successful aspects of these pieces are also considered in the context of this evolution, along with those aspects which were retained and employed in future pieces. The conclusion evaluates the overall progression, and discusses areas for future development which have arisen from my own research through composition.

Introduction

This thesis supports the portfolio compositions which were written between 2006 and 2010. The majority of the music is created entirely from sustained tones, and the written thesis explores the compositional and experiential issues of working with this type of material. The thesis describes not only *how* I use sustained tones, but *why*; it describes many of the characteristics I find interesting about them, and why moulding them in particular ways produces results which I find engaging and provides an enthusiasm and curiosity to continue to work with them in new contexts.

Background

I have always had a strong interest with the vertical aspect of music, and upon being introduced to the micropolyphonic compositions of György Ligeti at university, I developed an enthusiasm for the global approach to musical organisation where individual parts are not heard separately, but as contributors to the global mass of sound. In particular, listening to Ligeti's large orchestral work *Lontano* performed in concert with its lush sustained textures generated a fascinating acoustic environment, and the dichotomy between the vast, immobile clusters and the seething internal mechanics attracted me to this music. I slowly assimilated a version of this approach into my own writing, which developed throughout my Masters course: the textures became more protracted, notes lengthened, and the contrapuntal nature of micropolyphony was lessened as I employed simpler pitch patterns so that the specific harmonies of the sustained tones could be perceived more clearly.

As my work progressed, I became less concerned with more traditional concerns of a leading narrative, gesture, and tension and release; instead, I operated with a more experimental approach involving the exploration of sustained tones as 'sounds-in-themselves', instead of placing them within a developmental, teleological structure. This then lead to a strong engagement with the music of La Monte Young; by attending various performances of his work, I became more engaged with the conflict between the apparent stasis suggested by the notation of sustained tones, and the reality of a microcosm of movement and transformation. This became a strong thread which I explored within my own compositions; however, distinct from Young's continual repetition, I maintained a desire to manipulate the global movement of the piece to bring about a further layer of transformation within the listening experience.

Process and perception

Early on in the course of the doctorate I became interested in the use of simple pitch processes to control the movement of sustained tones throughout a piece; I developed a strong interest in the music of Alvin Lucier, James Tenney and Phill Niblock, who all employ pitch processes to present the innate characteristics of sustained tones in different manners. Particular points of interest for me were the searching mathematical experiments of Tenney, Lucier's clarity in the materialisation of phenomena, and Niblock's moulding of dense sound masses into colossal, yet coherent, shapes; specific work by these composers is detailed throughout the thesis. I explored different approaches from this wide process spectrum in my compositions, and the portfolio presents what I deem to be the most fruitful of these experiments. These processes represent the backbone of my compositional materials, and as such, other sustained tone musics which are not based upon overt processes such as the organ pieces of Charlemagne Palestine, or much of the music from the burgeoning reductionist improvisation scene in both acoustic and electronic media, are not included in the overall argument.

It was clear to me that the internal 'grain' of the sound – the shifting intonations, harmonics, accents and other phenomena – were mainly the result of the imprecision of human performers aiming to sustain an ideal realisation of a particular pitch. This varying layer of the sound developed into a primary area of research and became a focal point for the design of the compositions, and so the thrust of the argument in this thesis is directed towards sustained tones in instrumental music; electroacoustic music and the work of many artists working with sustained textures in field recordings, are omitted owing to the limited scope of this thesis.

What fuels this compositional refinement described above is my continuing interest in the *perception* of this music. Because of this, there is much emphasis in the thesis upon how one might interpret and experience the music; various perceptual grouping mechanisms are discussed in detail, and applied to the sonic experience. All descriptions of my perceptual experiences of certain pieces (both my own and those of other composers) are not intended to suggest that they are the only way in which these pieces can be experienced; rather, each description is of my own, personal experience, which has then led onto further developments in my compositional approach – hence the reason for their inclusion in the discussion of my compositional refinement.

Whilst attention is given to the perceptual mechanisms engaged in listening to my music, a more comprehensive discussion of predictability, expectation, memory and temporality in reductionist music was not possible in a thesis of this size, although I hope to explore such avenues in future research projects.

This thesis is written entirely from a compositional perspective; discussions of performance practice with regard to the interpretation of the portfolio pieces are therefore outside the range of this study. However, the performer remarks from the *in tones* installation in Appendix 4, which are included to demonstrate how effectively my concert-length compositional approach transferred to an extended duration, give a brief insight into various performative experiences of my music.

Overview

The thesis describes the gradual refinement which my compositional approach underwent from the beginning of the doctorate up the present. Due to this refinement, much of the conceptual thinking detailed in the thesis pertains to those compositions composed during the final few years of the PhD.

Chapter 1 examines the conceptual theory behind the creation and perception of my music, particularly with regard to my approach to instability within various aspects of the music. After initially discussing the perception of a singular formal model with regard to gestalt theory, I explain how we perceive the transformational surface layer arising from sustained tones, and particular models of temporality that have both shaped and reinforced my compositional strategies. The use of repetition in the portfolio is also explored, leading to a discussion of the decentralised aspects of my music; my approach to teleology and closure is considered, and placed alongside other composers' music within a 'closure spectrum'.

The musical language discussed in chapter 2 describes the tools used to implement these concepts. My own use of harmony, duration and instrumentation is considered alongside examples from other composers, and a discussion on the extended glissando is also included, from its use both at a local material level and at a higher structural level. I present some examples from other composers who employ extended glissandi in their work, discussing commonalities of these approaches with my own. This is not intended to be a comprehensive survey of the use of extended glissandi, as the scope would prove too wide for this thesis; I include these other examples to provide more insight into my own individual use of glissandi within the portfolio. The chapter concludes with reflections upon my approach to notation: its role, overall development throughout the thesis, and the primary parameters which differentiate the various notational formats employed throughout the pieces.

Chapter 3 is a chronological series of commentaries on the portfolio pieces. Whilst the compositions submitted are the result of my own research and thought, the commentaries are my reflections upon both the strategies used in creating the pieces, and the effectiveness of the final work itself. The commentaries aim to shed light on compositional processes employed, placing them in context with music from myself and others. Through these commentaries, I aim to communicate the refinement which all aspects of my music experienced throughout the doctoral course, and why this refinement came about. The first three compositions in this chapter were written at the beginning of the PhD, and are included to demonstrate how the initial threads of ideas, which would later manifest themselves as primary structural devices, were combined with other devices to produce works which vary significantly with more recent pieces – to the extent that the first piece, *Sonotron*, is built upon short, accented notes, rather than sustained tones. These three pieces help to contextualise the following pieces in the chapter, in which the conceptual and technical tools described in the previous chapters manifest themselves more overtly than in the three early works. The conclusions in chapter 4 reflect upon the portfolio as a whole, and explore areas for future development which arose out of the compositional research.

Chapter 1: Context

This chapter presents my conceptual approach towards working with sustained tones, and the instabilities in the detail of the sound which arise from this. After initially discussing how the form of a composition can be perceived as a single gestalt entity, there follows an exploration of various aspects of the musical experience which we focus upon in the homogenised environment of a single gestalt. Looking first at the fluctuations in the surface layer of the sound, then moving onto how we process information – and how this can affect our experience of temporality – the argument demonstrates how the apparent stability and homogeneity of sustained tones in a singular gestalt approach results in an engaging *instability* on a micro-perceptual level. The final section of this chapter then discusses the pitch processes which I use to create a single gestalt, and how the use of continuous gradual variation creates a non-hierarchical, decentralised listening experience. This leads to a discussion exploring the various levels of closure displayed in the portfolio pieces, and how these represent an overall focus upon instability in form.

1.1: Form as Content

Sculptor Donald Judd said of works of art that they 'should have a definite *whole* and maybe no parts, or very few'.[1] His own approach to structure was against the idea of relating contrasting parts, as he wanted to sustain the idea of the entirety: '[t]he whole's *it*'.[2] This approach towards the structuring of an art work is a central tenet of my own thoughts towards musical composition: a music which creates little sense of variation or development, where homogeneity overrides contrast, is a music tending towards being perceived as a whole, which can lead the listener to focus on various aspects of the music which often go unnoticed when there are a number of parts. Through this investigation, it shall be shown how my own compositions work towards a 'definite *whole*'.

---

[1] Lippard, Lucy R. ed., 'Questions to Stella and Judd', *Minimal Art: A Critical Anthology*, ed. Battcock, Gregory (Toronto, 1968), 154.

[2] Ibid., 154 (my emphasis).

Composer and theorist James Tenney has said: 'I think of form as the same thing, on a larger temporal scale, as what’s called content on a smaller scale'.[3] Tenney's music tended to focus on the exploration of a single gesture, and how its formal shape is created directly from the material. *Having Never Written a Note for Percussion* consists of a single dynamic swell performed tremolando, usually played on tam-tam, over a 'long time' (often fifteen minutes or more). The swell *is* the formal shape, in that there are no other structures present in either the local material level, or at a global level: the form is the content. In an essay on Tenney's approach, Brian Belet states that 'elements that contain unified or similar parameters strengthen continuity, as does repetition and close variation of specific elements'.[4] It is this approach that I take as a starting point, working towards a strengthened continuity from both parametric equivalence and repetition, both of which will be explored in greater detail in this chapter.

Tenney's theories proposed in Meta † Hodos are central to my compositional aesthetic, and inform how I consider material and structure when composing music designed towards being perceived as a whole. His theories describe our aural perception's process of formally breaking music down into sections of different sizes, something which I actively aim to present in order to sustain the strengthened continuity. The smallest size is termed an 'element', and a group of elements can then fuse together to form a 'clang'; clangs fuse together to form a 'sequence' and so on up until the highest hierarchical level of 'movement/piece' is reached.[5] The form of the music is realised out of the variance between sonic parameters of these different 'temporal gestalts' (TGs), for instance how much louder or softer one TG is in comparison to another. More specifically, Tenney called upon gestalt perception terminology to further define his argument: primary factors of cohesion and segregation between TGs are *proximity* and *similarity* - all other factors being equal. Proximity refers to temporal proximity, and those sound elements which are simultaneous or contiguous will tend to form clangs; temporal placement, or the overall sustained nature of the resultant sound, will cause our perceptive processes to group these elements together. Similarity refers to any number of sonic parameters, for instance pitch frequency, timbral qualities and duration; when elements which have formed clangs due to close proximity contain similarity in other parameters, a stronger sense of gestalt grouping is perceived in the listener – the individual 'parts' of the music form a cohesive 'whole'.

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[3] Polansky, Larry, The Barton Workshop, dir. James Fulkerson, James Tenney: Postal Pieces (sleevenotes), (2004) New World Records NWR 80612. First printed as interview with Gayle Young, Only Paper Today, (1978, Toronto), 16.

[4] Belet, Brian, 'Theoretical and formal continuity in James Tenney's music', *Contemporary Music Review*, 27/1, (February 2008), 26.

[5] Tenney, James, *Meta + Hodos and META Meta + Hodos*, 2nd ed. (no place, 1988).

Within the music I write, the quantitative differences of these gestalt factors between temporal gestalts is kept low, a state which Tenney termed as 'isomorphic'. When these isomorphic TGs are placed within a slow, gradual process, as is often found in my portfolio pieces, they are not heard as separate entities, but as part of a singular form: a singular hierarchical upper-level TG. This TG is made more cohesive when a highly predictable linear process is used as the generative basis for the material. The perceiver does not apply their cognitive faculties towards delineating the separate lower-level TGs; rather, these lower-level TGs fuse together *because* of the singular linear process, which itself is the whole form. Therefore, the upper-level formal gestalt unit structurally comprises many TGs, but perceptually consists of only one. The strength of the near-isomorphism in parametric values tends to bias our perception towards the singular form-as-object gestalt unit (perception of the whole), as seen in many recent pieces within the portfolio such as the extremely close clusters from *in tones*, the gradual pitch ascent of *Clarinet Quartet* and *Like a Continuum*, and the glissandi from *Gradual Music* which expand to cover a semitone at their widest.

Belet's statement above, concerning a strengthened continuity, describes the characteristics of isomorphism in TGs which constitute a single upper-level gestalt unit. In a number of my pieces, the shape of the lower-level composed components becomes the formal shape of the whole piece; a consistent unity across the structural foundations and up to the sounding surface layer of the material provides an unyielding binding force. For instance, the cello glissandi of *Virtual Fusion* parallel the overall global form of the piece, thereby strengthening the notion of form-as-content in perception.

Most of the compositions within this portfolio demonstrate a strong structural linearity, derived, to greater or lesser extents, from the cohesive singular gestalts. This linearity implies a pattern which can be predicted in the short-term, but no long-term goal is identifiable (see page 40 for further discussion of the relationship of my music to teleology). The linearity comes from simple formal shapes, which vary in their determinacy from piece to piece: whilst some pieces specify exact pitches and timings, others give a range of options to the performers. The portfolio demonstrates how pieces with even a certain level of indeterminacy – albeit very tightly controlled – can generate the perception of a singular gestalt and a definite whole. Through control of the material to the extent of total timbral similarity and severe limitations on choice of pitch range, the varying parameters soon become subordinate to the invariable surface of the sound.

The depth of the *context of dependency* of a piece describes how much temporally remote material constrains the probability of occurrence. In music with a much higher rate of change in information than my own, this remote material has little influence; however, in the low information music of this portfolio, this context size is much wider. For instance, if the music has been steadily rising over a semitone for the previous six minutes, as in *Clarinet Quartet* and *Like a Continuum,* then this entire time frame enables us to predict that there will continue to be a slow rise in pitch over a similar time frame. If there has been a gradual cluster expansion over a long period and the cluster has just begun to gradually contract, we can predict that the contraction will continue on for a long time. Therefore, the listener has a high expectation of what will follow in this music, because of most (if not all) parameters remaining the same, therefore directing the listener's focus upon the fluctuations of the surface layer in the sound. Comparatively small parametric changes in pitch and duration within the surface layer are unable to provide a stage for perceptual grouping mechanisms to separate the sound into smaller TGs, merely subjecting the surface of the sound to an overall unsteady, fluctuating character, which carries the main content within my recent work.[6]

1.2: The Surface Layer

1.2.1: Controlling the surface

In an influential article, 'The Minimalist Aesthetic in the Plastic Arts and in Music', Jonathan Bernard outlines the three criteria he sees as essential for minimalism in composition: an emphasis upon the *surface* of the work, the minimisation of chance or accident, and a concentration upon arrangement rather than composition.[7] Of these, it is the surface layer emphasis which appeals most to me as it generates a level of instability within the music which fascinates me, and has informed my compositional approach throughout my doctoral studies. The continuous near-repetition of elements within the structures of my music, varying only slightly in different parameters and producing a coherent temporal gestalt form, provides an auditory experience which directs the listener's perceptual processes towards the immediate detail within this surface of the sound. The surface layer itself is created through indeterminate fluctuations, and rendered effectively through specifically-composed processes to generate the surface layer, hence my lack of adherence to Bernard's other minimalist criteria.

A clear example of this emphasis upon the surface layer is La Monte Young's *Arabic Numeral (any integer) to H.F.*[8] (1960), which instructs the solo performer to repeat a large accented piano cluster continuously for a certain number of times. In his programme note for this piece, Michael Parsons writes that 'what is actually perceived is the uncontrolled and unintended deviation which arises from the impossible attempt to achieve a constant sound'.[9] It is not the piano cluster itself which Young intends to direct listener's perception towards, but rather the differences *between* each cluster. Importantly, this piece employs exact repetition: pure isomorphism on the part of the performer. The same action is performed repeatedly, without variation, whereas my own music is constructed from *near*-repetition, with overall gradual variation. Whilst both approaches direct perception onto the surface layer, my composed variations allow for a gradual change of state where different harmonies or surface layer activity may be perceived, as opposed to the unintended performed variations of the same object from *Arabic Numeral (any integer) to H.F.*.

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[6] The auditory system may combine information over time in order to improve performance (Plack, Christopher J., *The Sense of Hearing* (Mahwah, 2005), 167) so once a temporal process is understood, the auditory system can divert more of its processes towards other areas – for instance, the surface layer of the sound.

[7] Bernard, Jonathan W., 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music*, 31/1, (Winter, 1993), 95.

[8] Young, La Monte, *Arabic Numeral (any integer) to H.F.* (Unpublished).

It is from this singular, predictable gestalt unit that the surface layer activity is brought to the fore of the listener's perceptual processes. Form is chosen, and pitches and instructions are selected, specifically to direct listeners towards perceiving these surface layers - the transformative qualities of which provide a new layer of aural engagement for the audience. The formal unity of the piece is not compromised by the range of surface layer activity, whose transformative qualities remain definitively within what would be perceived as the required values of isomorphism (i.e. altering their values in only one or two parameters – see section 1.2.3, page 27 for further discussion of the surface layer's relationship with the formal unity). The music in the portfolio is designed to be of a singular determinate form, within which the indeterminacy of the surface layer activity is brought to the fore.

The manner in which this 'subject matter' is perceived is less concerned with what Ian Quinn calls 'quarendo' (to obtain, to get) which is familiar to more traditional compositional syntax, but with 'audiendo invenietis' (to discover on hearing).[10] The singular formal gestalt does not lead or entertain the perceiver through various contrasting levels of engagement; the perceiver is given the opportunity to discover these naturally-occurring variations within the surface layer of the sound, and engage with their transformative qualities. Composer Chiyoko Slavnics defines this level of engagement with the surface: 'My music requires that the listener step forward, come very close in order to see (hear) the details – just as one would in order to look at the details of the pigment on a painting'.[11] This 'looking in' aspect of the music is one which I want to promote with the compositional designs I employ; the avoidance in the structural design of other composed material which may draw attention away from the formal unity (such as unpredictable dramatic gestures) allows the listener to be fully engaged with this surface detail (Slavnics' pigment on the painting). Larry Polansky summarises the point: 'It's no so much that Tenney wants to tell you something, as it is that, like Cage, he is interested in providing a tool to help you evolve'.[12]

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[9] Quoted in Smith, Dave, 'Following a Straight Line: La Monte Young', originally published in *Contact* no.18 (Winter 1977-78), 6.

[10] Quinn, Ian, 'Minimal Challenges: Process Music and the Uses of Formalist Analysis', *Contemporary Music Review*, 25/3, (June 2006), 283-294.

The need to import greater meaning into the auditory experience is lessened, and, for me, aesthetic pleasure is derived from freeing oneself from becoming directed within a progressive, developmental rhetoric. Painter Frank Stella spoke of how critics would always assert that there was something else *besides* the paint on his canvases, but his approach is based firmly in the knowledge that the only thing present is what can be seen.[13] The surface layer, and its transformational qualities, do not represent or signify anything externally – they are simply unstable phenomena arising from the gradually-varying pitch structures. My own enjoyment of listening to James Tenney's *Having Never Written a Note for Percussion*[14] (1971) does not wane once it is clear that the piece is built solely from a simple arc form; rather, this allows me to appreciate the transforming densities of, for instance, partials and dynamics from the single tremolando process. I align with Tenney's approach to form that 'as soon as you've heard a couple of minutes of it, you get a pretty good idea of what you're going to hear later'.[15] This clearly allows the listener to appreciate the surface layer fluctuations; a range of formal models are applied in pieces within the portfolio to investigate different approaches to this formal surface layer concept. Each time I experience a new realisation of a portfolio piece, I will perceive the detail differently; although the formal model will remain the same, conditions in the surface layer will never be identical to previous performances. This was a fascinating aspect of a pre-composed piece which I wanted to apply to my own reductionist outlook: the piece could be perceived as a whole, and yet the listener could also experience the various indeterminate parametric fluctuations arising from the performance. The sculptor Robert Morris articulates the idea concisely: 'simplicity of shape does not necessarily equate with simplicity of experience'.[16]

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[11] Slavnics, Chiyoko, 'Opening Ears – the Intimacy of the Detail of Sound', *Filigrane: Nouvelles Sensibilités*, No.4, (2006), 39.

[12] Polansky, Larry, 'Jim Tenney and Space Travel', *Perspectives of New Music*, 25/1, (Winter – Summer, 1987), 437-8.

[13] Bruce Glaser, Questions to Stella and Judd, *Minimal Art: A Critical Anthology*, ed. Battcock, Gregory (Toronto, 1968), 157-8.

[14] Tenney, James, *Having Never Written a Note for Percussion*, (Baltimore MD, 1971).

Nowhere is simplicity of shape expressed more clearly than in Young's *Compositions 1960 #7*[17] (1960), which demonstrates the intensity and variable nature of a sustained perfect fifth; a single temporal gestalt is generated which simultaneously promotes a unity of the whole and brings forth myriad complexities in the surface layer). Young is insistent that the piece be performed on 'continuously tunable sustained instruments such as bowed strings and winds, and in no case on keyboards (organs) or synthesizers',[18] an approach often taken by installation realisations of the piece. This clearly shows his intent towards promoting the variable qualities within the surface layer by requiring that instruments which may be liable to alter their pitch over extended durations play this music, rather than instruments of fixed pitch. Human performers of continuously tunable sustained instruments may unintentionally deviate in their tuning, even only slightly, thus rupturing the stability of the surface layer: a synthesiser would (theoretically) produce an unchanging, perfectly stable tone. In my own work, I develop upon this idea within certain pieces of the portfolio, with acoustic instruments playing *alongside* fixed electronic sources; this provides a platform for surface layer deviations and exposes the fluctuations within the performance of acoustic instruments (see the commentaries on *Virtual Fusion* and *Bilinear* for further discussion about my use of electronics).

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[15] Dennehy, Donnacha, 'Interview with James Tenney', *Contemporary Music Review*, 27/1 (February 2008), 83.

[16] Morris, Robert, 'Notes of Sculpture', *Minimal Art: A Critical Anthology*, ed. Battcock, Gregory (Toronto, 1968), 228.

[17] Young, La Monte, *Compositions 1960 #7* (New York, 1963).

[18] E-mail communication between MELA Foundation and Benjamin Gait.

Referring back to Parson's programme note for *Arabic Numeral (any integer) to H.F.* what is actually perceived is the uncontrolled and unintended deviation which arises from the impossible attempt to achieve a consistently identical sound. Cardew also wrote of the same piece that 'these elements occur rather *in spite of* the instructions, although naturally they are the *result* of them'.[19] Similar to *Compositions 1960 #7*, a human performer theoretically *could* perform *Arabic Numeral (any integer) to H.F.* in a super-precise fashion. However, this would – interpreting Parsons' and Cardew's comments – result in a less engaging performance than if the performer were culpable of such human traits as physical and attention fatigue. This is distinctly different to the music within this portfolio: if a performer were to interpret these pieces to a super-precise level, the form and material within the pieces are such that the surface layer detail would prove engaging for the listener anyway, due to the inherent instability within the material. It is important to note the difference between Young's approach of a continual sustained movement with no notated variation, and my own, which is based upon gradual movement with pre-composed minutiae variation comprising a gradual process. Thus, it is apparent how my own music supports the perception of continuously-transforming surface layer detail, providing a platform for both subtle compositional variation, and variation realised upon performance.

1.2.2: Surface layer detail

Sustained tones act as a supporting environment for this variation upon the surface layer of my music. The variation is comprised of many acoustic and psychoacoustic phenomena, which arise from physical waveform interference, and the non-linearity of our auditory systems, respectively. Whilst many of the phenomena can occur with shorter durations, an environment of continuous sustained tones allows these phenomena to be comprehended much more effectively, as there are no relatively large transformations in other parameters to divert attention away from the surface. Tony Conrad has described how a listener's connection to (traditional) musical language is cut off in the context of a single sustained sound;[20] this music encourages the listener to form their own language from the given materials, which links to Polansky's idea of the listener 'evolution': an individual making their own unique comprehension of the instability. Seth Kim-Cohen refers to the continuous sustained tones of Young's Dream House[21] as having 'no textual, no signifying, status',[22] also referring to the self-referentiality of this music: it represents, or signifies, nothing – only itself. Therefore, this next section describes only what is present (sonically and psychologically) away from the score, as opposed to a representational approach: the main acoustic and psychoacoustic phenomena which are realised within performances of my music, looking in detail at how they are created and the contexts in which they occur. Therefore, this next section *describes* the acoustic and psychoacoustic phenomena which occur upon experiencing my music, without attempting to discuss these in any representational manner. I will show in detail how these occurrences are created, and the contexts in which they occur.

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[19] Cardew, Cornelius, *Treatise Handbook* (London, 1971), xiv.

The primary resultant acoustic phenomena which are perceived within much of my music are beating patterns. These occur when two pitches, whose fundamental harmonics are very close in frequency are heard simultaneously. The two waveforms collide and produce constructive and destructive interference patterns, much as in waves in water when they appear to bounce back off the side of a swimming pool and cancel out waves coming from the opposite direction. These constructive and destructive patterns results in a change of amplitude to the aggregate sound of both pitches: constructive interference increases the amplitude, while destructive interference decreases the amplitude. With these two phenomena happening alternately at high speeds, the resultant sound is one of an amplitude 'wave', with the perceived dynamic of the sound continually rising and falling as the alternating amplitude causing our eardrums to vibrate back and forth at the same speed.

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[20] Duguid, Brian, 'Interview with Tony Conrad' (1996) <http://media.hyperreal.org/zines/est/intervs/conrad.html> accessed 9/8/2010.

[21] A permanent sine-tone installation of Just Intoned drones in a New York City apartment, established in 1979.

[22] Kim-Cohen, Seth, *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art* (New York, 2009), 137.

The speed of this rising and falling is directly linked to the proximity of the fundamental frequencies: a difference of one hertz (one cycle per second) will give a beating speed of one-per-second, i.e. one peak and one trough within one second. A difference of two hertz will give a two-per-second beating speed, twelve hertz will give twelve-per-second and so on. When a beating speed moves above the threshold that the human auditory system can perceive (usually around 20 Hz), it becomes a difference tone. These are entirely psychoacoustic phenomena, in that they are manifested not in the real world, but within our auditory apparatus. However, close pitch clusters – such as those employed in my music – produce frequency differences lower than this threshold, so these differences are perceived as beating patterns in the ear of the listener. The pieces within the portfolio are designed such that close fundamental frequencies will regularly collide with each other at varying distances and create a multitude of beating speeds (from the interaction of both the fundamentals and their harmonics) which are constantly accelerating and decelerating, therefore providing an active, engaging surface layer for the listener.

The phenomenon of beating patterns is actually much more engrained into traditional tonal language than is often realised; it forms the basis of our understanding of consonance and dissonance, as put forward by German scientist Hermann von Helmholtz,[23] and formalised by James Tenney.[24] The theory that, as beating speeds increase, our sensation of dissonance increases, is assimilated into my compositional lexicon and supports the unstable surface layer beating speeds; this provides a high degree of variability between consonance and dissonance (or 'roughness', as is used in scientific terminology) in performance within what is a comparatively stable system of structurally near-isomorphic temporal gestalt units. This dialectic between different speeds of beating and their transformative nature, and thus the very real ambiguity of consonance and dissonance, creates an instability in the music and is involved in the concepts for many of the portfolio pieces, from the distinct puddles of beating patterns in the second section of *Virtual Fusion* to the multilayered complexes of patterns from *in tones.*

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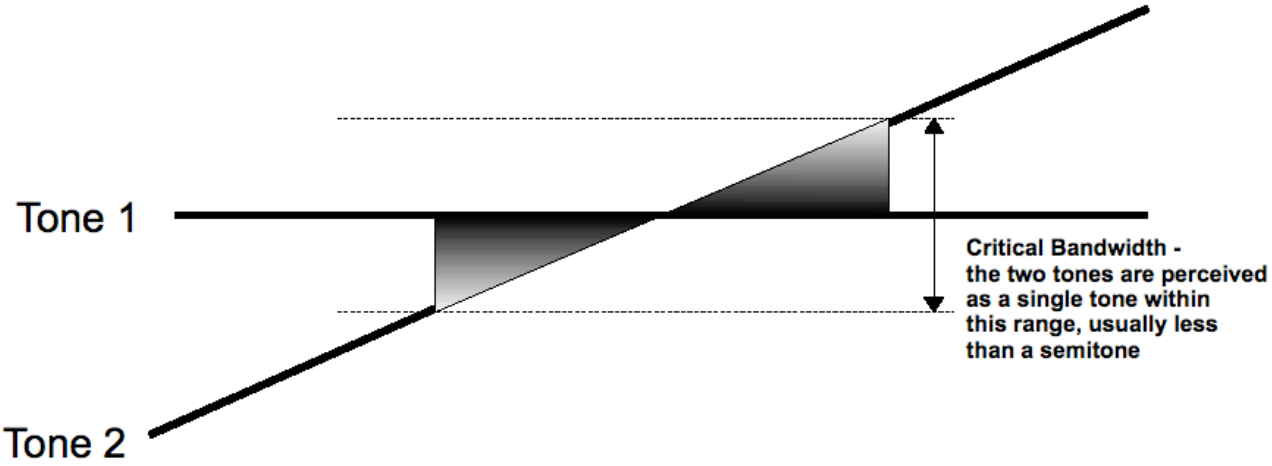
[23] Helmholtz, Hermann von, *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (Dover, 1954).

[24] Tenney, James, *A History of 'Consonance' and 'Dissonance'* (New York, 1988).

Another phenomenon which features heavily in the portfolio due to its engaging instability in facilitating our perceptual processes to parse streams is that of the critical bandwidth: two or more sounds which are a certain close frequential distance apart fuse together and are perceived as one pitch. This is a variation upon the gestalt perceptual concept of close proximity, where gestalt units in close relation to each other are grouped together and perceived as one unit: the close proximity prevents them from being streamed apart. The critical bandwidth is most noticeable in the glissando, which features often in the portfolio on both a local level and as a structural device. As the glissando moves out from a unison (a common occurrence in my pitch processes), the unison pitch seems to broaden out as beating increases, moving towards a sense of dissonance because of faster beating patterns (increased roughness), and as the critical bandwidth is passed the unison pitch splits into two separately-perceivable pitches; Figure 1 shows this effect as an ascending glissando moves across a sustained pitch. A number of pieces within the portfolio demonstrate and are built around this instability provided by pitches fusing through frequential proximity. The 'just noticeable difference' is specifically that frequential-interval at which the auditory system begins to parse two close frequencies into two separate pitches.

Figure 1: Example of the critical bandwidth and Good Continuation.


Tone 1
Tone 2
Critical Bandwidth - the two tones are perceived as a single tone within this range, usually less than a semitone

Another characteristic of the surface layers in my music is related to performance technique. My own aesthetic is centred upon acoustic instruments being asked to hold sustained tones over a certain length of time. There will always be occurrences such as bow changes, breaths taken, and slight unintended deviations in intonation, and these physical acts also contribute towards the active surface layer. This has already been mentioned, relating to the deviations which Parsons and Cardew describe in *Arabic Numeral (any integer) to H.F.*, and the reason that continuously tunable instruments are called for in *Compositions 1960 #7*; as stated above, whilst I do not specify these particular occurrences in the notation, they will always be realised upon performance to some degree due to human imperfection.

As well as specific external phenomena influencing our perception of the surface layer, there are also two gestalt grouping principles which underpin a number of structural decisions and influence our surface layer perception. The first of these is Common Fate, which describes how two gestalt units which move in the same direction are grouped together as the same gestalt;[25] for instance, two glissandi moving at roughly the same speed will be grouped as one gestalt, even if they are in different pitch registers. It is only when one of them diverts significantly from this trajectory that we stream them as separate gestalts, therefore generating instability with simultaneous glissandi; this is demonstrated by the two separate strands in Figure 2.

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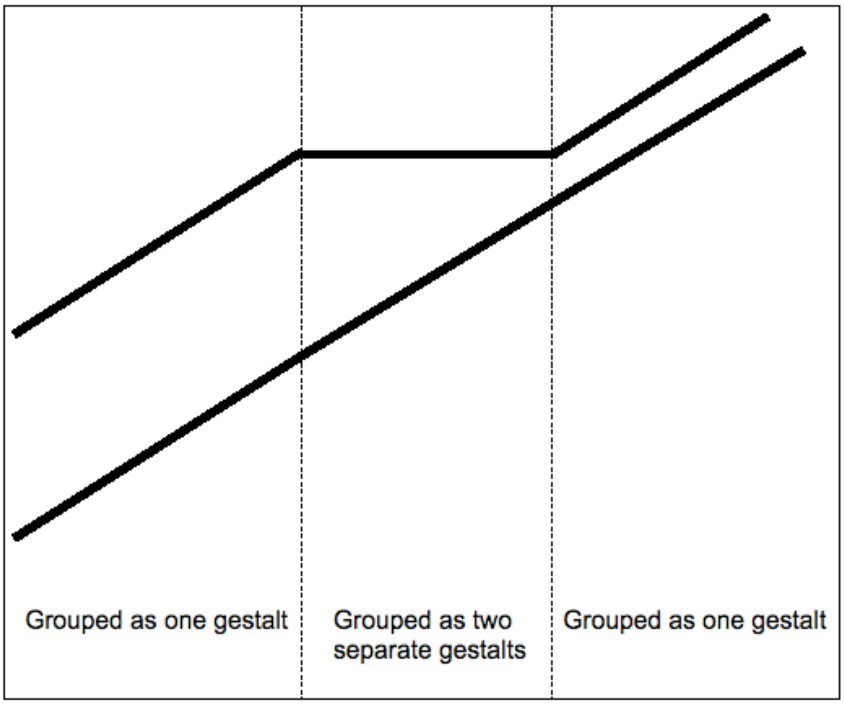
[25] Deutsch, Diana, 'Grouping Mechanisms in Music', in *Psychology of Music* 2nd ed., ed. Deutsch, Diana (San Diego, 1999), 300.

Figure 2: Example of Common Fate groupings.



The second gestalt principle, Good Continuation, accounts for our ability to continue perceiving a predictable, unidirectional pitch pattern, even if it is hidden by another gestalt.[26] In a number of pieces (such as *Bilinear*, *Gradual Music*, *in tones*), much of the local level material employs a linear glissando which approaches a unison with a held tone, whereupon gestalt fusion within the critical bandwidth, known as 'masking', groups the two pitches as one making the perception of each individual line impossible; once the glissando continues on past the held tone and towards the limits of the critical bandwidth, the masking gradually dissipates and the glissando is perceived as a separate unit once it passes the just noticeable difference. Figure 1 gives a situation where good continuation is applied: the two glissandi on either side of the held tone are grouped together as the same glissando, despite the perceived loss of a glissando within the critical band.

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[26] Deutsch, Diana, 'Grouping Mechanisms in Music', in *Psychology of Music* 2nd ed., ed. Deutsch, Diana (San Diego, 1999), 320.

The above descriptions of the surface layer detail that appears in my music suggests that my compositional intentions are to achieve a constant state of flux within the sound, a very real sense of instability. The notated material may appear somewhat fixed through use of sustained tones, with little if any contrast in dynamics and timbre. However, the surface layer becomes active in terms of resultant acoustic phenomena, and is continually varying between different states of stability and instability.

1.2.3: Surface layer perception

This variance between states in the surface layer can then be perceived in a similar manner to how the pitch processes are perceived, as is explained in this following section. The isomorphism used in the portfolio is designed to make chunking difficult. 'Chunking' refers to the application of sectional boundaries, and this difficulty in chunking results in the perception of a single, whole gestalt. Thus, for instance, in *Corradiation* there is very little parametric variation throughout, apart from the pitch transformation over a tone (either ascending or descending, depending on the line). The ability to arrange hierarchical phrase structures is lost, as is our sense of time-order. So far I have only discussed chunking in terms of the gradual process, however, “parametric values” can also be applied to extra-notational phenomena, including audible beating patterns, masking patterns, and difference tones. One of the results of my own work in this area is the proposed application of gestalt grouping principles onto surface layer phenomena. Whilst existing literature discusses *what* phenomena may occur in a surface layer,[27] they often stop short of describing how these phenomena may relate in performance, and how they may be experienced by the listener. I am interested in applying our perceptual mechanisms already discussed onto these phenomena, taking beating patterns as a primary example, and discussing how this has informed my compositional approach.

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[27] For instance, Roads, Curtis, *Computer Music Tutorial* (Cambridge, 1996); Cook, Perry R., ed. *Music, Cognition and Computerized Sound: An Introduction to Psychoacoustics* (Cambridge, 1999); Bregman, Alfred, *Auditory Scene Analysis: The Perceptual Organisation of Sound* (Cambridge, 1994).

Beating patterns can be chunked into separate sections, and although we remain aware that these patterns have no long-term ramifications on the form of the piece as they are not in any way part of a narrative, or form a sense of hierarchy, their duration, speed, frequential register and dynamic all contribute to our grouping them into different sections. At the end of section 1.1, I discussed how small parametric changes within the surface layer are unable to provide a stage for perceptual grouping mechanisms to separate the sound into smaller TGs. However, according to Bob Snyder, a change in a single parameter does not constitute a sectional boundary, but rather an articulation or variation *within* a section. This is certainly context dependent, as a single parametric change of a large magnitude, for instance a large intervallic or dynamic change, may well create a new sectional boundary. But the notion holds for the small parametric changes in the surface layer: if we hear a continuous transformation of speed in a beating pattern over a period of time, this is perceived as an *articulation* in the gestalt. This articulation may not significantly alter the manner in which we perceive the following information, in the way that a large intervallic change might suggest a hierarchy in comparison with smaller changes, but we certainly perceive it as an *occurrence*.

This does not contradict Tenney's theory of a form comprising a single gestalt: the two notions can coexist. Even within Tenney's own compositional output, the existence of these articulations is evident. For instance the slight temporal variations in the tremolo *Koan*[28] (1971) and the shifting spectral energy in *Having Never Written a Note for Percussion* both include articulations arising out of change within a single parameter; they do not form new temporal gestalts due to the low informational nature of the change, but there *is* a perceived alteration within the sound. The articulations do not provide the basis of a hierarchical phrase structure, therefore they do not impose upon the singular form. The singular form is not compromised – the object remains as one large temporal gestalt due to the near-isomorphism of the material – but the articulations from slight parametric changes, and the relationships between these articulations, provide the basis for the evolving sense of listening described by Larry Polansky above.

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[28] Tenney, James, *Koan*, (Baltimore MD, 1971).

What I aim to generate in my pieces is the instability arising from sustained tones within a singular, near-isomorphic gestalt. The shorter durations of my pieces allows the audience to fully comprehend this singular gestalt, whilst also experiencing the instability of the surface layer. The combinations of articulations create a continually fluctuating environment of beating patterns, and this applies to other experiential phenomena, both acoustic and psychoacoustic. A clear instability is set-up between moments of pure global unison, and sections with beating patterns, whilst still being comprehended within the context of a 'whole' temporal gestalt. These moments which bring about the instability, i.e. when parametric changes gradually occur, are described as taking up more memory space than stable moments of low information.[29] Thus, duration experienced during instability is perceived as being shorter, but remembered as being longer, whereas the opposite holds for sections of stability: they are perceived as longer durations, but remembered as shorter. The flux between parametric change and parametric stasis ensures our perception of both experienced and recalled temporality is also in flux, hence Jonathan Bernard's remark that music of this type is 'music that is *about* time'.[30] By varying the particular processes involved between different pieces, and therefore the overall shape of the singular gestalt, the portfolio demonstrates a range of compositional perspectives towards how this instability is framed by singular gestalts.

1.3: Temporalities

To end this section, I want to discuss how vertical time and phenomenology, two different models of how we perceive the passing of time, relate to my compositional intentions of near-isomorphic pitch processes and transforming surface articulations described above. By discussing the suitability and relevance of both temporal models, I hope to help define further my own intentions with the music, stemming from how I perceive these temporal experiences.

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[29] Snyder, Bob, *Music and Memory: An Introduction* (Cambridge, MA, 2000), 213.

[30] Bernard, Jonathan W., 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music*, 31/1, (Winter, 1993), 122.

1.3.1: Vertical Time

Jonathan Kramer's notions of vertical time are initially a helpful route into describing the experiential aspect of my music. He defines verticality as a perfectly defined fixed present, where the past and future do not exist to the perceiver, but instead there exists a single present stretched into an enormous duration, a 'potentially infinite “now”'.[31] He defines a broad range of twentieth-century pieces as exhibiting vertical time in experience, from La Monte Young's conceptual pieces to the music of Morton Feldman.[32] There are many similarities between my music and the temporal experience of vertical time. Kramer states how vertical compositions themselves are not usually unstructured, but rather their temporal continuum is unstructured as the composer is not directing the listener through a narrative of contrasting gestures. He also describes how the existing structure in such music exists between simultaneous layers of sound rather than between successive gestures. This points strongly towards the primary role of acoustic phenomena within my own music. The phenomena are a direct result of the simultaneous layers of sound, and provide a structure of their own to the musical experience, as described above.

Resonating with my own near-isomorphic, methodical approach to pitch patterns, Kramer defines a 'special type' of vertical music, which can be described as 'minimal music', or 'process music'. This includes pieces such as Steve Reich's *Come Out*[33] (1966) and Frederic Rzewski's *Les Moutons de Panurge*[34] (1969) that are based around the repetition of a cell, which either undergoes gradual methodical phase transformation or a simple additive process respectively. In my recent pieces such as *Corradiation* and *Gradual Music*, I use multiple uniform, stepwise pitch arcs which are based entirely on simple processes, and would clearly fall under the minimal or process manner.

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[31] Kramer, Jonathan, *The Time of Music* (New York, 1988), 55.
[32] Ibid., 386.
[33] Reich, Steve, *Come Out* (1966).
[34] Rzewski, Frederic, *Les Moutons de Panurge* (Self-published, 1969).

Referring to process music, Kramer states that 'one might think of such works as purely linear, but listening to them is not a linear experience, despite their internal motion'.[35] This also aligns with the non-linearity of the temporal experience from my music, which arises from the continual temporal flux provided from the surface articulation groupings. However, Kramer then includes the following quote from Jann Pasler to support his account of vertical time:

> Repetition […] does not require us to recollect. In minimal music, it does not mediate past, present and future, but rather forces us to concentrate fully on an extended present. Time appears to stand still as the work turns in place. Indeed the object here is not time but eternity.[36]

Although I use repetition in my music, I do not have the idea in my mind that time will be 'standing still' upon experiencing the music. It is in fact the opposite: the flux from the surface layer provides inconsistency within the linear experience, but one that propels the forward motion of the music, rather than resulting in time standing still. Kramer states that '[t]he experience is static despite the constant motion in the music.'[37], whereas I perceive the constant *temporal flux* in the music to provide a constant motion. The unceasing gradual variation in the process certainly does provide the non-linear of which Kramer describes, but I intend for the transformational surface layer to provide fluctuating temporalities which move *away* from stasis, even though they go no further to providing any hierarchy of phrase structure. I include this discussion not to demonstrate that Kramer's categorisations need further defining, as it may well be that he only intended this definition for *rhythmic* minimal processes, where acoustic phenomena do not occur and the rate of transformation does remain consistent. Rather, I want to clearly establish how I perceive the surface layers of my music as affecting the temporal experience, and therefore why these articulations, and the processes which are employed to specifically generate them, are integral to my music.

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[35] Kramer, Jonathan, *The Time of Music* (New York, 1988), 57.

[36] Jann Pasler 'Narrative and Narrativity in Music', invited paper read to the International Society for the Study of Time, Dartington Hall, England, 9/7/86, as quoted in Kramer, Jonathan, *The Time of Music* (New York, 1988), 411.

[37] Kramer, Jonathan, *The Time of Music* (New York, 1988), 57.

1.3.2: Phenomenology

A model which I find addresses the temporal flux within the linear processes of my music is the 'unbroken continuity' of phenomenology, as described by Edmund Husserl and expanded upon by Maurice Merleau-Ponty. The short durations of my pieces, and the simplicity of their pitch patterns, for instance, the two glissandi from *Corradiation*, or the expanding and contracting arc of *Gradual Music*, result in the ability to sense the overall singular shape of the piece, even with the instability from the groupings of the surface articulations causing temporal inconsistencies. I see this fluid, continuous motion as aligning with the temporal experience of Merleau-Ponty's unbroken continuity.[38]

Within this unbroken continuity, we perceive not just the immediate present, but through the processes of retention and protention we feel some of the past and some of the future in the *perceived* present. The continuity is conserved by retention, which maintains the immediate past *within* the present, and protention, which brings about an awareness of the immediate, unactualised future.[39]

To me, this suggests the notion of a continually moving time-window; upon experiencing my music, the window is extended owing to the near-isomorphism, and therefore high predictability, of the process, and consequently the context of dependency is widened. This enables us to maintain more of the past and future in the present than higher-informational experiences. However, the various relationships between the indeterminate surface layer articulations produce a temporal flux, and thus the length of the time-window is continually transforming, depending on the activity of the surface layer. This results in the non-linearity of experience, as described by Kramer, but allows for the sense of motion I perceive in the music from the unbroken continuity.

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[38] Merleau-Ponty, Maurice, *Phenomenology of Perception* (London, 1962), 419.

[39] Husserl, Edmund, *Lectures on the Phenomenology of Internal Time Consciousness* (Dordrecht, 1991), 25.

1.4: Gradual Process

Gradually varying pitch processes form the main structures for the majority of pieces in the portfolio, and the final section of this chapter examines the concepts behind these processes, and how they contribute to the notion of instability within the music.

1.4.1: Repetition

For gradual pitch transformation on discrete sustained objects, be they a complex of sounds such as in *Bilinear* or simply single sustained notes, some form of repetition with variation is involved. The same performative actions are employed each time – apart from those used for pitch control – and the sound retains the same timbre and dynamic envelope as before. However, repetition represents a spectrum of different types of process; the near-isomorphism with which I work, which is fitted into pitch structures that have a clear goal on a compositional level, rather than a perceptual level, is best described as iteration. Iteration is the process of repeating yielding results successively closer to a desired result, or until a prescribed condition is met.[40] The majority of the pitch structures I employ are entirely conditional, working with predictable, methodical iterative structures. The structure of *Gradual Music* from the portfolio (Figure 3) demonstrates these linear iterations:

Figure 3: *Gradual Music* pitch structure.

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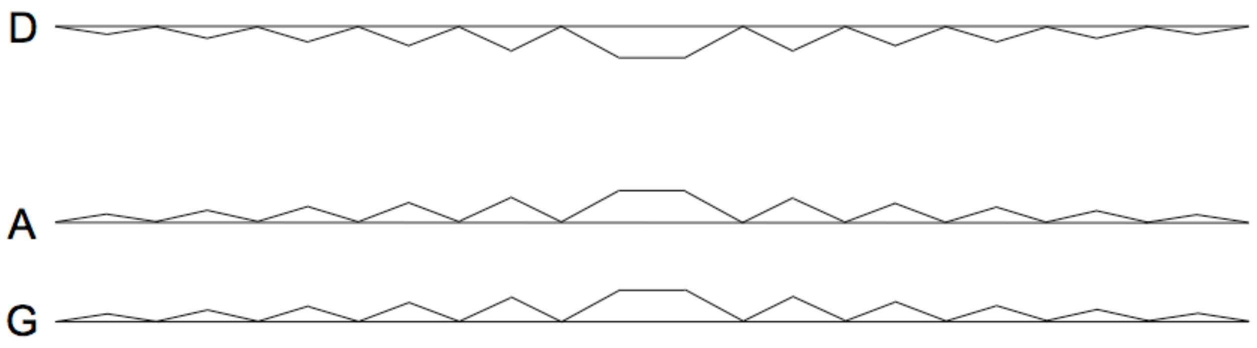
[40] n.a., 'Iteration', *Merriam-Webster Online*, <http://www.merriam-webster.com/dictionary/iteration>, accessed 8/8/2010.



Each glissando object is repeated, but with a very gradual pitch variation on each iteration (all other parameters remaining equal); the goals of the process are to expand the glissandi out towards a whole semitone, before they contract back towards the smallest glissando of a twelfth-tone. The glissando object undergoes iterations until these goals are met, whereupon the piece ends. I employ the term 'iteration' as I believe it communicates the *processual* nature of the entire structure, rather than simply the *repetitive.* Iterative methods by definition involve repetition, but only so that results can gradually be brought closer to a sought-after outcome. To achieve the desired outcome in my music, the iterative process can usually be reduced to 'shift/expand pitch microtonally higher/lower'; this is either in discrete equal steps, such as *Gradual Music*'s glissandi increase/decrease of a twelfth-tone upon each iteration, or through less measured means such as the tablatures in *Clarinet Quartet* and *Like a Continuum*, which provide a general pitch ascent.

To contextualise this iterative method, at the other end of the repetitive spectrum, away from iterative methods directed towards conditional states, lies perseveration (the act of insistent, often redundant, repetition). Before looking at perseveration in my own work, some background on its pervious creative use in the arts may help shed light on how I view my own work. Young's *Arabic Numeral (any integer) to H.F.* exhibits one of the clearest examples of perseveration in musical composition. For the performer, the repetitions of the piano cluster are not directed anywhere but to when the final cluster is played; for the listener, the piece is a seemingly-endless line of repetitions. The term 'perseveration' is used because of the redundancy of the structure – no change occurs in the instructions for the action throughout. For the perceptual listening experience, however, there is great change – from within the surface layer as discussed previously in this chapter. The structure *contains* the repeated material, rather than moulding it into another form, and presents it for the listener's examination. 'The one thing I learned in my work is that to make the work I wanted you couldn't impose properties on the materials. You have to reveal the properties of the material itself'.[41] This quote could easily have come from Young on *Arabic Numeral (any integer) to H.F.*, but instead comes from American sculptor Carl Andre. Andre's *Lever* (Figure 4) consists of 139 firebricks laid out in a straight line. The repetition model is simply directed towards to the 139th brick, and is arranged into a straight line – just as the piano clusters in *Arabic Numeral (any integer) to H.F.* are not transformative, but remain stable along a straight line. 'Repetition provides a simple format within which to present materials in a natural, untouched state'[42] writes Thomas De Lio on sculptor Carl Andre's work, in particular his *Timbre Piece* where pieces of wood are arranged in an interlocking pattern, resulting in a low information model. Similar to *Lever*, the various natural perturbations in each different piece of wood are exposed, immediately drawing the viewer's perception upon the differences between each piece: the viewer perceives any variances within the repetitions.

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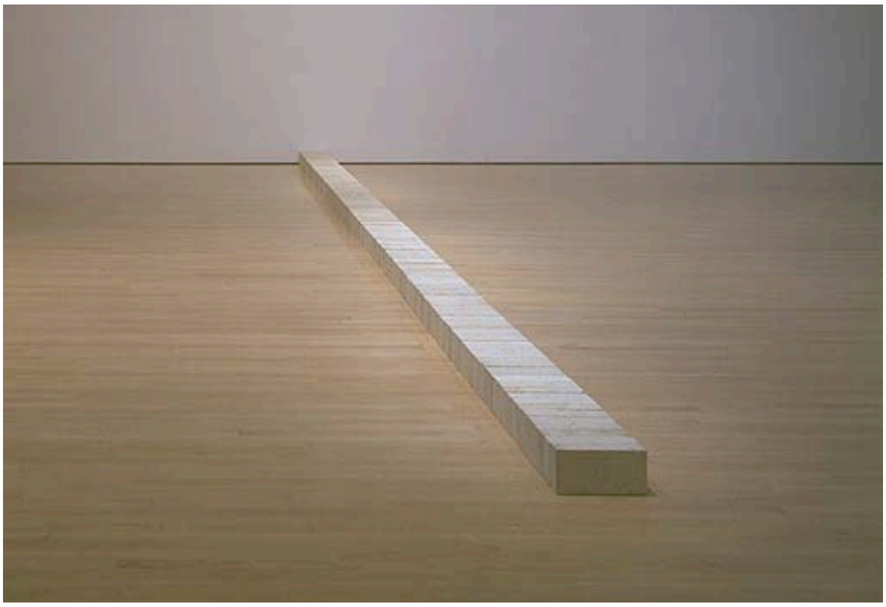
[41] 'Tate Archive Journeys: Reise: Art Movements, Artist's Biographies', *Tate: British and International modern and contemporary art*, <http://www.tate.org.uk/archivejourneys/reisehtml/mov_artbiogs.htm> accessed 8/8/2010, as quoted in Tate Liverpool *Minimalism* catalogue, 1978.

[42] DeLio, Thomas, *Circumscribing the Open Universe* (Lanham, MD, 1984), 92.

Figure 4: Carl Andre, *Lever* (1966). Photo © National Gallery of Canada.



The concert installation *in tones* – the final piece of the portfolio – is nearest in alignment of all my music with the perseverative approach. The following is a score excerpt from Flute 1, which is played alongside a sustained organ dyad (all other ensemble parts resemble this closely):

Figure 5: Excerpt from *in tones* Flute 1.

Select four fingerings for tones just slightly sharper than the C an octave above middle C.
Play comfortable, long tones, using only these fingerings and the C, for the first 10 minutes.

Select four fingerings for tones just slightly flatter than the C an octave above middle C.
Play comfortable, long tones, using only these fingerings and C, for the final 10 minutes.

This process is carried out across varying ensembles over the four hour duration, so consequently there is no large-scale transformation as seen in other works in the portfolio. The global structure is clearly representative of the perseverative approach, but in the individual instrumental instructions there is clearly composed manipulation of pitch, which differs significantly with Young's and Andre's approach of simply presenting materials and allowing their inherent fluctuations to occur. I intentionally apply transformational systems, even one as non-directional as *in tones*, which still directs the players towards transformation of pitch. The progression of these tones does not lead to anything, it is simply generating the articulations in the surface layer and harmonies.

So, my own iterative approach does not rely upon the redundancy of repetition as found within perseveration, but is instead built on linear change which gradually moves material through various points until a particular pitch condition is met. However, the music's identity is created from just *how* gradual these changes are; to approach a state of information deprivation, each pitch change is small enough so as to bring about a perceptually isomorphic (or near-isomorphic) environment. Whilst the glissandi transformations of *Gradual Music* in Figure 3 do not seem to point towards isomorphism, the microscopic nature of the actual pitch changes does not induce a clear set of iterations expanding or contracting in the mind of the listener. Rather, these iterations are included to instigate varying surface layer articulations, whilst the process remains relatively isomorphic to the listener.

There are clear similarities with Steve Reich's approach to the use of process, outlined in his 1968 manifesto 'Music as a Gradual Process':

> Listening to an extremely gradual musical process opens my ears to *it*, but *it* always extends farther than I can hear, and that makes it interesting to listen to the musical process again. That area of every gradual (completely controlled) musical process, where one hears the details of the sound moving out away from intentions, occurring for their own acoustic reasons, is *it*.[43]

His interest in a process and sounding music that are 'one and the same thing' demonstrates an approach that has 'no use for hidden constructive devices that serve to obscure a musical process'.[44] The impersonality of Reich's perspective enables an intense marshalling of the perception upon the sonic consequences: 'Focusing in on the musical process makes possible that shift of attention away from *he* and *she* and *you* and *me* outwards towards it'.[45] The structure is conveyed by the gradual variances within the process – an approach I particularly align with, as the singular gestalt form is rendered clearly through the near-isomorphism of each stage of the process.

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[43] Reich, Steve, *Writings about Music* (New York, 1974), 11.

[44] Schwarz, K. Robert, 'Steve Reich: Music as a Gradual Process: Part II', *Perspectives of New Music*, 20/1&2 (Autumn 1981 – Summer 1982), 226.

Reich's manifesto has been criticised for calling upon psychoacoustic phenomena as a secondary feature in a manner that suggests that the central tenet itself does not contain enough worth to stand up for itself.[46] I agree with this criticism, however I believe the issue is the separation of the psychoacoustic outcomes in his music as a distinctly *other* phenomenon from the perception of the pitch process, as opposed to being fully integrated into the micro-transformational experience. The importance for me lies in the combination of myriad varied articulations into the aural experiences of these kinds of processes. Merleau-Ponty's statement can be applied to this diverse surface layer *alongside* the transformational pitch-process: 'the perceived thing is not an ideal unity in the possession of the intellect […] it is, rather, a totality open to a horizon of an indefinite number of perspectival views'.[47]

1.4.2: Decentralisation

The use of a gradual process in artistic creation exposes the totality of the experience to the perceptions of the listener. Artist David Lee states that 'the spectator is not directed to take home with him a static mental picture of the piece. The *idea* is dissolved in the complexity of experience'.[48]

This multitudinal approach, where one idea does not prevail but rather the listener is able to experience various perspectives, results in a non-hierarchical listening environment, as summarised by Deleuze's concept of the *decentralised* work. The gradual arc form of *Bilinear* does not induce a sense of hierarchy: one does not attribute greater value to the beginning or the end. The overall sense of the pitch ascent and subsequent descent does not equate to a level of importance at a certain point: the entire form is equal, or non-hierarchical. The gradual iterative approach which I employ is itself a decentralised process, as although there are pitch alterations within each iteration, none of these iterations cannot be traced back to an origin of the series (echoing Deleuze on decentralisation: 'all resemblance [is] abolished so that one can no longer point to the existence of an original and a copy').[49] Just as each brick in Andre's *Lever* exists individually, as opposed to as a replica, there is no 'initiator' in my processes with which to compare other iterations - there is simply a series of the same object, be it a single sustained tone or a tone-complex, which have undergone pitch manipulation.

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[45] Reich, Steve, *Writings about Music* (New York, 1974), 11.

[46] Bernard, Jonathan W., 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music*, 31/1, (Winter, 1993).

[47] Merlea-Ponty, in DeLio, Thomas, *Circumscribing the Open Universe* (Lanham, MD, 1984), 32.

[48] David Lee, A Systemic Revery, *Minimal Art: A Critical Anthology*, ed. Battcock, Gregory (Toronto, 1968), 198.

This contrasts with various other approaches to gradual process which produce a clearer sense of original/copy upon perception. In Lucier's *I am Sitting in a Room*[50] (1970), each new iteration is not only compared with previous iterations, but also the original, intelligible speech sample; whilst the listener can detect the overall transformational process, they will only ever hear it to some degree in the light of the initial sample. Many Reichian processes also invite similar experiences: the phase pieces begin in unison and then depart, resulting in comparison to the stability of the initial pattern. *Four Organs*[51] (1971) begins with short durations and then gradually transforms to much longer durations, and this again invites comparison with the shorter statements of the beginning, thus propounding the original/copy dialectic. It is the abolition of this dialectic, the projection of the decentralised approach, which many of the pieces in the portfolio work towards.

The decentralised approach imbues our perception of the surface layer articulations as well: we group distinct patterns together, but do not attribute relative hierarchical value onto any of them. Instead they simply form a continuous succession of occurrences which we perceive; our retention and protention processes allow us to experience various occurrences simultaneously throughout, which again enforces the decentralised nature of the entire listening experience.

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[49] Deleuze, Gilles, *Difference and Repetition* (London, 2004), 82.
[50] Lucier, Alvin, *I am Sitting in a Room* (Boston, 1970).
[51] Reich, Steve, *Four Organs* (London, 1980).

1.4.3: Teleology and closure

The gradual pitch processes employed in my music are specifically designed to activate surface layer articulations, and it is these which form the main perceptual focus of the pieces. However, placing these processes within structural models which exhibit varying levels of teleology instills a diversity into the portfolio as a whole. Therefore, as well as being a study into the perception of surface layer articulations, I see the portfolio as demonstrating the manner with which iterative processes can be used to bring about a sense of closure through varying levels of teleology, presenting different perspectives on the same phenomena.

In discussing how various degrees of teleology inhabit the different compositions in the portfolio, it becomes apparent how each piece can be placed somewhere within a 'closure spectrum'. The drones of Dream House represent one end of the spectrum, where no sense of teleology or closure is brought about through the unending perseveration in the music, which continues with no apparent end. Earlier in this chapter I explained how *in tones* is the piece in the portfolio closest to a perseverative approach, and therefore it inhabits this end of the closure spectrum; the microtonal pitch variations do not direct the listener towards any kind of predictable linearity, and over the piece's extended duration there is no alteration in the manner in which these pitches are arranged. There is no sense that the music is moving *towards* a different state in any possible manner: the repetition remains entirely stable throughout the entire duration.

Other music in the portfolio lies further away from this point in the spectrum, existing more towards

Kramer's notions of non-directed linearity where the music moves with 'constant motion but goals are not unequivocal':[52] the particular transformational process is apparent, but a global teleology, an end goal, is not evident.

The pitch structure of each portfolio piece defines where they lie in the spectrum between the two points of perseveration and linearity. For instance, *Clarinet Quartet*'s ascending glissando directs the listener to the knowledge that, over time, the pitch contour will continue to rise; however, there is nothing in the material which implies an end to this process, merely a continuation of it. However,*Virtual Fusion*'s gestalt-object glissando is supported by the spectra of the electronics which moves from inharmonicity to harmonicity[53] over the course of the whole glissando, imbuing the perception of the glissando with a sense of closure lacking in *Clarinet Quartet*. *Corradiation*'s two sets of glissandi which move outward towards an octave unison convey a similar sense of directionality to the pitch process as with *Virtual Fusion*. Although a certain level of teleology is apparent in this pieces, to be clear, all these pieces still present a decentralised listening process. The difference in pitch between each iteration is so small that no hierarchy is formed during the listening experience, therefore allowing the listener to focus upon the surface articulations.

The structure of *Gradual Music* (Figure 3) demonstrates the linearity of a gradual expansion and subsequent contraction. Again, whilst the listener may be directed toward the overall sense of expansion/contraction, the iterations change in pitch only one-eighth of a tone each time, and thus the surface articulations remain as the primary layer of engagement as the iterations move in a methodical, non-hierarchical manner.

Much additive music exhibits these same characteristics of non-directed linearity, particularly the early works of Philip Glass. Pieces such as *Music in Similar Motion*[54] and *Music in Fifths*[55] (both 1969) all direct the listener into a linear perceptual experience, where attention is always placed upon anticipating the next addition. As with my own music, there is no final, immediately observable goal towards which the music is moving. However, the listener is able to perceive the process clearly, and can easily anticipate the addition of an extra note upon each iteration, thereby confirming the existence of a local directionality. Different to my own approach is the particular level of uncertainty there is concerning each successive iteration in much of Glass' additive music: whereas in my own processes it is clear whether the overall pitch structure is ascending or descending, or expanding or contracting, upon perceiving Glass' music is it difficult to protend exactly which pitches will be added next, and therefore the overall contour cannot be protended. The speed at which the music moves means that it is difficult to comprehend exactly which pitches have been added, and therefore listeners may become disengaged with the pitch process. The gradual processes in my own music enable the listener to gain an overall sense of the pitch contour(s) upon which each piece is built, rather than them remaining uncertain due to complexity issues.

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[52] Kramer, Jonathan, *The Time of Music* (New York, 1988), 40.

[53] See Chapter 3 for further explanation of these individual processes.

In this sense, I adopt a more Reichian approach which ensures the listener is aware of the process that is unfolding. However, this is where similarities with Reich ends: much of his early music, in particular the phase pieces such as *Piano Phase*[56] and *Violin Phase*[57] (both 1967), can be described as cyclic in nature due to the circular pitch process which ends where it began. Whilst my own pieces such as *Gradual Music*, *Bilinear* and *Violin with Clarinet and Piano* also work in this way, they retain a decentralised perceptual experience due to their non-hierarchical nature; the gradual approach means that no import is given to the material returning to its initial state, as it does not render the surface layer any less detailed. A generalised structure of Reich's phase-transformational pieces (e.g. *Piano Phase*, *Violin Phase* and *Electric Guitar Phase*) is shown in Figure 6:

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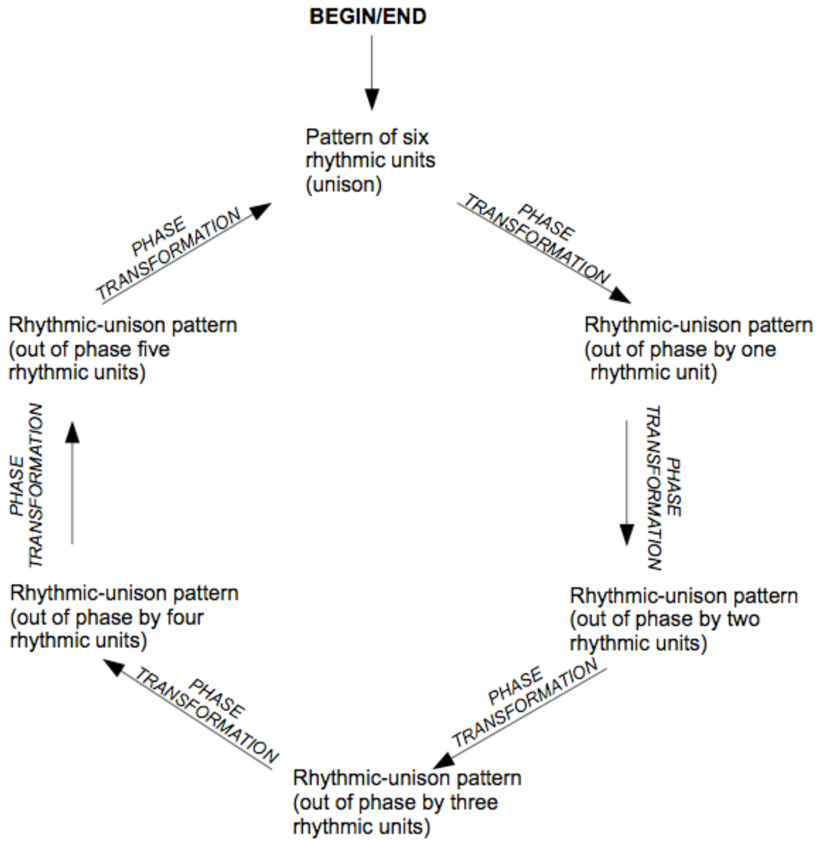
[54] Glass, Philip, *Music In Similar Motion* (New York, 1969).
[55] Glass, Philip, *Music in Fifths* (New York, 1969).
[56] Reich, Steve, *Piano Phase* (London, 1980).
[57] Reich, Steve, *Violin Phase* (London, 1979).

Figure 6: Phase-transformation process in the early music of Steve Reich.


BEGIN/END
Pattern of six rhythmic units (unison)
PHASE TRANSFORMATION
Rhythmic-unison pattern (out of phase by one rhythmic unit)
PHASE TRANSFORMATION
Rhythmic-unison pattern (out of phase by two rhythmic units)
PHASE TRANSFORMATION
Rhythmic-unison pattern (out of phase by three rhythmic units)
PHASE TRANSFORMATION
Rhythmic-unison pattern (out of phase by four rhythmic units)
PHASE TRANSFORMATION
Rhythmic-unison pattern (out of phase five rhythmic units)
PHASE TRANSFORMATION

This cycle demonstrates how there are always many local climaxes within the overall structure which occur at the rhythmically-synchronised moments;[58] this necessarily places a hierarchy upon the structure, as these moments take on an importance which the transformation sections cannot due to their *lack* of unison. In my own music, I strive to avoid these local climaxes as they prevent a total decentralisation and would detract perception away from the surface layer articulations.

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[58] Gregory Sandow describes these moments as 'small climaxes' (Gregory Sandow, "Steve Reich: Something New," *The Village Voice* (10 March 1980), 74). I see them them specifically as goals towards which each transformational section is headed, although they are unlikely to be heard as such due to their complexity.

Once the cycle is fully achieved in Reich's music, and the phase returns to its original unison pattern, a strong sense of closure is created. There is a similarity to the approach in my arc-structure compositions, for instance *Violin with Clarinet and Piano*, *Bilinear* and *Gradual Music*, as once the end of the piece is experienced, the listener will have a stronger sense of the overall structure and of whether the model ended either exactly, or similar, to how it had begun. However, these pieces avoid anything which may be referred to as 'local climaxes'; by lacking such sections as the 'phase transformations' in Figure 6, no hierarchy is placed upon certain sections of the material over others – there is still a clear tendency towards decentralisation.

It is only *Inversions in Retrograde* and *Corradiation* within the portfolio which demonstrate a strong sense of closure. The iterations of *Inversions in Retrograde* produce harmonies ever closer to the E major root position chord at the close of the piece; once this final condition is met, there is a clear sense of a conclusion to the process. The closure in *Corradiation* is provided by the movement of the two glissandi towards an octave unison, although this closure is only perceivable towards the end of the piece when the glissandi are close to their final destinations. This is almost an inverse structure of Reich's phase-transformational pieces, as he uses the unstable transformational sections as 'boundaries' to the stability of the rhythmically-unison patterns. *Corradiation* exemplifies my interest in maintaining instability as the main content of the music through the slowly-ascending glissandi, which use the stability of unisons as a 'boundary' point at the beginning and end of the piece. This idea manifests itself throughout the portfolio, differing only in how clearly the unison is emphasised. For instance, *Corradiation* has a sustained octave unison at its close, whereas the glissandi sections of *in tones* finish immediately as the unison is achieved, therefore acting only as a marker for the performers, rather than as a perceived boundary for the listener.

The stable extremities of *Corradiation* and *in tones* that contain extended transformational processes are representative of the theme demonstrated throughout this chapter: an emphasis towards instability, and how it can be made manifest through various compositional techniques in the music of sustained tones. A continuously transforming surface layer, a non-linear temporal experience, and a constant gradual process all contribute to the variable nature of this music. Whilst at a superficial level, the music seems to consist of very little movement arising from the low information of the gradual processes, my own interpretation is of a single structural gestalt which consists of continuous instability and transformation, as described throughout this chapter.

Chapter 2: Musical Language

This chapter will discuss different materials which I use for composition. The tools described in this chapter should be seen in the light of issues described in the previous chapter; the individual devices outlined here are all combined in various configurations within the different pieces of the portfolio. Detailed discussion of the individual portfolio pieces is left for the following chapter.

2.1: Harmony

Harmony is the single most important factor in my music: it is harmony which drives the formation of acoustic phenomena for surface layer articulations. However, whilst much of the harmonic structuring is designed for the generation of these articulations, my own preferences for near-unisons and near-octaves - or what I term a harmony of the 'almost' - infuse my compositional writing. Easily-recognisable intervals such as thirds and fifths are detuned, and spectra are misaligned or overlaid so as to mask their fusing potential. The nature of 'almost' harmonies can suggest microtonality, which I have been employing for much of my composing life. The nuanced colours available through microtonal harmonies is one aspect which drew me to this area initially, and working within an open field of frequencies, away from a specifically tempered system, allows for a much richer choice of pitches.

There are two main approaches to harmony employed throughout the portfolio compositions: harmonies based on spectral theory, and harmonies operating within a small cluster.

2.1.1: Spectral harmony

My own harmonic approach is related more to James Tenney's employment of the harmonic spectra, rather than the more teleologically-defined 'Spectralist' approach, as propounded by Murail and Grisey. I tend to employ mostly lower order harmonics, and a number of pieces make use of unison or near-unison harmonies.[59] *Proximity Stream* uses three simultaneous spectra layered upon each other, and *Virtual Fusion* continually alters the harmonicity of a simple harmonic series to produce an 'almost' effect, leading to a perfect harmonicity at the end of the process. The extended chords of *Inversions in Retrograde* in just intonation, which is a tuning system derived from the harmonic spectra, produce an 'almost', which then disperse through glissandi.

2.1.2: Clusters

This is the majority of pieces within the portfolio, and can be seen in pieces such as *Bilinear*, *Slide Movement*, *in tones*, *Clarinet Quartet*. Standard harmonic language does not suffice when discussing music of this nature as often the critical band prevents us from perceiving the different pitches separately. So, bearing in mind that the usual definition of harmony is simply the simultaneous combination of notes,[60] I tend to think about it in terms of density. The density shifts according to the numbers of tones being played, but also from the proximity of the pitches: faster beating patterns can be perceived as heavier densities, while slower patterns seem to be much thinner. The decentralisation of the work discussed in the previous chapter appears through its persistent, yet non-teleological, shifts in density. Much of Alvin Lucier's recent music for chamber ensemble (for instance *Wind Shadows*[61] (1994) and *Q*[62] (1996)) present similar shifting densities as that of the portfolio, and the principle similarity between these pieces which brings about the varying beating patterns, and therefore varying densities, is the employment of glissandi. *Like a Continuum* involves four sets of close clusters, each an octave apart; thus, multiple shifting densities are heard along with near-octave phenomena resulting from the combination of the octave harmonics.

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[59] Both Webern and La Monte Young notably enjoyed using near-octave unison clusters in their music. Phill Niblock also states that, with the combination of a 57 Hz tone and a 113 Hz tone, “you know *something's* going to happen” (Warburton, Dan, 'Phill Niblock', *The Wire*, 265 (March, 2006), 37.

[60] This is separate to the *study* of harmony, i.e. the analysis of harmonic progression.

[61] Lucier, Alvin, *Wind Shadows* (Kiel, 1994).

[62] Lucier, Alvin, Q, (Kiel, 1996).

Corradiation's two lines begin a minor sixth apart, and then gradually move outwards over a tone to an octave unison. The initial interval is entirely functional, so that both trajectories travel the same small distance in opposite directions to reach unison, and the ensuing harmonies during the piece are a result of the pitch process. This is essentially a development of the near-octave harmonic approach, allowing resultant harmonies from the simple pitch structure, but additionally, since each of the lines is sung by two singers who will be microtonally out of tune with each other, small clusters are generated throughout the piece.

As a contrast to these ensemble pieces, *Ruptures*, a short piece I wrote for Steve Altoft's eighth-tone trumpet in 2007, is included in Appendix 2 (page 116). The piece is built upon the same close microtonal clusters of other pieces mentioned, therefore remaining consistent with my harmonic outlook. However, the melodic nature of the meandering microtones placed too much focus upon the contour of the music, rather than the harmonic aspect, and is included to demonstrate that it is specifically the *combinations* of these colours which appeals to me the most strongly. This piece demonstrated that a harmonic approach, rather than one based on a singular melodic model, is more effective for my intentions, hence its exclusion from the main portfolio.

2.2: The extended glissando

> I hate glissandi when they are used as an effect. But if you make a piece entirely out of glissandi, in which they serve a structural purpose, that's a different matter. [63]

The glissando, a continuous elision of discrete pitch relationships, permeates much of the thinking behind the music in this portfolio. In the above quote, Lucier is initially referring to the more traditional use of glissandi: quick speeds, acceleration in the rate of pitch change, often increasing in dynamic toward the end. This tends to be referred to as a 'secondary gestalt'[64] – a supplementary expressive device enhancing a primary gestalt. It imposes an external shape which tends to become modified by the conscious mind and to be perceived with more simplicity than it actually possesses.

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[63] Alvin Lucier, (transcribed by Anne Guthrie.), *Ostrava Days 2005 Report* (Ostrava, 2005), 116.

[64] Pike, Alfred, 'The Theory of Unconscious Perception in Music: A Phenomenological Criticism', *Journal of Aesthetics and Art Criticism*, 25/4, (1967), 396.

However, the type of glissandi which both Lucier and I find of more interest compositionally have a much slower speed, with total linearity in the rate of pitch change, and of consistent dynamic throughout. The extended duration allows for perception to grasp accurately every detail of the shape, and – along with the lack of other gestural material within the music – ensures its perception as a primary gestalt. This type of glissando often forms the basis for global or section-level pitch structures in my music, and on a local level is one of the main instigators of gradual harmonic change.

In pieces such as *Gradual Music*, sections of *in tones* and *Violin with Clarinet and Piano*, the glissandi operate against sustained tones within a range of a semitone, so that usually the harmonic shift is translated into a different density weighting and resulting beating patterns. In a piece such as *Inversions in Retrograde*, the glissandi provide motion to offset the stability of the fixed harmonies of the separate chords.

Thus, there are three different functions of the glissandi:

- to provide the underlying structural contours of a piece
- to shift harmonic densities (and consequently produce beating patterns) in close clusters, often alongside sustained tones
- to provide instability, in contrast to immobile harmonies.

The first function is seen in pieces such as *Clarinet Quartet* and *Like a Continuum*, where sustained tones are played from within the small pitch range, which gradually rises through the frequency scale during the piece. This glissando-based structuring technique is also used by various other composers in different contexts. Much of Phill Niblock's music uses gradual glissandi layered upon each other as a structural device; *Five More String Quartets*[65] (1991-3) places sustained tones within a glissando construct which gradually move the initially scattered pitches into octave unison by the end of the piece. James Tenney's *Koan* for solo violin from his set of *Postal Pieces* connects consecutive ascending glissandi on adjacent strings, giving an impression of one overall continuous structural glissando. *Ajapajamapam*[66] (2002) for choir, by Lithuanian composer Rytis Mažulis is constructed from a thirty-five minute descending glissando over a perfect fifth, and the first page of the score is shown below:

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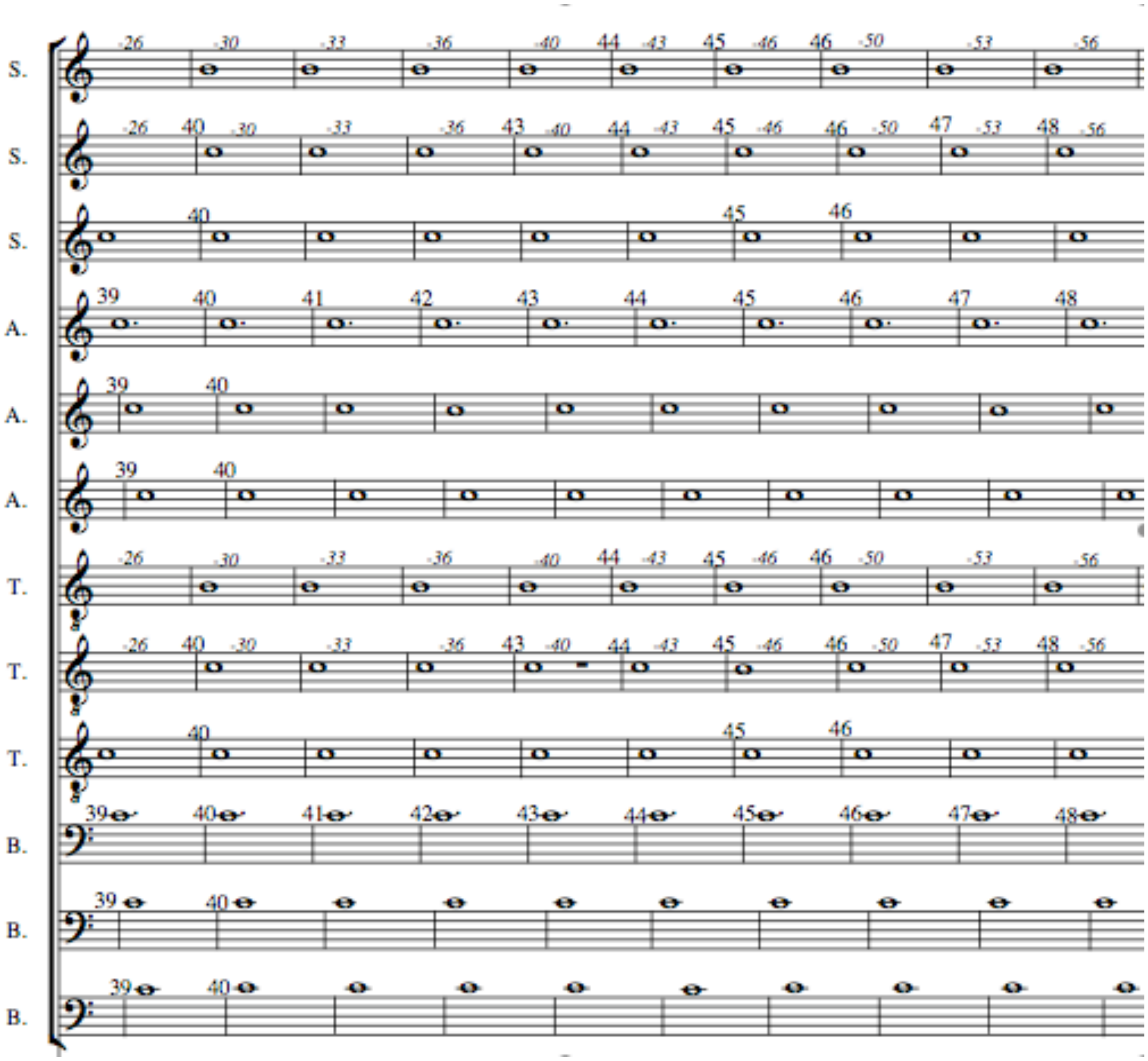
[65] Niblock, Phill, *Five More String* Quartets (1991-93).

[66] Mažulis, Rytis, *ajapajapam*, (Vilnius, 2002).

Figure 7: Rytis Mažulis, *Ajapajamapam*, (2002) mm. 39-48. Image © Lithuanian Music Information and Publishing Centre.



The glissando in this Mažulis excerpt is technically a move from dominant to tonic, but because of the very slow nature of the glissando (the singers, while following a glissando being played through their earpieces, are essentially singing sustained notes), we do not hear any such harmonic return in the aural experience. The structural glissando merely provides an elongated single gesture (a pitch modulation process), which is duplicated at slightly different speeds for different singers within the ensemble. A number of my pieces are based on similar principles: for instance, *Like a*

Continuum for saxophone ensemble involves an ascending glissando over a minor third played simultaneously in four separate octaves. Whilst the exact individual pitch changes are not notated (as opposed to the Mažulis excerpt above), the overall reliance on the simplicity of the glissando gesture to produce complexity in experience is clearly evident. As Lawrence Alloway states: '[s]implicity is as sustaining in art as elaboration'.[67]

Tashi Wada's *Duet*[68] (2006) for two violinists also uses a single glissando as the global structure. Both players are instructed to glissando down two octaves from a high G to the low open G-string, descending in unison as slowly as possible. The listener will continually parse the two streams into one, and then back out to two as the myriad pitch, dynamic and durational fluctuations continue to coincide and then differ. The main difference between this piece and those previously discussed is the use of the glissando as performance material, as well as the global structure, therefore resulting in a less stable environment for beating patterns than pieces with sustained pitches.

Environments that are much more conducive to inducing beating patterns are *Crossings*[69] (1982), *Wind Shadows*[70] (1994) and *Q*[71] (1996) by Alvin Lucier, and *Cellogram*[72] (1971) by James Tenney. These pieces all provide an integration of the second function of glissandi as noted above, with the previously discussed first function. The Lucier pieces all involve multiple extended glissandi layered upon each other in very close proximity (often within a tone), and Tenney's *Cellogram* pits slow glissandi of a fifth on the cello against its open strings. The critical band is most evident in these pieces, as the various instrumental/string layers move from being perceived separately to being one entity as the Just Noticeable Difference is encountered and passed. Portfolio pieces such as *Slide Movement* and *Violin with Clarinet and Piano* operate within a similar area, again utilising both of the first two glissando functions.

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[67] Lawrence Alloway, Systemic Painting, *Minimal Art: A Critical Anthology*, ed. Battcock, Gregory (Toronto, 1968), 53.
[68] Wada, Tashi, *Duet* (Self-published, 2006).
[69] Lucier, Alvin, *Crossings*, (Kiel,1984).
[70] Lucier, Alvin, *Wind Shadows*, (Kiel,1994).
[71] Lucier, Alvin, Q, (Kiel,1996).
[72] Tenney, James, *Cellogram* (Baltimore MD, 1971).

Returning to the notion of a single glissando as global structure, some of Lucier's most well-known works, such as *In Memoriam John Higgins*[73] (1984) and *In Memoriam Stuart Marshall*[74] (1993) provide the clearest example yet of the nature of beating patterns. Both pieces involve solo instruments holding sustained tones against a slowly-ascending sine wave glissando, and beating patterns result as the sine wave crosses the pitch area of the sustained tones. The liner notes to a recent Lucier CD[75] which includes these pieces explain that as the amplitude of these beating patterns change (i.e. what creates the sensation of 'beats'), which is a result of the two frequencies moving in and out of phase, then the pitch of the tone complex will itself drift higher and lower, therefore creating a smooth glissando.[76] While this glissando is of minimal pitch change, the nature of these pieces is such that the listener's perception is entirely directed toward pitch alteration, and thus may well detect these infinitesimal glissandi.[77] Indeed, the phasing involved in beating patterns (a continuous 'glissando' of pitch and amplitude) is similar to the phasing of some of Reich's gradual processes: patterns fall into phase together and are perceived clearly – analogous to maximum amplitude in beating patterns – and then move out of phase to become much less clearly articulated.

The third function for glissandi noted above, to provide instability, in contrast to immobile harmonies, is employed in pieces such as *Inversions in Retrograde*, where sustained harmonies are separated by small, gradual glissandi. These glissandi are not heard as separate to the global sound, but rather disrupt the evenness created by the sustained chords. Chiyoko Slavnics describes similar situations in her own music as those 'that are stable, and those that are destabilised by a dissolution of “harmonic identity” through glissando'.[78] She notes how the glissando enabled her to develop forms with 'dynamic, inner structures'[79] - the harmonic dissolution being the most important role of these transitive structures. The global forms are not designed to have such low entropy as my own process-based compositions: Slavnics discusses how she is cognisant of contrast, continuity, non-repetition and other compositional devices, and consequently creates an extended narrative within her music. However, it involves such minimal material over such an extended duration that the listener tends not to compare gestural devices with previous events, and the individual shapes comes to form only the harmonic dissolution which she describes.

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[73] Lucier, Alvin, *Im Memoriam Jon Higgins* (Kiel, 1987).

[74] Lucier, Alvin, *Im Memoriam Stuart Marshall* (Kiel, 1987).

[75] Lucier, Alvin, Anthony Burr/Charles Curtis (Anthony Burr, Charles Curtis, ANSI002).

[76] This is apparent in a piece such as *Strength in Unity*, where, although only sustained tones are called for in the score, very slight alterations of pitch are produced through the variations in amplitude in the beating patterns.

[77] The liner notes go on to discuss how Helmholtz's original German term for beating (*Schwebung*) relates to the English “sweeping” and 'swooping', implying a continuous glissando motion.

James Tenney spoke of the glissando as a reminder of a certain physical reality, the fact that the 'frequency is a continuum and we don't have to think of it in scale steps'.[80] We *can*, and often do, break it down for it to be structured in some other way than a continuum, but this is merely a human construct placed upon the continuous parameter of pitch. For me, the glissando (in any of the functions noted above) allows for a complete, non-hierarchical exploration of frequency within a chosen interval, and serves as a superior platform for producing particular acoustic phenomena.

2.3: Duration

Aside from the installation piece *in tones* which lasts four hours and is clearly separate in terms of the duration to other pieces in the portfolio, the mean duration of pieces in the portfolio is 8'42”. While most of these durations have come about from concert programme limitations, from experience, I find that durations between this mean value and the mode of 11' allow for listeners to fully comprehend the form of the piece clearly and easily; given the low rate of information change which is occurring in the sound, these durations also allow listeners to recall most of, or the entire piece, much more easily than longer durations. This means cognitive comparative strategies can be employed, whereas in music of longer durations the listener is unlikely to have the capabilities to refer back to previous sections in the order in which they appeared. Whilst I do not profess this to be objective research conclusions, and it is clearly context-dependent, the shorter durations, in comparison to Phill Niblock's 20' durations for instance, allow for an easier comprehension of form and time ordering, and the low information of my music ensures that even an average concert-length duration of 10' will seem like longer when it is being experienced.[81] See the commentary for *in tones* in a discussion of working with a much more extended duration.

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[78] Slavnics, Chiyoko, 'Opening Ears – the Intimacy of the Detail of Sound', *Filigrane: Nouvelles Sensibilités*, No.4, (2006), 39.

[79] Ibid., 37.

[80] Dennehy, Donnacha, 'Interview with James Tenney', *Contemporary Music Review*, 27/1 (February 2008), 89.

Those pieces with continuous sustained tones of fixed pitch (for instance, the EBows in *Gradual Music*, or the octave Es from *Inversions in Retrograde*) last longer than the average duration of the portfolio. These fixed tones provide an extra layer of transformational articulations and harmonies alongside the pitches undergoing the structural process, and I felt that this added information could maintain a strong level of engagement over a longer duration than other pieces built on simple processes without a fixed tone.

Pieces which include silence, such as the breaks in between gestalt objects in *Violin with Clarinet and Piano*, or were more likely to involve periods of silence, such as *Strength in Unity*, tend to be shorter in duration than the portfolio average. Since the emphasis of my compositional approach is upon the interaction of surface articulations, I believed that longer durations comprised of many silences would compromise the perception of the surface layer, as attention would be drawn over the duration to the alteration between sound and silence. I found the shorter durations to be more suitable to focussing attention on the qualities of each sounding object.

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[81] Bob Snyder's states that 'time periods with little information are experienced as being long, but remembered as shorter' (Snyder, Bob, *Music and Memory: An Introduction* (Cambridge, MA, 2000), 214).

2.4: Use of instruments

Tony Conrad describes the fusion between his violin and John Cale's viola in the Theatre of Eternal Music 'as though smelted into one sound mass, I felt that the Dream Music had achieved its apogee'.[82] This points towards the effectiveness of homogeneity in sustained tone textures. Homogenous instrumentations remove timbral contrast, or any kind of timbral resistance between individual instruments, directing the totality of the listener's attention toward other parameters such as (in my music) harmony and related acoustic phenomena. In his thoughts on the monochrome of his black paintings, Ad Reinhardt talks about the 'undifferentiated unit, oneness, no divisions, no multiplicity',[83] and it is this indistinguishability between instruments which I apply to many of the portfolio compositions.

All but two of the pieces employ homogenous groups of instruments, employed to avoid distinct timbres from standing out from the global homogenous texture.[84] Burkhard Schlothauer describes how, in pieces such as *Harmonium #2*[85] (1977) and *Critical Band*[86] (1988) by James Tenney, 'the more precise and sensitive the musicians play, the more they themselves disappear in the group sound', as the 'smallest changes in bow pressure (or the embouchure) modulate the pitch audibly'.[87] It is this level of homogeneity which I require of the musicians in my music: there are few examples of where instruments would be heard separate to the central mass, thus the precision in performance can lead to this 'disappearance' within the overall sound. Homogeneity was refined throughout the course of my doctoral studies by employing longer tones, for instance *Clarinet Quartet* uses many short tones, but *Corradiation* only uses longer, sustained durations. Also, recent pieces use a balanced dynamic throughout the ensemble, ensuring a strong homogenous blend; the varied dynamics of *Proximity Stream* have been modified in recent pieces to a similarity of dynamic across the whole ensemble. Both longer tones and equality of dynamic supports the directing of attention towards the harmony, and subsequent phenomena.

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[82] Conrad, Tony, 'Lyssophobia: On *Four Violins*', *Audio Culture: Readings in Modern Music*, ed. Cox, Christopher and Warner, Daniel (London, 2004), 318.

[83] Reinhardt, Ad , *Art as Art*, (Berkeley, 1991), 90.

[84] The exceptions are *Violin with Clarinet and Piano* and *Virtual Fusion* – see individual commentaries for further discussion.

[85] Tenney, James, *Harmonium #2* (Lebanon, NH, 1976).

[86] Tenney, James, *Critical Band* (Lebanon, NH, 1988).

[87] Schlothauer, Burkhard, Zeitkratzer, *James Tenney: Old School* (sleevenotes), (2010) ZKR 0010.

To achieve the focus on the pitch parameter, pure tones[88] from instruments are called upon, as they have the most favourable ratio of perceivable pitch-to-noise than other modes of playing (for instance sul ponticello, col legno, mutes, or breath tones). This ensures a clarity in pitch perception for the listener, without other sounds intervening and diverting perception. Players are instructed to work towards an ensemble balance with regard to tone quality and dynamic, so that individual instruments gel with others as best they can.

The choice of pure tones is also linked to the durational aspect of the music; for the majority of extended techniques on different (mainly wind) instruments, pure tones can be sustained easier and for longer durations than can certain other performance techniques (for instance multiphonics, breath tones, and split tones). The employment of pure sustained tones informs the various instrumental forces found in the portfolio. Aside from the first piece, *Sonotron* (for four pianos), all the pieces include instruments which can maintain a steady tone (with respect to pitch, timbre and dynamic) over a sustained duration. For instance, percussion instruments – pitched or unpitched – do not feature in the portfolio (aside from the piano), as their dynamic and timbral quality transforms significantly throughout a single tone. I opt for single-reed woodwind instruments over double-reeds due to the former's broader, more subtle sonority which lends itself to ensemble blending more effectively.

Gradual Music and *in tones* are built around continuous sustained tones: EBowed piano and organ respectively. Because wind instruments cannot sustain notes indefinitely as strings can, the sustained note durations are achieved by the instruction of a 'comfortable' breath. This instruction, used by many composers from the experimental tradition, can be seen in a piece such as Tenney's *Clang;* however, there the instructions call for each duration to be measured, so that the dynamic peak of each pitch is exactly halfway through the note's duration. Paragraph seven of *The Great Learning*[89] (1968-71) by Cornelius Cardew calls for 'comfortable breaths', although here singers are encouraged to move around the performance space in between changes of pitch. My own application is for players to take comfortable rests, but there is an implication to maintain a certain 'momentum' throughout the performance. This became a central tenet for my compositional approach towards the end of my doctorate: by employing an open approach to duration for the wind instruments, the focus of the performer was directed towards duration, rather than entry and exit points. Feedback from performers suggested that this was a successful strategy, and allowed them to sustain a note for a length of time that was suitable for individual performers.

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[88] 'Pure tone' here is to be understood in the musical sense of a single tone played in a standard manner, as opposed to acoustics terminology defining it as a sine tone.

Instruments are usually instructed to fade in, avoiding accents so as to maintain homogeneity; string instruments are far more effective at this than winds – except the clarinet, which has an exceptional capability to fade in from silence. However, that dichotomy is never an issue as these different families never fade in simultaneously, even when both are involved in a piece, for instance in *Gradual Music*, where the separate groupings of brass and strings are kept as distinct homogenous timbres. Thus, no dialectic can be wrought from within a piece based upon difference of note onset.

The inclusion of a glissando as musical material usually defines which instruments are used in a piece; in actuality, this formula is reversed, as the particular group of instruments for which I write (for instance saxophone ensemble or trumpet trio) establishes whether glissandi can be included, from the limitations of the instrumental mechanics. Where slow, extended linear glissandi would be particularly unidiomatic for instruments (for instance, a clarinet quartet), the glissando acts as the global structure for the piece. Microtones are employed for these instruments (often employing tablature – see section 2.5 on notation) to limit discrete steps in the glissando structure. A piece such as *in tones*, with its multitude of differing homogenous groupings, allows for various glissandi and microtonal approaches to be used within one piece, entirely dependent upon each particular group of instruments.

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[89] Cardew, Cornelius, *The Great Learning* (London, 1971).

In *Virtual Fusion* and *Bilinear*, I employ sine tones alongside the acoustic instruments. The processes controlling the electronics will be discussed in the commentaries, however it is worth stating here that I specifically only use sine tones due to their lack of harmonics, thus enabling them to blend particularly well with other sonorities over extended durations. For instance, in *Bilinear* the sine tones blend in a close cluster with a clarinet which has a sonority resembling a sine tone when played softly. This means that the similarity between the quiet clarinet and sine tones supports a blended, homogenous sound, and the attention of the piece is directed toward the resultant harmonies rather than timbral differences.

Dynamic levels called for across the pieces in the portfolio range between medium and soft: importantly, in my recent music, the dynamic remains consistent throughout, exempting the fading in and out of tones to blend with the homogenous texture.

Thomas De Lio has described the imposing nature of verticality upon sculpture,[90] and in a similar manner a sustained loud dynamic can impose itself upon the aural space. Phill Niblock is known for demanding very high volume levels at concerts (110-115 dB) for the correct realisation of his intentions:

> When *3 to 7 – 196*[91] is loud enough you hear the overtones and lose the cello completely and when you turn it down you just hear cello. It's just the best example of what happens with different loudness levels.[92]

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[90] DeLio, Thomas, *Circumscribing the Open Universe* (Lanham, MD, 1984), 93.

[91] A Niblock composition for solo cello and electronics (1974).

[92] Saunders, James, 'Phill Niblock', in *The Ashgate Research Companion to Experimental Music,* ed.

This is clearly to create a situation which presents the richest overtone spectra attainable from the recorded samples. These examples of large verticalities/intensities do not produce a heightened sense of 'dramatic' tension in the perceiver – they are employed to demand a particular perceptual experience. For my own music, however, I specifically do not call for a louder dynamic. The sound should not impose itself upon the listener in the way that a 'high' intensity or 'loud' verticality does; rather, the sound should remain very much in the middle of the standard performing intensity level, allowing beating patterns to be distinguished, but without oppressing the auditory space.

Whilst the loud volumes produce rich overtone spectra, for my own music I dislike employing such imposing sounds; from my own perceptual experiences of the music of composers such as Chiyoko Slavnics, Michael Pisaro, Alvin Lucier and my own pieces, a softer sound can draw the listener into its environment, rather than immediately immersing them, regardless of their will. A softer sound requires a more intense listening attitude from the audience, but can produce very acute aural results when concentration is raised so as to perceive the music clearly.

Another more practical advantage with softer sounds is that performers can control their tone more easily and wind players will not risk compromising the pitch and quality of their tone through sustained embouchure pressure. Overall, it it is a more comfortable dynamic level to play at, thus supporting the comfortable note durations referred to earlier.[93]

2.5: Notation

For me, notation has two roles: the practical arranging of elements for performance, and the transferral of a particular attitude towards interpretation. These are not mutually exclusive, in many cases one informs the other. While the first of these roles is self-explanatory and serves pragmatic,

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Saunders, James (Farnham, 2009), 322.

[93] Niblock uses edited samples of instruments – with onset and endings of notes removed, and using only the most stable of recordings - thus avoiding this problem.

instructional requirements, the second role is more subtle in its manner. The visual nature of a score, the wording of instructions, and the use of staves all contribute to the transferral of a type of approach to performance. In my own recent scores, I have strived for a real sense of elegance – a simplicity which employs a minimum of notation materials to ensure the compositional concept is realised as intend it to be. This notion of simplicity is then transferred to the performer, who allows it to determine their performance approach.

The approach which I hope to convey to the performers is that of the non-interventionist described by Philip Thomas. In this approach, the performer's entire focus is on the 'production of sound within the parameters of the score',[94] and for my own music the term 'sound' can be replaced in that phrase with the term 'pitch'. There should be a 'focus upon material in the immediacy of the moment', not with the communication of gestures or contours. The contours inherent in my music arise out of the resultant pitches, and the performers should not make efforts to project this line any more than the pitch movement does. A number of my scores are only one page long: this is representative of the simplicity in notation, and promotes the concise, non-interventionist approach of simply carrying out the action required, without the addition of other performance techniques employed in other musics to bring out gestures, contours, or a sense of narrative.

To reflect this pursuit of concision in scores, my use of notation has developed significantly throughout the course of the doctorate – this is evident with even a cursory glance through the portfolio scores. The main trend is the move towards more indeterminacy in notation, such as tablature instead of specific pitch notation, and prose scores. The changes in notation are integrally related to compositional concepts and are often informed by them, For instance, the durational sections in *Like a Continuum* appear as a result of a wish to include unspecified note-entries for players. Feedback from players also often informs future notations, whether they be refined versions of systems previously used, or wholly new concepts.

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[94] Thomas, Philip, 'A prescription for action: a common approach to performing simple, complex, graphic and verbal scores', *The Ashgate Research Companion to Experimental Music,* ed. Saunders, James (Farnham, 2009), 91.

There is no one single notational format which I adopt for compositions, instead there are a number of factors which determine the employment of a particular notation. These factors stem from harmonic and durational concerns, which are the parameters that alter the most throughout the portfolio. They include:

- approach to microtonality
- process employed
- synchronicity
    - level of synchronicity desired
    - manner in which it is employed
- instrumental forces and ensemble balance.

2.5.1: Approach to microtonality

Throughout the course, I have employed a variety of tuning systems: just intonation, quarter-, eighth- and twelfth-tone harmonies, standard equal temperament, and non-specific microtonality resulting from discrete glissandi or text instructions. The system chosen for particular pieces, which often arises from instrumentation, harmonic conception and global structure, informs the notation by determining if conventional staff notation is used (for equal temperament, just intonation, quartet-, eighth- and twelfth-tone systems), or if another notational form is required. These determinate tuning systems communicate a precision to the performer that they should aim towards; in reality, only *Inversions in Retrograde* relies on an exact harmony (the piece was conceived in harmonic terms – this is discussed further in the individual commentary); the other pieces simply require varying degrees of detuning. For instance, a performance of *Corradiation* does not fail if the singers do not manage to pitch exact quarter-tones at the specified points;

rather, they should use these quarter-tones as a goal, as they direct the overall pitch trajectory, and the intended surface layer articulations will occur whether an exact quarter-tone is sung or not. *Proximity Stream* uses much less specific microtonal notation, shown in Figure 8.

Figure 8: Microtonal notation used in *Proximity Stream.*

𝄰	Slightly sharper than a sharp
𝄱	Slightly flatter than a sharp
𝄮	Slightly sharper than a natural
𝄯	Slightly flatter than a natural
𝄬	Slightly sharper than a flat
𝄭	Slightly flatter than a flat

The imprecision in the above pitch notation is employed because there is no strict trajectory in this piece, as there is in a piece such as *Corradiation*; so the notation could focus solely on the 'out-of-tune'-ness of these required pitches. The ensemble parts for *in tones* use text alone to define 'slightly sharper' or 'slightly flatter' pitches. Again, no more specific pitch trajectory is required of the players than to be slightly higher or lower than a fixed pitch. In this way, this imprecise pitch notation suggests an undefined pitch range, as opposed to a specific fixed pitch; however, the range suggested will guarantee the sought after articulations.

2.5.2: Synchronicity

The *level of synchronicity* describes how temporally co-ordinated the different performers are within a piece (this include performers controlling electronics). The portfolio pieces inhabit a wide range within this spectrum of durational control, which is a result of how specific I wanted to be in creating a fixed predetermined global shape to the music.

Clarinet Quartet represents an extreme control, with players' entry and exit points dictated very specifically by clock timings in minutes and seconds: note durations are determined exactly in a piece such as this. *String Sextet*, in its use of five-line staves with a tempo and bar lines, also involves a strong control over temporal relationships between players through a different method of notation.

There are a number of pieces which employ less controlling notation of durations, but still exert some specifics: pieces such as *Virtual Fusion* and *Gradual Music* all allow for a small amount of freedom in note duration, as a duration range is given either in the text instructions or above the staff, but they clearly demand a high level of synchronicity between players in the ensemble. *Like a Continuum* and *Corradiation* use much more indeterminate methods in controlling ensemble synchronicity: within given time brackets, particular tones are played independent of others in the ensemble. These tones should be of a 'sustained' duration, and can overlap into the next section. The differences between these two methods stem directly from the compositional concept. For instance, *Gradual Music* was designed with a clear wave-like contour in mind, so that a glissando had to begin just as the previous one ended, thus a strong level of ensemble synchronicity was required. *Like a Continuum* was intended to have multiple superimposed contours which ascended at different rates throughout the composition, hence the freedom of note-entry and note-duration.

Strength in Unity represents the most indeterminate approach to synchronicity within the portfolio. It contains only one reference to synchronicity: both players should have finished the first half of the composition before continuing.

The various *manners of employment* for synchronicity range between standard tempo markings and bar lines, clock time in minutes and seconds, and ensemble interaction; often a combination of these is present in scores. For instance, *Inversions in Retrograde* includes approximate note-durations in the text and staff notations, but relies on the performers' co-ordination to enter new sections simultaneously, whereas *Slide Movement* requires no temporal ensemble interaction, as the players follow a stopwatch throughout.

2.5.3: Pitch process

Where a compositional concept involves a transformative pitch process (where the pitch contour moves through specific, predetermined points), the notation reflects this in its inclusion of notation based upon pitch (five-line staves) or pitch-altering actions (wind tablature). *Bilinear* has an arc form governing the pitch movement for the two contours, and this is represented by the use of five-line staves. Pieces such as *in tones* and *Strength in Unity* have text based descriptions as the pitches do not follow complex pre-ordained transformational processes: *Strength in Unity* uses only two pitches an octave apart and microtonal variations, and *in tones* allows performers to choose pitches sharper and flatter than a given pivot pitch, which are then played in either the first or second ten-minute sections, as specified in the text. As opposed to five-line staff notation, the text approach conveys a sense to the performers that the resultant effects of the sound are more important than those pitches chosen. In comparison, in *Bilinear* the clarinettist is aware for the five-line staves that there should be an arc form in the pitch movement throughout, which they should clearly try to maintain in performance.

2.5.4: Instrumental forces

This category is less conceptually-driven, and arises from a practical standpoint of which notations are suitable for which instruments due to their mechanics. The singers in *Corradiation* can easily obtain microtones within a semitone, so a simple glissando line to indicate the global pitch contour suffices. However, the saxophone ensemble in *Like a Continuum* required particular fingerings to be provided to ensure a smooth microtonal ascension, hence the tablature governing the overall look of the score. This category is *ex post facto* of the compositional concept; as opposed to the previous three factors, it is designed to suit the instruments involved, rather than arising in conjunction with the compositional method.

Chapter 3: Commentary

The pieces contained in the portfolio exhibit the progression and development of my compositional writing throughout my doctoral studies. This commentary presents this progression by grouping certain pieces together where appropriate, and shows how concepts are maintained and treated in differing contexts. Above all, I intend this commentary to present the trajectory of refinement which I feel has occurred in my composing throughout the past five years; kernels of ideas, threads, have gradually become more explicit and crystallised into stable principles, as I have shed previous compositional pre-occupations so as to present musical material in the clearest possible manner. Figure 9 gives a generalised version of the particular attributes which were developed throughout this refinement; these details are explained in detail within the individual commentaries.

Figure 9: Overall refinement throughout the doctoral course.

Beginning of PhD		**End of PhD**
- Multiple contours		- Single/few contours
- Multiple sections		- A single section
- Conventional use of staff-based notation	→	- Various notational methods involving indeterminacy
- Intuition controls inner details	→	- Process controls entire piece
- Gestural use of dynamics		- Uniform dynamic throughout
- Non-linearity in contour/process		- Linearity in contour/process

3.1: Sonotron (2006)

4 pianos: 3'30”

Sonotron was written following a commission from the Society for the Promotion of New Music for a four-minute piece for the Corn Exchange in Leeds, a large circular performance space with a wide reverberant acoustic. Having become interested in Xenakis' musical thought in relation to sustaining musical textures over complete sections, I wanted to follow up his idea of a 'sonotron', which he had applied to his orchestral piece *Terretektorh*[95] (1965-66). Xenakis described the sonotron as 'an accelerator of sonorous particles, a disintegrator of sonorous masses, a synthetiser [sic].It puts the sound and the music all around the listener and close up to him'.[96]

I wanted to create a mechanical spinning process around the circular platform of the Corn Exchange which increased in speed as it revolved around the four pianos. In *Sonotron*, short, accented tones are passed around the quartet, using logarithmic processes to control the increase and subsequent decrease in speed, resulting in an exponential version of the arc form seen in later pieces in the portfolio. This percussive layer is complimented by a bed of sustained harmonic resonances whose strings are activated by the percussive layer from silently-depressed lower notes in the piano.

The piece undergoes four iterations of the speed increase/decrease model. The accented rhythms remain identical on each iteration, but the pitch cluster alters throughout the piece, as documented in Figure 10. The sustained chords which are built up in each section are included to show how these resonant harmonies continue to expand up to the mid-point of the piece, then revert back to their initial state and expand differently, responding to the pitch cluster in the treble.

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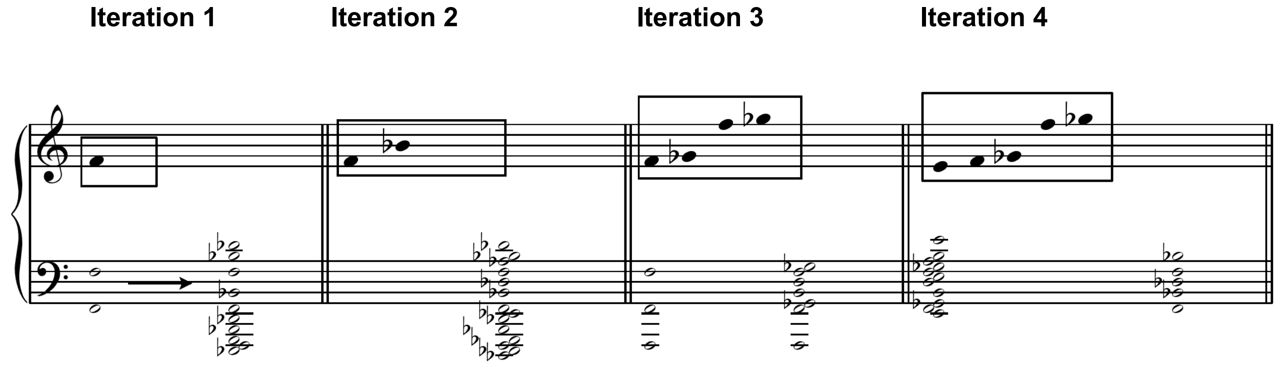
[95] Xenakis, Iannis, *Terretektorh* (Paris, 1965-66).

[96] Xenakis, Iannis, *Formalized Music*, rev. edn. (Stuyvesant, 1992), 237, quoted in Harley, James, *Xenakis: His Life in Music* (2004, New York), 46.

Figure 10: Cluster size progression in *Sonotron.*



The choices of pitches in the accented layers are intuitively worked out, in contrast to the more dogmatic approach to pitch structure employed in later pieces, such as the methodically-expanding clusters of *Gradual Music*. The piece suffers somewhat for this: whilst the intention was to direct the focus upon the rhythmic glissandi (with the resonant harmonies as a secondary feature), the sporadic changing of pitches in the percussive layer leads the listener to follow the melodic contour of this layer rather than any others. The harmonies were also composed intuitively, with the aim not only to expand them vertically from the initial state, but to vary their complexity: the sustained harmonies in the first two sections contain only consonance, but the final two iterations contain dissonances from the expanded cluster in the treble.

The piece also brought up problems of rhythmic imprecision in the notation. The logarithmic process in the rhythmic structure of the sonotron demands a high level of intricacy when the speed of the note-movement is at its peak. However, this became a problem for the performers as the difficulty of the semiquaver triplet rhythms in the sparser areas of the structure proved particularly troublesome to count. Because of this, *Sonotron* was the final piece I wrote where I used intricate staff-based durational notation to create rhythmic effects – other forms of durational organisation such as clock timing and length-of-comfortable-breath notes were used in future pieces. The nature of the more successful sustained layer of this piece from the harmonic resonances was what continued on as a thread into later pieces.

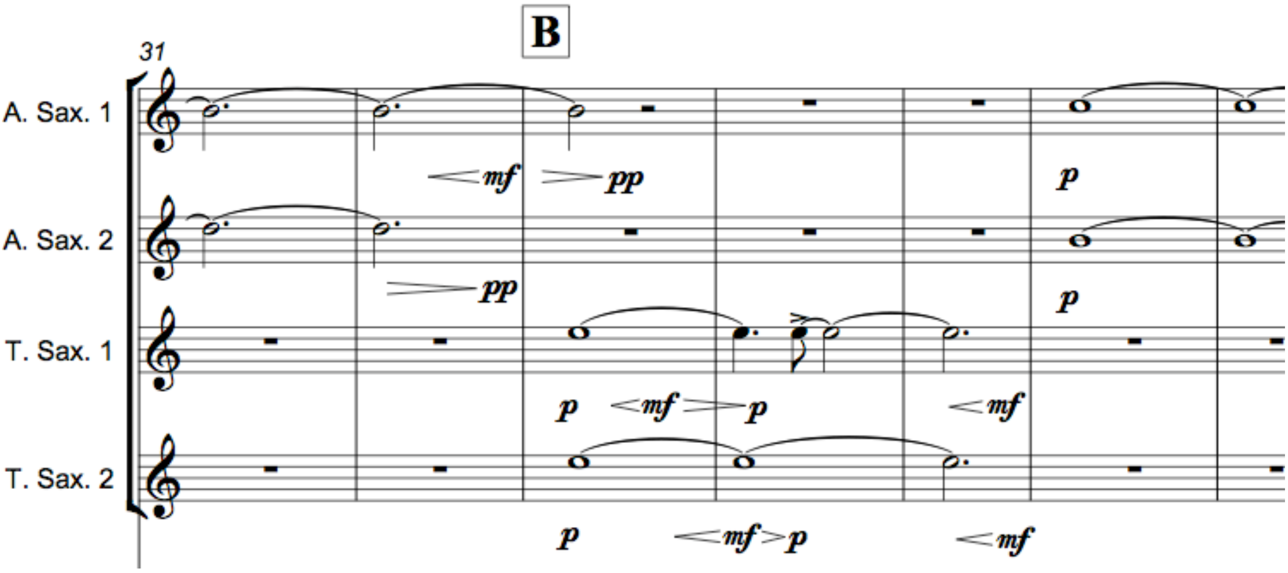
3.2: Proximity Stream (2007)

Saxophone quartet (2 alto saxophone, 2 tenor saxophone) and string ensemble (4.3.2.2.1): 7'

The title, *Proximity Stream*, is a combination of terms from gestalt perception, referencing how the effectiveness of our streaming (parsing) capabilities to separate signals degenerates as proximity between them decreases. With respect to audition, this is clearly perceived in close pitch-clusters (as explained in Chapter 1.2.2 with critical bandwidth), and is the central concept of the piece (and a number of others, such as *Clarinet Quartet*, *Slide Movement* and *in tones*).

The saxophone quartet play a continuously-sustained cluster of D4, Eb4 and F4 throughout, breaking only for notated breathing points. The gestural nature of this cluster can be seen below, where a multitude of dynamic markings are present in comparison to the more stark nature of later pieces, such as the constant dynamic of *Corradiation* and *in tones*:

Figure 11: *Proximity Stream* mm. 31-37.



The material for the strings was designed to alter how the listener perceives this sustained cluster.

It is composed in three distinct temporal sections, each designed to contrast significantly with the others, drawing attention to their particular features. Certain string groupings were used in each section, to support the contrasts:

1) various harmonics (up to the seventh) from the pitches in the saxophone drone (violins)
2) fundamental notes whose lower-order harmonics equate to the saxophone pitches (violas, cellos, double bass)
3) microtones within the saxophone cluster (violins, violas, cellos).

There is a strong sense of homogeneity within the separate groups of instruments (saxophones, high strings, low strings, mid-string cluster). The first two sections exhibit no transformation throughout their duration; only the densities change as instruments enter and exit due to local intuitive decisions. The third section sustains a consistent texture throughout, except at letter I where the two groupings of saxophones and strings are heard consecutively to emphasise the contrast between the tempered cluster and the microtones of the strings. This deviation from the non-hierarchical, non-developmental, approach of the first two sections was an intuitive decision, and one that seems fairly redundant with the benefit of hindsight as I feel it disrupts the continuity of the non-developmental approach.

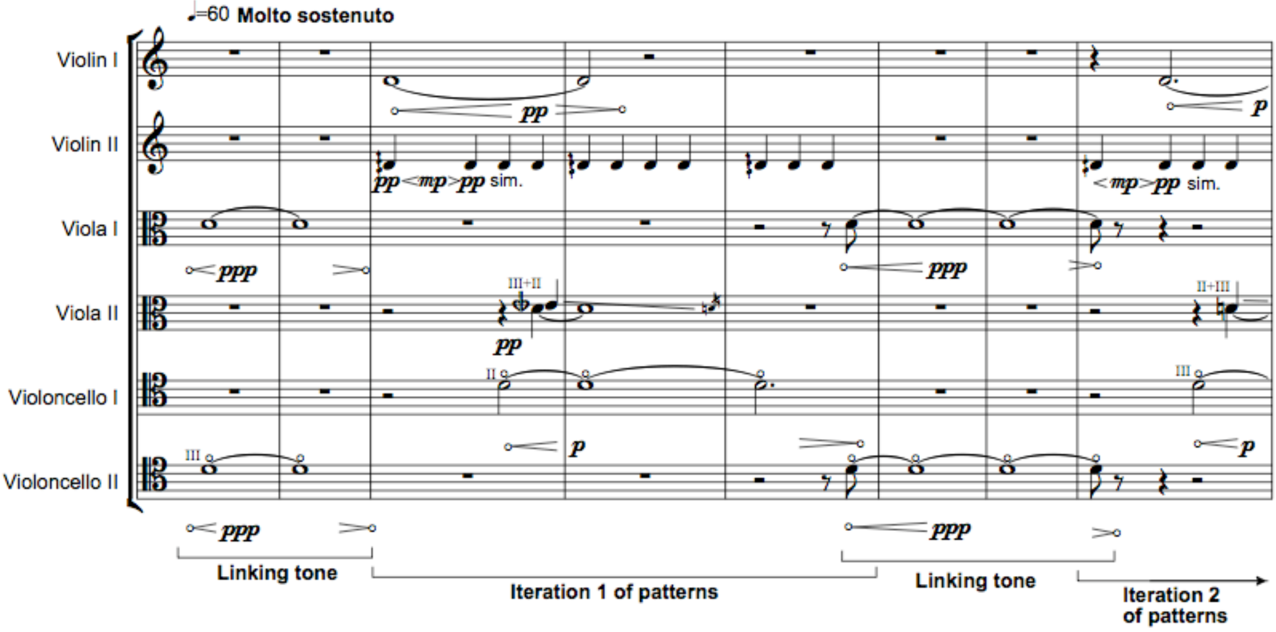
While my intentions were for the strings to combine with the saxophone harmonics and create interference patterns in the first section, and vice-versa in the second section, this effect did not materialise; following this piece I decided to concentrate solely upon the combination of fundamental frequencies in sonorities rather than continuing to explore spectral harmonies which may not materialise themselves in performance.

3.3: String Sextet (2007)

2 violins, 2 violas and 2 celli: 15'

String Sextet represents the end of a multiplicative approach to form in my composition, where various processes are intuitively layered or juxtaposed, whose ordering cannot be obtained from the early stages of the piece. The sextet consists of various short, simple patterns of sustained tones layered upon each other; most of the patterns are created from non-directed linear processes, but the global layout of the whole structure is entirely intuitive. Each iteration of these layered patterns is connected by a linking sustained tone on an instrument which is currently not involved with the patterns (the first eight bars of this model are shown below).

Figure 12: *String Sextet* mm. 1-8.


♩=60 Molto sostenuto
Violin I
Violin II
Viola I
Viola II
Violoncello I
Violoncello II
pp
p
pp<mp>pp sim.
<mp>pp sim.
ppp
III+II
II+III
pp
II
III
p
Linking tone
Iteration 1 of patterns
Linking tone
Iteration 2 of patterns

The patterns involved throughout the piece include:

- increase/decrease in dynamic
- increase/decrease in note duration
- ascending/descending pitches
- glissandi double-stopped with close sustained pitches ascending/descending in pitch

- gradual movement of bow position between fingerboard and bridge
- patterns of natural harmonics on alternating strings
- crotchet pulse.

I layered the various subtly-contrasting patterns on the strings, whilst relying on their ability to homogenise to render the various processes more as composed fluctuations rather than gestures in an intended narrative (these fluctuations can be seen as an unknowing composed instrumental reference to articulations, as described in section 1.2.3, page 28). However, I did intend on the patterns being perceivable to some extent through the non-directed linearity of their processes.

The crotchet pulse is the only pattern which does not transform upon each iteration. *String Sextet* is the only piece in the portfolio which includes any kind of regular, audible pulse throughout (the pulse in *Virtual Fusion* appears only in the second movement); the pulses are dynamic swells, rather than articulated attacks, but in other pieces in the portfolio involving dynamic swells (for instance, the various layered saxophone swells in *Proximity Stream* or *Like a Continuum*), these swells occur over longer durations, and are much more irregular – something which, in hindsight, I find works much more successfully because attention is not drawn to a regular tempo (and therefore away from the surface layer). The sections of pulses in *Sextet* do not occur continuously throughout, but only occasionally; again, this was an intuitive decision in the compositional process. In *Sextet*, the pulses function much more as a contrast to the linking sustained tones which divide each iteration.

In conception, this piece was not designed to project a strong teleological structure to the listener; the nature of the layering, however, does present a sense of non-directed linearity on a local scale. In performance, the homogeneity of the layers, and the very gradual nature of each pattern, meant that there was little anticipation of the next iteration as the divisions between patterns were very indistinct. Whilst I had intended a certain level of blending between the layers, the close pitch cluster, sustained tones, homogeneity in instrumentation and similarity between different patterns resulted in this blending being too high, and the teleological nature was lost. This piece was a clear facilitator of the move towards simpler structures involving a single, unadorned contour.

3.4: Clarinet Quartet (2007)

8'10”

The singular glissando structure marks *Clarinet Quartet* out as a distinct move toward the non-hierarchical gradual processes employed in later music. Combined with the move away from staff-based notation, this piece represented a significant departure in my musical language from previous works.

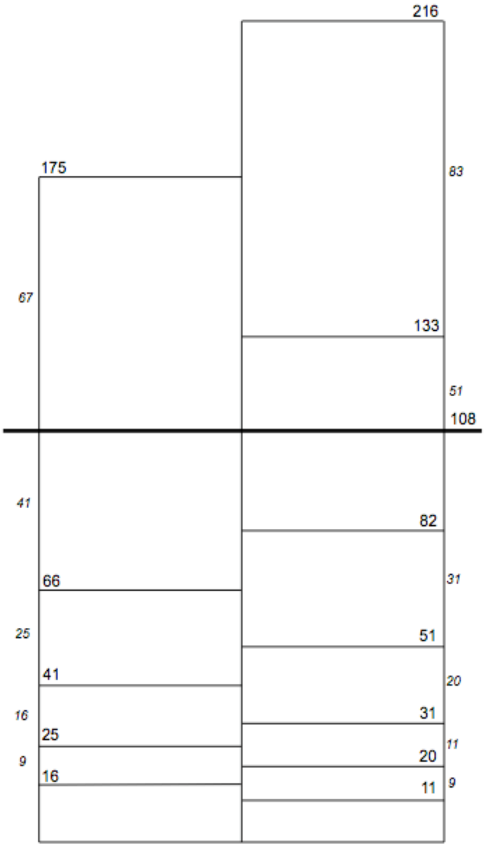
The structural simplicity, in comparison to earlier works, resulted from a distinct concentration on the materialisation of beating patterns. It had become clear that the more complicated patterns and forms used previously were carrying with them a changeable expectancy (on many levels, from local to global), and this was directing the listener's perceptions away from the articulations of the surface layer. An extended structural gesture would allow for greater expectancy to be maintained (in this case, a continually ascending pitch), therefore allowing the articulations to be perceived as a primary focus of perception rather than at a lower order beneath expectancy processes. I still felt the need for the material to undergo some kind of transformation, albeit a very small pitch change over the entire structure; a non-transformational model (such as that seen in the *in tones* installation) did not appeal as I was interested in the perception that the material had experienced a change of state – however imperceptible this may have been whilst listening. While composing this piece, I thought of this glissando very much as a discrete part of an infinite glissando, similar to the unbroken continuity from the phenomenological temporal model; I made no efforts to bring about closure within the overall form, simply cutting the piece where I saw fit.

This said, at this stage of my research I was still imposing my own intuitive decisions upon the piece in a number of ways: the glissando is not strictly linear, (the rate of pitch-increase is faster in the first third of the piece than elsewhere), the intervallic range is wider at the beginning and end of the glissando, and on a local level I wrote out specific beginning and end timing for all notes (in comparison with pieces such as *Like a Continuum* and *Corradiation*, where no note-timings are provided). These decisions were made intuitively to prevent the piece from being too linear and formulaic, and to provide areas of contrast, for instance a variety in cluster sizes, and sections of shorter and longer note durations.

The reason the linearity is not smooth is chiefly because I wanted a short section where the glissando would plateau onto a unison pitch before continuing. The whole range of the piece is roughly a tone, and this unison pitch was a tempered sounding middle B, which was chosen because this is a bountiful range of microtonal fingerings for the clarinet. This plateau would provide a moment of respite from the ascending pitch, and also a stronger intensity (the dynamic levels are slightly higher in this section); however, this sort of intuitive decision on a structural level was imbuing a certain hierarchy within the piece, which inhibited the nature of the gradual process. The local-level intuitive decisions about note entries and exits allowed me to create contrasting sections of longer and shorter note durations. Again, however, this drew perception towards these transformative contrasts, and away from the surface layer articulations; through the course of later pieces, these intuitive decisions were discarded for more linear structural shapes.

A contributing factor towards the non-linearity of the glissando is the model controlling both the specific entry point of each new pitch in the glissando, and when previous pitches should cease. At the time, I had been reading the architect Le Corbusier's writings on his formulation of the Modulor, 'a grid in which mathematical order is adapted to the human stature'.[97] The elegant manner in which the system was deduced, deriving from a square and its golden section, appealed to me; the resultant scales produce a series of intersecting golden sections, as shown in Figure 13.

Figure 13: Modulor scale of measures.



Le Corbusier defined the Modulor as 'a scale of measures; the foot-and-inch and the metre are numbers';[98] essentially, these measures are golden section proportions stacked together in a certain order, but one that would appeal aesthetically in architecture as a result of their relationship with human height (it was found to mimic the proportions of a human with arm raised). To me, the strength of the Modulor was its ability to be reformed in any way one wished, retaining measurements in proportion to the original figure. The model was applied to the glissando in *Clarinet Quartet*, not because I was claiming a similar proportional relationship with sound as with architecture, but because of the aesthetically pleasing manner in which the measurements could fit together within the length of a glissando, and still allow for a gradual (if non-linear) ascension in pitch. Thus, pitch entries were mapped onto the Modulor as in Figure 14.

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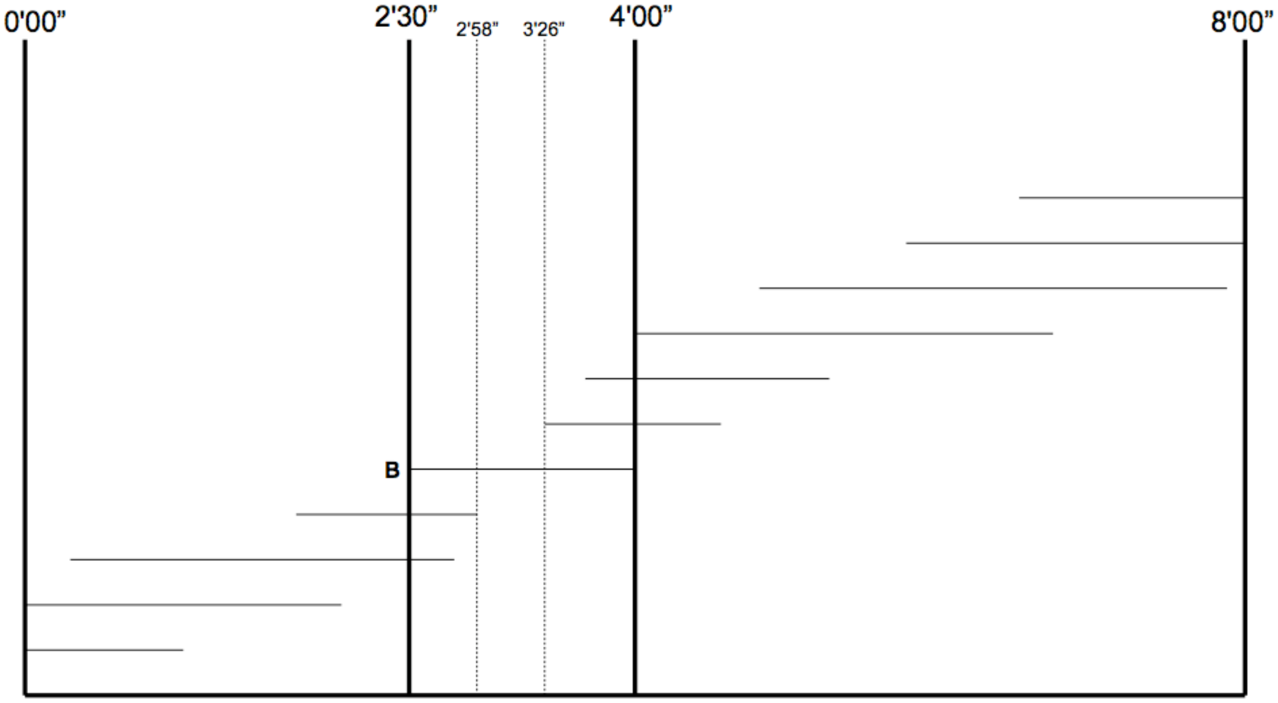
[97] Le Corbusier, *The Modulor* (Basel, 2000), 41.
[98] Le Corbusier, *The Modulor* (Basel, 2000), 178.

Figure 14: *Clarinet Quartet* Modulor structure.



As explained, local-level note durations were not governed by the Modulor. They range from one second to fifteen, and create moments of silence throughout. Whilst note entries were governed by the global pitch structure from the Modulor, durations were entirely intuitive on my part, as I still intended on maintaining a certain level of control over individual note lengths.

The score of *Clarinet Quartet* represents my first attempt at employing tablature notation. Owing to the close proximity of the pitches (often within a quarter-tone of each other), staff notation was ineffective, and because the quartet for whom the piece was composed had little experience of working with microtones, a purely tablature-based notation seemed most appropriate. Since each new pitch varied so little with the previous pitch and therefore a similar embouchure could be maintained, there was no need to indicate to players the approximate pitch on staff notation. Also, this liberated the music from specific pitch systems and allowed players to focus on keeping the resultant pitch steady, rather than aiming for a particular pre-ordained microtone or tempered pitch. The piece is also the first piece in the portfolio with clock timings rather than bars. This approach was successful as there are no cadential points or new sections within the piece, and the only point of emphasis, the plateau on B, was provided by a raised dynamic level.

The localised gestural nature of the varying note-durations, in combination with multiple varied dynamics, leant itself to a more dramatic sonic result than intended. While this did not completely undermine the success of the piece, it prompted me to work solely with longer note-durations in future pieces - such as the length-of-comfortable-breath durations of pieces such as *Corradiation* and *Bilinear*, and the unbroken sustained durations of *Inversions in Retrograde*. However, the singular glissando which controlled all instruments provided a strong direction of perception towards surface articulation.

3.5: Violin with Clarinet and Piano (2007)

5'

This piece was written for a workshop with the Gemini Ensemble, and came about through a desire to focus on a gradual glissando interacting with a sustained tone and exploring resultant beating patterns. Along with *Virtual Fusion*, this is the only piece in the portfolio with a heterogeneous instrumentation without internal homogenous groupings.

The concept of the piece therefore took a different form from previous works: the glissando-sustained tone model became a distinct object to be repeated, and each instrument had a different role within that object. The title refers to the fact that the violin is the instrument which brings about the changing articulations within each object whilst the other instruments remain fixed. The piano provides the initial attack to each object, entering simultaneously with the violin, and the clarinet fades in on a microtonal variant of the pitch. The violinist then traces a slow glissando to where they perceive the clarinet's pitch to be and sustains this pitch for a few seconds before fading out with the clarinet. Thus, beating patterns are heard from interactions between the three elements at varying points within each object.

What intrigued me about this concept was how the beating speeds would differ in various registers, and so the object was repeated seven times at different pitches. The object-pitches are worked out from the open violin strings, so that the player would have a large distance on the fingerboard to cover in the glissando, rather than a small roll of the finger. Each string is used once, from low to high, before the pattern is repeated in reverse using semitonally different notes than the first time. Thus, the structure is based on an arc form: whilst there is a certain degree of closure (returning to a *similar* point as at the beginning, not the *same* point), no importance is given to the final object, or any of the objects, as they are all merely reproducing a set model at varying pitches.

Each object is separated by a silence, which serves to delineate them from previous objects: whilst comparison between objects is clearly available, the overall pitch contour becomes a less important focal point for the listener due to the intermediary silence continually disrupting this contour, directing the attention toward the surface articulations.

The score combines previous forms of notation by involving both a five-line staff (for the initial tempered pitches) and clarinet tablature. There was no need to provide any kind of temporal graphic representation of each object – it was simpler to describe it using text, as this allows the violinist to use their ears to direct the glissandi, rather than a combination of aural and visual stimuli. I was very satisfied with the clarity of the notation with this piece; its uncluttered, reduced nature projects a sense of precision and abstraction to which I aspired, and the rendering of the whole score (the text instructions plus the symbolic notation) as a single page encourages all the performers to be aware of, and engage with, their roles throughout. Future pieces such as *Bilinear* and *Corradiation* owe their notational brevity to the simple and effective format of *Violin with Clarinet and Piano.*

A larger work was created from the initial concept of this piece: *Strings with Small Ensemble* (reproduced in Appendix 3, page 118) lasts approximately twenty-three minutes, which is considerably longer than the five minutes of *Violin with Clarinet and Piano*. The longer timespan and greater contrast brought on by a larger ensemble (eleven players, though with only three instruments playing in any one object, as with *Violin with Clarinet and Piano*) proved detrimental to the simplistic structure; the variety of colour and object-duration provided by the sheer diversity of the heterogeneous instruments shifted the focus away from the surface layer and towards the composed timbral contrasts, as well as the continual alterations of sound and silence as described in section 2.4.

3.6: Like a Continuum (2008)

Saxophone ensemble: 11'

Like a Continuum employs the same Modulor-based ascending glissando structure found in *Clarinet Quartet*, including the plateau on a unison pitch; the pitches differ to that piece in that the cluster size is slightly larger (sounding flat F# to a flat A natural), and the glissando is played in four octaves on sopranos, altos, tenors and baritones. This means that as well as there being beatings from close pitch-clusters as heard in the *Clarinet Quartet*, beatings between fundamental pitches and the first harmonic of the group playing the octave below occur - although this is a result of the registral capabilities of the instruments rather than an exploration into harmonies based on the instrumental spectra. The cluster size is larger than in *Clarinet Quartet* because of the smaller number of microtonal fingerings available on the saxophone: for the pieces to have the same Modulor structure, they needed the same number of separate pitches, therefore the cluster size must increase for the saxophones. However, the piece is three minutes longer and so this larger cluster size does not compromise the effect of the gradual pitch process.

The main difference *Like a Continuum* has to previous pieces is its use of indeterminacy in temporal organisation. Instead of prescribing specific beginning and end points for notes, time-windows are given, with a choice of available pitch fingerings to be played within the window over sustained notes lasting a comfortable breath. As explained in the instructions, notes may overlap into the next time-window, but the player should then only use fingerings from within the new window. The notation proved successful: I wanted to avoid each player being a slave to specific on/off temporal notation as I felt that this had hindered the players in *Clarinet Quartet* in focussing solely on maintain a steady pitch, but I needed to control the rate at which the glissando ascended, and the time-windows solved the problem. The temporal freedom afforded by this notational approach enabled players to focus much more on sustaining their individual pitches, without any unconscious portamenti into the' pitches of others.

One issue which lead to refinements in later pieces was the 'swell' which I instructed players to place upon each note. They were asked to fade in from a quiet tone (saxophones being much less flexible than clarinets at fading in from *niente*) and swell to a louder dynamic, but not one which would cause the pitch to split.[99] However, the swells became too gestural for what I had intended, and brought attention to themselves as gestalt objects, rather than homogenising with the overall texture, thus attention was directed away from the surface layer and consequently, a hierarchy was placed upon these individual gestalts. Also, another problem which resulted from these swells was that of the 'herd mentality' exhibited by the ensemble. It is clear from the recording that often, members from the ensemble (and in particular, some of the more inexperienced players) joined in with the swells performed by others (i.e. performing simultaneous swells): these larger group swells act as a safety net, one that players could hide behind, or became dragged into because of the collective force of the group swell. Whilst I had made efforts to combat this in my instructions to players in rehearsal, it was clear that the issue needed to be addressed in future works: these swells, in time, were replaced by a constant dynamic held throughout a note, revoking the gestural nature of the swell and the want to join the herd.

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[99] Certain microtonal fingerings on wind instruments have a tendency to split when played too loudly.

A final note about this notation is that it is the first piece in the portfolio which instructs more than one player to read the same part (employed later in *Strength in Unity* and *Corradiation*). It is a notational strategy which I have found very effective in ensuring particular pitch contours are rendered, and in bringing about various acoustic phenomena. In realising this notation, two players could choose to play exactly the same fingerings, at the same time and for the same length throughout the piece (although highly improbable), and yet the surface layer articulations would still arise due to infinitesimal pitch differences between the players, and in this case the interaction with other sections at different octaves.

3.7: Virtual Fusion (2008)

Clarinet, cello, piano and live electronics: 11'

In *Virtual Fusion*, the heterogeneous nature of the instrumentation is blended somewhat by the sine waves of the electronics: however, the instruments continue the roles seen in earlier pieces. The cello glissandos to the clarinet's microtones (similar to the model of *Violin with Clarinet and*

Piano, but with the rising clarinet microtonal fingerings from *Clarinet Quartet*), and the piano generates sustained microtonal harmonics from sympathetic vibrations (the technique employed in *Sonotron*). This is the only piece which is divided into two movements. I wanted to provide two differing perspectives upon a gradual glissando up a semitone: one perspective created from fluid sustained movement from the whole ensemble, the other built upon a continuous pulse.

The first movement makes use of the concept alluded to in the title: the 'virtual fundamental' phenomenon in psychoacoustics. This is where a given harmonic series lacking a fundamental will, if the degree of harmonicity amongst the harmonics is high, direct the listener’s auditory process to create a fundamental, therefore allowing the listener to hear a fundamental pitch which is not actually present in the external sound. The virtual fundamental in this case is a steadily rising pitch, which finally lands upon a sounding middle D. The glissando-object technique from *Violin with Clarinet and Piano* is placed within a more fluid structure, where the cello and piano sustain their notes (the piano plays with pedal down throughout), instead of observing a silence. Each new frequency from the clarinet determines the level of inharmonicity of the sine waves: the further away from the D, the more inharmonic the sine waves are, resulting in a gradual move from inharmonicity to perfect harmonicity. Consequently the virtual fundamental will become clearer in the mind of the listener as the movement progresses, until being perfectly lucid in the final aggregate.

Each time a new level of harmonicity is determined from the clarinet's pitch, the sine waves are triggered to glissando gradually to their new frequencies; this glissando occurs simultaneously with the cello's glissando, therefore creating a sense of the instability Chiyoko Slavnics described in chapter 2.2, page 54. Although these glissandi tend to be minute (covering roughly an eighth of a tone or less), the shifting nature of the glissandi balance against the sustained pitches surrounding them, and create moments of heightened surface layer activity. In this way, the whole gradual process consists of waves of activity, interspersed with more inactive textures: a hierarchical system, albeit a very subtle one, is imposed upon the process.

The second movement has a much simpler model, with significantly simpler use of the electronics – a single sine wave gradually ascends over a semitone (the final D of the previous movement, to an Eb) for four minutes. The acoustic instruments play unison pulses against this sustained glissando: every fourteen notes, the clarinet and cello move up microtonally, and the piano alters the density of its sustained harmonics. The piano then gradually fades out as the instruments and sine wave near the new tempered semitone; I did not want to have the piano shift up a semitone halfway through, as this would disrupt the smooth continuity of the other instruments and would bring unwanted attention to itself.

While the gradual glissandi produce interesting articulations and the instrumental blend is in continuous subtle transition, in hindsight the overall form of the piece is unsatisfying to me – the final movement in particular is too methodical, and adds nothing to what previously happened in the first movement. It would have been more fruitful to concentrate solely on the process of the first movement, extending that into a piece in its own right. Also, the piano material is at odds with the rest of the ensemble: overlapping EBows of the tempered pitches would have enabled a smoother transition and enhanced the surface layer with further articulations.

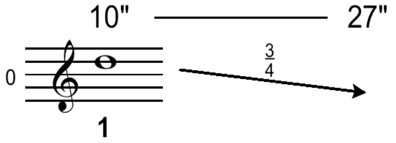
3.8: Slide Movement (2008)

Trumpet trio: 8'10”

Written for the trumpet trio Split, *Slide Movement* makes use of the main tuning slide on the trumpet to gradually trace out two triangle waves, beginning on a sounding C above middle C, with the nadir at the F# a tritone below. 'Distractor' tones (both sustained pitches, and glissandi moving in both the same and opposite directions as the triangle wave) are played alongside the main glissando so as to create beating patterns and mask the waveform structure by creating clusters within the critical band. The protention experienced from the triangle wave path varies significantly due to these distractor tones: the homogenised sound of the trumpets ensures strong beating patterns and masking, so that the expected structural contour of the waveform is at times clearly protended, and at other times entirely abolished as the surface layer articulations form interactions with the distractor tones and take precedence over the sound. Had the distractor tones been on timbrally-contrasting instruments, the contour would have been much easier to perceive: however, it was this alternation between protended clarity and blurred focus (from the homogenous critical band-sized cluster) which I had intended to be one of the main perceptual factors in the piece. Because the triangle waveform is not always prevalent, the piece exhibits a certain degree of decentralisation due to there being no heightened sense of intensity at any point. The peaks and troughs are always masked by the distractor tones, and therefore there is a distinct non-hierarchical nature to the overall sound.

As well as using conventional tempered and microtonal valving, players were required to control the glissandi by moving the tuning slide to specific positions (fully extended, fully closed, and three positions in between). For this, I developed a tablature notation (shown in Figure 15) which included valving and slide positions for both the entry of each note and how much the slide should move throughout due to glissandi, along with staff notation where appropriate to direct embouchure control. The temporal control over note entries and exits was similar to that used in the *Clarinet Quartet*: specific timings to be read in conjunction with a stopwatch.

Figure 15: *Slide Movement* tablature notation example.



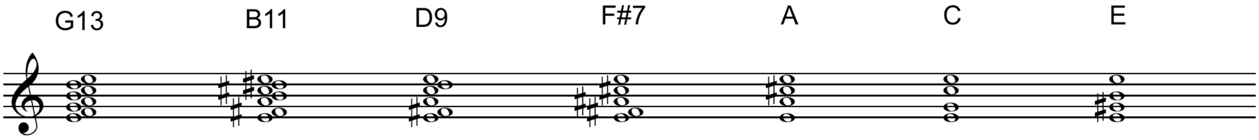
The two triangle waves were of equal duration (four minutes each), so each ascending or descending glissando lasted two minutes. These were then divided up into twenty-second segments, which each contained a glissando over a semitone. This level of specificity, which ensured that the shape of the triangle waveforms were adhered to strictly, demands a tighter temporal control than some of the previous pieces. Whilst not allowing the freedom of entry points and comfortable-breath lengths of other pieces, this notation results in a fluid texture, retaining the movement of continuous glissandi which indeterminate notation may not guarantee; players responded positively, with adaptability to the altered notation proving relatively easy.

3.9: Inversions in Retrograde (2008)

String quartet: 12'-14'

Inversions in Retrograde was composed for the Jack Quartet, and was conceived as a simple series of sustained inversions on E from the sixth inversion to root position. Thus, the first chord is G13 (sixth inversion), as the thirteenth note – the bass note of a sixth inversion – is an E. The cello sustains an E above middle C throughout, forming the bass note of the inversions. This is supported by the E an octave above sustained throughout by violin I, and the enclosed space formed by this octave acts as a kind of boundary to the changing harmonies within, as well as an anchor throughout the piece. The full harmonic progression is shown in Figure 16:

Figure 16: *Inversions in Retrograde* harmonic progression.

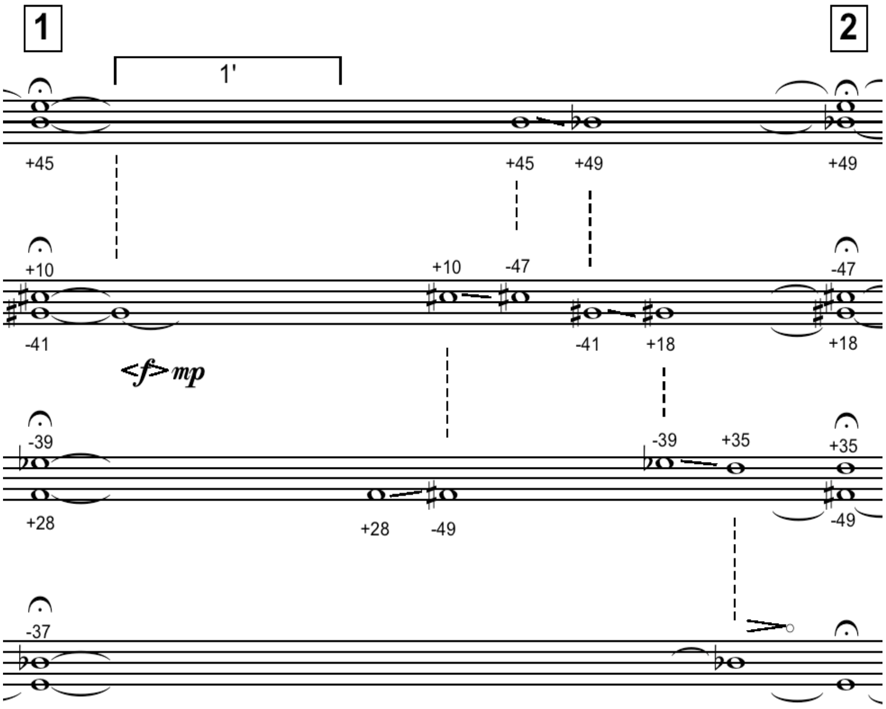


Partly influenced by the sounding-precision of harmonies in *Arbor Vitæ* (2006) for string quartet by James Tenney, and to enhance the purity of each harmony, I placed each chord in a just intonation tuning relative to the tempered octave Es which were played continuously. For instance, the penultimate chord of C major has a first inversion, with a third at the base of the chord. In just intonation, the third is flattened by fourteen cents, so in this chord the root C is *raised* by 14 cents, keeping it relative to the tempered octave Es (other notes are changed accordingly, for instance the +2 cents of a perfect fifth becomes +16 cents in the C major chord). A tuning system which adapts to the needs of each chord is greatly different to a piece using only one pre-set tuning system: each chord sounds individually bright and acute compared with those surrounding it, whilst the continuity of the piece is retained by the octave Es. The original score used cent markings to indicate tuning deviations from tempered pitches. However, at the behest of the quartet I made a just-intoned version of the score using ratios relative to the cello's E – both versions of the score are included in the portfolio. Also, after a workshop with the quartet, it became clear that the initial chord (which originally instructed all the players to enter simultaneously) should involve staggered entries to improve ease of tuning.

This decision to apply just intonation was certainly bolstered by the knowledge that the Jack Quartet had previously performed other music in just intonation (for instance, Rob Wannamaker's *3 Test Signals*); had the performers been students, for example, I would not have applied a just intonation system onto the pitch process. I feel that the piece would have been no less successful, as the articulations and sense of closure would still be present; however, the inclusion of the tuning system imposes a distinct acuteness upon each individual chord, and offers an alternative clarity to equal temperament.

Continuing the exploration into sustained tone textures, it was important to ensure an overall fluidity throughout so that listener's perceptions were not directed to any other new parameter other than pitch change and surface layer. At the points of harmonic change, I built in glissandi for the inner voices to avoid compromising the sustained texture – Figure 17 shows this first set of fluid glissandi between the first and second chords of the piece. The players were instructed to use visual interaction to communicate beginning and end points of the glissandi, as they were sometimes smaller than a quarter-tone and difficult to aurally perceive within the texture. These glissandi provide the destabilisation of harmony (Slavnics' dissolution of harmonic identity') which compliments the stability of the sustained chords. In this way, the piece differs from many others in the portfolio as it balances surface layer articulation (beatings which arise from the glissandi) with pure sonorities from the harmony. The central concern is one of harmonic *progression*, rather than harmony-as-density (as explained in harmony in chapter 2.1, page 46); the glissandi and consequent articulations were a *result* of this central concern, rather than a basis for it.

Figure 17: *Inversions in Retrograde* glissandi example.



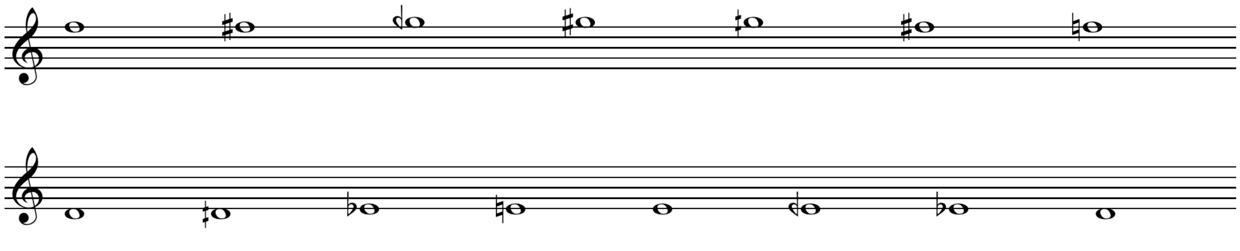
There is a strong sense of closure to this piece which I had intended from the beginning of the compositional process; as opposed to the lack of closure in *Clarinet Quartet* and *Like a Continuum*, I wanted to apply a global teleological pull towards the final chord of the piece so that the articulations could be seen in the light of an alternative harmonic cadential pattern. The sense of closure arises from both a harmonic viewpoint (I personally believe it to be the A major chord second inversion which enforces the elongated cadence towards E, bolstered by the continual presence of the octave Es) and also due to the constantly thinning texture, which is implemented after only the first chord. Whilst the acute sonorities of each new harmony are presented as being independent, once we reach the final chord it is clear that a hierarchy has been in place throughout, directing us toward the final root E major triad.

3.10: Bilinear (2009)

Clarinet and electronics: 11'

Bilinear was commissioned by the Ergodos Festival in Dublin for clarinettist Jonathan Sage. It represented a development of the techniques introduced in *Violin with Clarinet and Piano*, in that a gestalt-object is placed within a single arc structure. As with *Virtual Fusion*, sustained sounds eliminate silences between the objects, and in *Bilinear* there are – as the title suggests – two distinct pitch arcs. These arcs are split up into discrete pitches, and the clarinet continually alternates between the two arcs which remain roughly a tenth apart throughout (the pitch contours are shown in Figure 18 below). The lower contour begins and ends the piece, with the higher contour interspersed in between.

Figure 18: *Bilinear* pitch contours.



The gestalt-object differs to that from *Violin with Clarinet and Piano* by having no initial onset attack, and by each object comprising two sine wave glissandi which begin either side of the clarinet pitch and glissando across it in opposite directions before fading out. The sine waves blend with the clarinet so that a homogeneous texture results, and the distinct articulations of the beating patterns become the primary focus for listener engagement. There are three layers of beatings created: one between the two sine waves, and one between the clarinet and each individual sine wave. The hierarchy of these layers transform throughout the object due to the varying dynamics of the clarinet.

Each object is still clearly delineated by the continual alteration between the two arcs, from both the large pitch intervals, and the significant difference in beating speeds as they are much faster in the higher arc due to the larger frequencies. Each arc moves only microtonally higher or lower, so in contrast to *Violin with Clarinet and Piano*, each line is perceived as moving only very little, if at all. This results in a much weaker sense of closure to the process than in *Violin with Clarinet and Piano*, even though in this piece the final pitches are the same ones with which the arcs began. The reason an arc structure was employed, as opposed to the extended glissando of previous works, was that as the higher arc continued to ascend, the faster resultant beating speeds combined with higher pitches would become too shrill and compromise the balance within the piece; a hierarchy would be imposed due to the significant changes in sonority. Whilst I wanted to contrast the two arcs' beating patterns, the decentralised nature of each arc needed to be retained so as not to divert perception.

I employed a graphical schemata of the gestalt-object in the notation, alongside text instructions and staff notation. Initially, this was because the clarinettist would control the onset of the sine waves himself with a pedal; however, although it was decided before the premiere that a pedal would not be used in the concert for practical concerns, I kept the schemata in to provide a clear visual aid as to how each object developed temporally. The accompanying quarter-tone staff notation suffices here, essentially indicating whether the tablature for each note should give a pitch higher or lower than the previous note. The time length of 20-25 seconds for each clarinet note was agreed with the clarinettist during the compositional process: we discussed the duration of a comfortable breath for him in both registers, and he suggested this time bracket. Whilst it is clearly indicated in the score, since the electronics are controlled live then the piece is not compromised if clarinet notes fall outside of the specified time bracket. This allows the performer to focus solely on sustaining the tone and holding a steady pitch, without feeling undue pressure to adhere to a strict time-limit.

3.11: Strength in Unity (2009)

Bass clarinet duo: 6'

This is the only piece in the portfolio where the main focus of perception is on the gradual transformation of timbre, rather than pitch. This piece has the fewest number of individual parts (even *Bilinear* has two separate sine wave lines), and so there was a conscious effort to introduce another simple, subtle process. With only two parts, there is less opportunity for surface articulations than with, for example, a quartet; the gradual timbral process adds a different order of articulations onto the surface layer, whilst still allowing me to write a piece for the nuanced tones of the bass clarinet.

The piece is centred on the sensitivity of the bass clarinet in its lower registers: a simple process moves a very soft note to a near-unpitched breath sound, where the fundamental has been removed, before this process is played in reverse an octave higher. The title points towards the significant difference in densities between a single note and when both instruments play simultaneously: in a setting as focussed and quiet (near-silence) as the one this piece takes place in, these different densities are amplified appreciably. The phrase '[d]o not synchronise note entries' in the text ensures that these moments of simultaneity in playing occurs organically rather than from any pre-compositional design.

Uniquely for the portfolio, the notation makes no recourse to any particular pitch; rather, just a “low note” and the octave above. Pitch may alter during the two processes, either from the subtle glissandi inherent in beating patterns (see chapter 2.2, page 53), or from alternate fingerings used for breathier notes which give a microtonal variant of the original pitch. With either of these two causes, pitch transformation is a consequence of the timbral process, rather than an innate element of it: an interpretation of the piece could involve players sounding only one pitch each for each process.

The piece is short, lasting only six minutes. However, since the timbral process returns to its initial state, thereby imposing a strong closure to the work, the global form was complete in itself and did not need extending. The movement from pitched to near-unpitched sounds creates a sense of hierarchy, as the pitched sounds create stronger beating patterns, therefore providing greater informational change and engaging our perceptual processes more than the near-unpitched sounds. Whilst I had added this timbral process to provide an additional transformational layer to the surface of the sound, with hindsight this seemed unnecessary and away from my own investigation into the result of gradual pitch processes, and the timbral transformation was not continued in future work.

The phrase '[p]lay any pitch in the low register' initially read '[p]lay a note in the low register which allows for a number of microtonal variations'. I made the change because of the latter's implication that the pitch chosen should be a tempered pitch, with 'microtonal variations'. While we remain in what I see as an unenlightened state, where microtones are seen as the 'alternate' notes as opposed to on an equal-footing with tempered pitches, we miss out on the harmonies available through an untempered approach to pitch: this piece represented, for me, a way towards liberating that position, something I intend to pursue in future compositions following the PhD.

3.12: Gradual Music (2009)

Horn, trumpet, trombone, piano, violin, viola, cello: 9'-12'

Written for musikFabrik for the Huddersfield Contemporary Music Festival 2009, the piece was titled after Reich's 'Music as a Gradual Process' manifesto from 1968 (discussed in chapter 1.4.1, page 37). In particular, Reich's description of the completely controlled process, 'where one hears the detail of the sound moving away from intentions'[100] appealed to me very much when writing this piece. I was drawn to the notion that the process is controlled, but the surface layer of the sound is 'uncontrollable', i.e. the multitude of beating patterns which would be created from various approximations of tuning. The piece represents a consciously decentralised approach towards creating shifting surface phenomena from a gradual pitch process.

The structure is based on a microtonal arc form consisting of a series of gestalt-objects, similar to that used in *Bilinear*, but now played against fixed sustained tones throughout guaranteeing a multitude of transitory articulations. The gestalt-object in *Gradual Music* consists of a glissando inwards away from the sustained chord, and then back towards it: the arc structure controls the intervallic size of the glissando (smaller at the beginning and end of the piece, largest in the middle).

To realise this structure, the three homogenous sets of instruments (piano, strings, and brass) are grouped into two different roles:

- The EBows in the piano and one open string from each string instrument sound the chord of the G (viola), A (cello) and D (violin) closest to middle C. These pitches are then sustained at a stable dynamic throughout the entire piece.

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[100] Reich, Steve, *Writings about Music* (London, 1974).

- The three strings (doubling stopping) and brass gradually trace glissandi away from, and back towards, this chord: the glissandi increase microtonally, reaching a semitone at their widest point, before the pattern reverses and the glissandi begin to reduce in size. In the first half of the piece, the strings glissando away from the initial chord, and the brass glissando toward the chord; this is then reversed in the second half.

The brass and strings are instructed to play at the same, steady dynamic as each other, and use a minimum of attack at all times. This ensures a level balance between the two families in their glissandi, neither taking precedence over the other. Despite the increasing/decreasing nature of the glissando process, this system represents a concerted effort towards a decentralised compositional model; the wider glissandi do not represent importance, clarity, effectiveness any more than the smaller glissandi represent the opposite. They certainly result in differing articulations, but this difference is not hierarchical: it is simply comparable, without prejudice – an unmediated difference. Each object is not a copy of a previous object, but is itself, and nothing more.

The near-total redundancy of the fixed pitches from the EBow and strings have the effect of continuously stimulating the nerve cells of those frequencies, whose output of neural impulses does not stay the same but drops off fairly quickly.[101] This results in the near-loss of perception of these tones (as the listener focuses on the variation in other parts), and they become purely activators of surface layer phenomena. This also applies to the sustained organ dyad from the *in tones* installation.

The score employs five-line staff notation (along with three pages of text instructions), and synchronicity is led by visual cues within the ensemble, similar to the approach used in *Inversions in Retrograde*. The instructions state for glissandi to last between 15-25 seconds; however, this is essentially a recommendation and was intentionally not marked on the staff notation as it was important for players – particularly the brass – to work towards a comfortable note length. The staff notation employs a twelfth-tone microtonal system; however, due to the practical issues of, for instance, a horn playing a glissando over five twelfth-tones, these symbols represent a gradual increase or decrease in intervallic size. They are merely a means to an end in this respect, as the text instructions in the score acknowledge that the sounding pitches will only be approximate to what is shown in the score.

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[101] Snyder, Bob, *Music and Memory: An Introduction* (Cambridge, MA, 2000), 208.

A final observation concerning this piece is that the players of musikFabrik performed the premiere without sheet music – something I had not requested them to do, but which helped significantly to focus the listener's perception towards the resultant sound rather than any visual stimulus. Whilst clearly only applicable in certain circumstances,[102] this is something which I would like to work with in future compositions.

3.13: Corradiation (2009)

Four voices (SATB): Variable duration

Corradiation is a scientific term describing a conjunction or concentration of rays into one point.[103] In this piece, the four voices act as the rays, gradually conjoining onto points an octave apart. The trajectories the voices follow are opposing linear glissandi, rather than a series of gestalt objects: soprano and alto (counter-tenor in the recording) move up a tone, from middle D to E, and tenor and bass begin on the F# below middle C and move down the same interval onto an E. The voices then remain on the E for the final section of the piece, acting as a strong point of closure, similar to that of *Inversions in Retrograde*. It may not be clear during the first listening experience that the voices are headed towards octave unison; however, once that octave unison has been achieved, it is clear that this was the intended goal from the beginning.

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[102] For instance, music which can easily be remembered without need for visual memory aids.

[103] n.a., 'Webster's Revised Unabridged Dictionary', *The ARTFUL Project*, <http://machaut.uchicago.edu/?resource=Webster%27s&word=corradiation&use1913=on&use1828=on> accessed 25/8/2010.

As with previous pieces such as *Clarinet Quartet* and *Like a Continuum*, the global glissando structure is realised on a local level by sustained pitches: 'each note should be slightly sharper or flatter than the previous one'. Whilst quarter-tone notation is employed to give three 'way-points' within the piece (before the final E), the two sets of voices will glissando at slightly different rates due to the indeterminate nature of the notation, thereby creating two sets of interweaving lines and producing surface layer phenomena. This piece was written specifically for the vocal ensemble Exaudi, whom I had seen perform Mazulis' *Ajapajamapam* (discussed in Chapter 2.2, page 51) which also asks for sustained microtonal clusters from the singers. This allowed me to work with these close harmonies with much more confidence than had it been other groups less experienced in this practice. The singers *did* mention how easy they found it to be drawn into the pitch of the other singer in their group, but they were able to consciously work against that occurring: for me, that produces an engaging sound as the trajectories continually intersect and then separate, generating a stability/instability flux.

Alongside this pitch process, there is a process of timbral development occurring: each glissando begins on one of two vowel phonemes on the International Phonetic Alphabet (“e” and “u”), and then moves through adjacent phonemes until they reach the same destination (ɑ).[104] Whilst this timbral transformation is less perceptually prominent than the pitch process, it affects the global sound as formants gradually alter and interact with formants from other voices, until reaching an isomorphic state at the end of the process (in conjunction with the octave unison in the pitch parameter) thereby reinforcing the sense of closure.

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[104] It made much more sense to represent the vowel sounds in existing words in the score (e.g. 'boot' and 'caught') rather than providing the phonetic symbols which would need to be memorised.

The score makes no reference at all to specific durations; the total duration should be worked out as a function of the singers' ability to sustain notes over long durations, rather than it being dictated by the composer (the duration of the different phoneme sections are then worked out from this total duration). Both notes and pauses should be a comfortable length, and since singers do not synchronise their note entries, there is a good possibility of silence occurring,[105] as is heard in the portfolio recording. The possibility of silence was built into the structure to generate a kind of good continuation mechanism in the perception of the listener: since the silence will have been preceded by a series of pitches which either rise or descend, our gestalt process may instinctively fill in the silence to some degree with the continuation of the pitch trajectories, however minute those trajectories may be.

Whilst *Corradiation* bears similarities to *Like a Continuum* in the organisation of pitch and durations, a significant difference between the two pieces is the dynamic. The singers in *Corradiation* are required to sustain a quiet dynamic throughout each note, with all four singers achieving a balanced ensemble dynamic. This helps to focus both the listener, and also the singer in maintaining a steady pitch throughout the note (see the final remark for *in tones* below).

A significant instruction in the score is that players should remain independent at all times (except for dynamic). This is certainly an aspect of my composition which has come about through the constant refinement of notation: musicians reading from the same notation, but acting independently and producing varying sonic results which fuels the interaction of the surface layer.

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[105] This is much more so than in *Like a Continuum,* where twelve players are likely to sustain a texture without break by chance due to the larger number of players.

3.14: in tones (2009)

Organ, piano duo, and quartets of: trumpets, euphoniums, cellos, clarinets, alto saxophones, laptops, violins, signal generators, flutes, electric guitars, violas: 4 hours

in tones was conceived as a 'concert installation': a piece with live performers realised over an extended duration where the audience may come and go as they please. My intentions with this piece were for the listener to become completely absorbed in the surface layer articulations, without reference to any composed structural alterations in the music. The main difference with this piece and others in the portfolio is the duration; staging an installation meant I was not hindered by usual concert-length constraints, enabling me to create a protracted duration which would immerse a listener into the surface layer much more so than the 11' minutes of previous works. A longer duration allows a listener to become completely accustomed to the sustaining pitches, and their attention is directed towards any new information provided by the shifting surface layer. The piece was designed to fill a whole afternoon (as there was an event following the installation in the evening), and the duration of four hours was chosen mostly from performer availability. However, a previous concert installation I created the year before which lasted 90 minutes felt far too short for my intentions as pitch changes had to happen far too frequently, and so I worked from the idea that the length for *in tones* needed to be at least double this, and four hours allowed me to fit in all the instrumental ensembles available to me.[106]

A single interval of a major third sustained on the organ for the duration forms the basis of the piece. Tony Conrad describes how, when two pitches are sustained for a certain length of time, the relationship between the two stops being harmonic and becomes 'intervallic'.[107] Although a somewhat vague concept, I partly align with this as the effect created by the sustained relationship of two notes seems to stop suggesting a movement in either direction (e.g. major third moving up to a perfect fourth), or *from* something, i.e. a cadential point, and begins to refer only to itself: it is an interval, that is all. However, an interval such as the major third is always heard as a function of the root (as opposed to, for instance, a minor second or a major seventh). The extended interval of *in tones* consequently pits these two concepts together, and each listener will have a unique perception of the interval, operating somewhere between the two ideas.

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[106] This previous installation is not included in the portfolio as I deemed it to be an unsuccessful experiment, and one upon which I wanted *in tones* to improve.

[107] Conrad, Tony, 'LYssophobia: On *Four Violins*', *Audio Culture: Readings in Modern Music*, ed. Cox, Christopher and Warner, Daniel (London, 2004), 314.

Alongside this major third, twelve instrumental ensembles play sustained tones on matching pitches and microtonal variants for twenty minutes each. The ensembles (both acoustic and electronic instruments) all involve homogenous instrumentation, and all but one are quartets. The organ changes register according to which ensemble is playing; for instance, trumpets were most sonorous a major third an octave above middle C, whilst euphoniums require the organ to play the octave below this.

There are similarities with Christopher Fox's 'Transcription' from his *American Choruses*[108] (1979-81); a choir creates a shifting bed of tempered sustained pitches alongside an organ playing a dissonant cluster. However, my approach fits the mobile instruments into a tight cluster with the two organ tones so that the sound is much less dispersed over the pitch range than Fox's, which has a much wider (and more changeable) cluster size throughout, therefore having a much more heterogeneous sound in comparison to *in tones.*

In creating the material for the ensembles, the extended duration necessitated that pitch processes with pre-composed closure (employed in pieces such as *Violin with Clarinet and Piano* and *Strength in Unity*) would not be suitable as I did not expect the audience to remain for the entire four hours, and thus the significance of the closure would be lessened.[109] Nor was it possible to create specified glissandi structures (e.g. *Gradual Music*) as instrumental mechanics rendered glissandi either difficult or impossible for some ensembles.[110] Instead, I opted for a much simpler pitch model which could apply to both the glissandi and sustained pitches. Rather than create a linearly transforming process, half of each ensemble would play pitches slightly higher than the organ for half of the 20 minute time window, and the others in the ensemble would play slightly lower; after 10 minutes, the two groups would swap roles. So, in a given quartet, one player begins playing pitches higher than the C, one playing pitches lower than the C; the third player begins playing pitches higher than the Ab, and the fourth playing pitches lower than the Ab. This model was applied to all of the ensembles (except the pianos – see below); where glissandi were possible, players are instructed to take one minute for each glissando, moving from the designated organ pitch to a pitch either higher or lower, depending on which group the player is in. I did not designate any of these microtonal pitches: text instructions required players to use alternate fingerings and embouchure control (for instance, on the clarinets), or simply glissando from or sustain pitches 'slightly sharper' or 'slightly flatter' than the organ pitch. The text instructions proved successful as rehearsal time was extremely limited, and I needed a notation which clearly communicated each performer's role without resulting in questions; a number of the players had little to no experience of playing contemporary music, so the notation needed to avoid specialist jargon or symbols. The score instructed players that the 'ensemble dynamic should be slightly quieter than the organ': this meant that the ensemble pitches would appear as 'shadows' of the major third, rather than the ensembles taking precedence. The ensembles act very much as instigators of the acoustic phenomena.

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[108] Fox, Christopher, *American Choruses* (York, 1979-81).

[109] *Violin with Clarinet and Piano* relies on the listener having heard all of the objects in sequence to be able to compare the effect register has upon the object in retrospect.

This pitch model meant that the ensembles could be placed in any order, as there was no linear transformation of pitch throughout the piece; also, audience members could attend for only a short time and experience the same pitch model as someone who attended for the entirety; there was no closure or logical end to the model. The homogenised sound of each ensemble meant that the switch of roles halfway through the time-windows is unnoticeable, so there is no cause for expectation within the listener.

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[110] Also, there was to be very little rehearsal time due to the multitude of performers involved, so smooth glissandi transitions, such as those seen in G*radual* Music, could not be relied upon.

This piece provides a strong exposition of perceptual concepts defined throughout the first chapter of this thesis. The non-transformative isomorphic nature of the pitch model produces an entirely non-hierarchical state: throughout each twenty-minute section, there is no single moment which ranks as more important than the others. The resultant surface layer is designed to burgeon with activity which will itself organically alter over time, but this alone does not impose a hierarchy – it remains as a series of *phenomena*, each as significant as the others. Stability and instability are in constant flux, and this invites the grouping mechanisms of the listener's perceptual processes to focus and engage with the surface layer. Because of the reduced transformation in the composed material, relatively small changes in information are significantly magnified and interact with the sustained texture.

in tones represents the apogee in the development of compositional refinement exhibited throughout the portfolio. Knowledge received from previous pieces informed me to make as few intuitive local-level alterations as possible (the most local decision for *in tones* is inserting a change halfway through each time-window), and to allow unchanging composed material to extend for significant durations. In other words: trust the material, do not include anything which I deem to be nonessential, i.e. which would detract from the perception of the surface layer articulations. The elegance of text notation certainly supported this belief; in my opinion, text scores are most effective when there are only a few elements to a piece. The uncluttered nature of the *in tones* text scores was a direct result of the overall refinement.

The fact that the ensembles changed every twenty minutes provided both sustainability for the piece over the four-hour duration, and also a necessary rest for the players. Each new ensemble sound was heard as a new realisation of the same idea, leading to a clear sense of decentralisation. However, as well as all being realisations of the same idea, each section remained self-contained; it did not belong as part of a linear process, or a vital part of a collection. Such is the flexibility of the pitch model, and the structure as a whole, that I hope to stage different versions of *in tones* in the future using available instrumentation, rather than adhering to the ensembles used in the version submitted with the portfolio. All performances, including the premiere, will be various realisations of the same *in tones*, each varying significantly in relation to the others in the resultant surface layer.

At the performance, I left a notebook open and encouraged performers to note down any thoughts they had about the playing experience. This was partly for documentation (along with separate video and audio recordings of the piece), and partly for reflection on my part, to see if anything could be improved. Edited versions of these comments are included in Appendix 4 (page 123); a remark about the twenty-minute window not being long enough has lead me to plan for longer ensemble durations in future realisations of the piece, instrumental practicalities permitting. Also, the remark stating that 'low dynamics help the focus of a well-balanced sound' is an encouraging opinion, and one that I will carry through into future works.

Chapter 4: Conclusions

The compositions contained in the portfolio are applications of the theories and concepts defined in chapter one, filtered through the stylistic language outlined in chapter two. They represent a linear exploration of my aesthetic over the course of the doctorate, and demonstrate how my own approach to compositional structures, notation and temporal organisation have evolved. This overall development has produced certain modes of working which I have clearly found to be successful as they continue to be employed in various forms within subsequent pieces. However, they also raise ongoing issues as to their continued enhancement, which I intend to maintain investigating after the PhD.

The first of these issues is the continuation of research into low information response strategies, resulting in new compositional models built upon isomorphism in pitch process. Conceptual explorations into the mind's rehearsal and recall capabilities, further study into grouping mechanisms and matters concerning the syntax of articulations have the potential to lead to fruitful avenues for future pieces. This must be primarily practice-based research supplemented by documented theoretical work, so that new work can be established upon personally-verifiable findings rather than context-dependent experimentation.

This broad field allows for further focus into areas discussed in chapter two of this thesis. Examinations of pitch and harmony can be enhanced through investigations into other suitable pitch systems and tunings and my ongoing interest in the use of glissandi, both on local and global levels. Since the choice of a tuning system evolves entirely from the concept of each individual piece, I do not feel an alignment with one system over any other. For instance, *Gradual Music*'s glissandi targets were easier to express using a tempered system, whereas the harmonies of *Inversions in Retrograde* were placed within a just intonation system to enhance their clarity. Because of this, I hope to investigate combinations of tuning systems within one setting, where the various qualities of each will contribute not only towards unique surface layers, but to engaging harmonies. I believe the notion of various pitch processes with individual tuning systems operating in combination is worth exploring further to engage perceptual differences between the systems.

I also plan to continue the work already undertaken on the interaction of ensembles for temporal organisation. The use of stopwatches in pieces such as *Clarinet Quartet* and *Slide Movement* proved effective, but I intend to investigate further how specific contours can be created from performer interaction, rather than with reference to external devices. The ability for ensembles to operate autonomously is a strong interest of mine, as it means the players act less as slaves to the timekeeping device and remain in control of the rate of movement through the piece. I found the indeterminacy in the notation for *Violin with Clarinet and Piano, Gradual Music* and *Inversions in Retrograde* to be particularly effective; duration in *Violin with Clarinet and Piano* was determined by the length of breath from the clarinettist, and the latter two pieces worked entirely from both visual and aural signifiers from other players. I believe that the fact that players are in control of both the length of their individual notes, and the speed at which the music progresses, results in a more fluid, natural performance. By focussing on performer autonomy over an external timekeeper, these pieces represent future models with which I intend to work; visual signals between players and specified alterations in the sound will be the objects for further investigation.

Finally, the use of auditorium space is an aspect of composition which has not been explored to a great extent within the portfolio: *Sonotron* engages with the circular architecture of the Leeds Corn Exchange, but otherwise pieces are designed for standard concert presentation, with performers on stage in front of an audience. A new *in tones* project is planned involving brass, and the piece will be constructed by placing performers within the auditorium space to maximise variety between interference patterns, thus producing an intensified field of articulations. In my consideration, the performers' decision to group together on stage for *Gradual Music* worked very successfully due to the tightly enclosed space which they inhabited: the antiphonal effect between the strings and brass glissandi is reduced significantly because there is very little physical distance between the players, and therefore the audience is encouraged further to perceive the sound as a whole, as opposed to separate groupings of players. Because of this, the clustering of players together in small ensembles is also a technique which I intend to develop upon on in subsequent works; this enhances homogeneity within the grouping, and may also aid the autonomous temporal co-ordination described above, as visual and auditory cues will be easier to perceive owing to the players' close proximity to one another.

The time spent on working on the series of compositions, and the concurrent critical discussion in this thesis, has furnished me with a clear working ethic which can be carried into later creativity. The ongoing exploration into decentralisation through gradual process and a concentration upon the surface layer of sustained tone textures preserves the desire to create, and the overall refinement exhibited has enabled me to define my own compositional intentions with clarity and purpose. Though the tools, media and context of my work may evolve over time, I hope to maintain a coherent investigation of the central tenets of this thesis into the future.

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Appendix 1: List of works 2006 – 2010

Works included in the portfolio are underlined.

in tones (2009) Variable duration
Various instrumentation
Student performers
St. Paul's Hall, Huddersfield, 16 January 2010.

Corratiation (2009) Variable duration
Vocal quartet (SATB)
Exaudi
St. Paul's Hall, Huddersfield, 9 March 2010.

Gradual Music (2009) 9'-12'
Chamber ensemble
musikFabrik
hcmf, St. Paul's Hall, Huddersfield, 28 November 2009.

Malkans (2009) 8'
BBC Concert Orchestra cond. Robert Ziegler
Royal Festival Hall, London, 6 May 2009.

Strength in Unity (2009) 6'
Bass Clarinet duo
Heather Roche and Sarah Watts
The Space, London, 23 April 2009.

Bilinear (2009)11'
Clarinet and live electronics
Jonathan Sage
Ergodos 'Off the Grid' Festival, National Concert Hall, Dublin, 21 April 2009.

Organ and electronics (2009) 1hr 30'
Organ and electronics
Elizabeth Hayward
Phipps Hall, Huddersfield, 20 March 2009.

Afterimage (2009) Variable duration
Sustaining instruments
Huddersfield University Synthesiser Ensemble
Phipps Hall, Huddersfield, 27 March 2009.

Inversions in Retrograde (2008) 12-14'
Jack Quartet
St. Paul's Hall, 26 March, 2009.

Lithosphere (2008) 8'30”
Eighth-tone trumpet, quarter-tone trumpet, quarter-tone horn
Ensemble Mikroblech
MicroFest, Walton-on-Thames, Surrey, 7 March 2009.

Slide Movement (2008) 8'10”
Trumpet trio
Split
St. Paul's Hall, Huddersfield, 13 November 2008.

Virtual Fusion (2008) 11'
Clarinet, Cello, Piano and live electronics
ShadowPlay
Seoul International Computer Music Festival, Seoul Arts Centre, 12 November 2008.

Parse (2008) 6'
Guitar orchestra
Unperformed.

Aggregate (2008) 7-8'
Flute, clarinet, alto saxophone, violin
Unperformed.

Sound Unbroken (2008) 10'
Chamber ensemble
Birmingham Contemporary Music Group
ArtsFest, CBSO Centre, Birmingham, 14 September 2008.

Strings with Small Ensemble (2008) 2'
Chamber ensemble
Edges Ensemble
St. Paul's Hall, Huddersfield, 20 June 2008.

Like a Continuum (2008) 11’
Saxophone ensemble
Student ensemble, St. Paul’s Hall, Huddersfield 19 March 2008.

Ruptures (2007) 3’
Solo microtonal trumpet
Steve Altoft, St. Paul’s Hall, Huddersfield, 30 October 2007.

Violin with Clarinet and Piano (2007) *5’*
For the Gemini Ensemble at the RMA Research Student’s conference
University of Sussex, 5 January 2008.

Effigy (2007) 9'
Recorder, Guitar, Trombone, Violin, Double Bass
Ensemble Mae, Huddersfield Contemporary Music Festival, 22 November 22 2007.

Loose Change (2007) 13’
Lever Harp choir
Solways Harps, Cairndale Hotel, Dumfries, 28 October 2007.

Percussion Quartet (2007) 9’
Student quartet
St Paul’s Hall, Huddersfield, 7 June 2007.

Clarinet Quartet (2007) 8’10”
Dunleavy quartet
St Paul’s Hall, Huddersfield, 7 June 2007.

String Sextet (2007) 15'
2 violin 2viola 2 cello
Student sextet
St. Paul's Hall, Huddersfield, 4 June 2008.

Proximity Stream (2007) 7’
Saxophone quartet and String Orchestra
Apollo Saxophone Quartet and Goldberg Ensemble
St Paul’s Hall, Huddersfield, 12 May 2007.

Spiral Chaotic (2007) 4’
Harpsichord and crotales
Jane Chapman as part of the spnm solo spotlights series
Wapping power station, 13 March 2007.

Black Space (2006-7) 8’
Solo Harp and electronics
Ruth Wall as part of the spnm solo spotlights series
Wapping power station, 6 March 2007.

Sextet (2006) 17’
Flute, clarinet, bassoon, horn, viola, cello
Unperformed.

The Measure of Things (2006) 5’30”
Flute, violin, cello
Unperformed.

is without nothing (2006) 2’10”
SATB
Ostrava Canticum
St. Wenceslas’ Church, Ostrava 28 August 2007.

Kronosity II (2006) 9’
Saxophone Quartet
Mars Saxophone Quartet
St. Paul’s Hall, Huddersfield, 7 June 2006.

Magna Construction (2006) 14’
Wind orchestra
Unperformed.

Entirosity (2006) 5’
String orchestra 4.3.2.2.1.
Scottish Ensemble, cond. James MacMillan
University of Aberdeen, 11 November 2006.

Sonotron (2006) 3’30”
Four pianos
Rolf Hind, Sarah Nicholls, Andrew Ball and Daniel Becker
Corn Exchange, Leeds, 7 May 2006 as part of the Leeds Fuse Festival.

Appendix 2: *Ruptures* for solo eighth-tone trumpet

Programme note

Ruptures explores the expansion of a single repeated pitch into a small microtonal cluster.

Ruptures was written for Steve Altoft and was premiered in St. Paul's Hall on 30 October 2007.

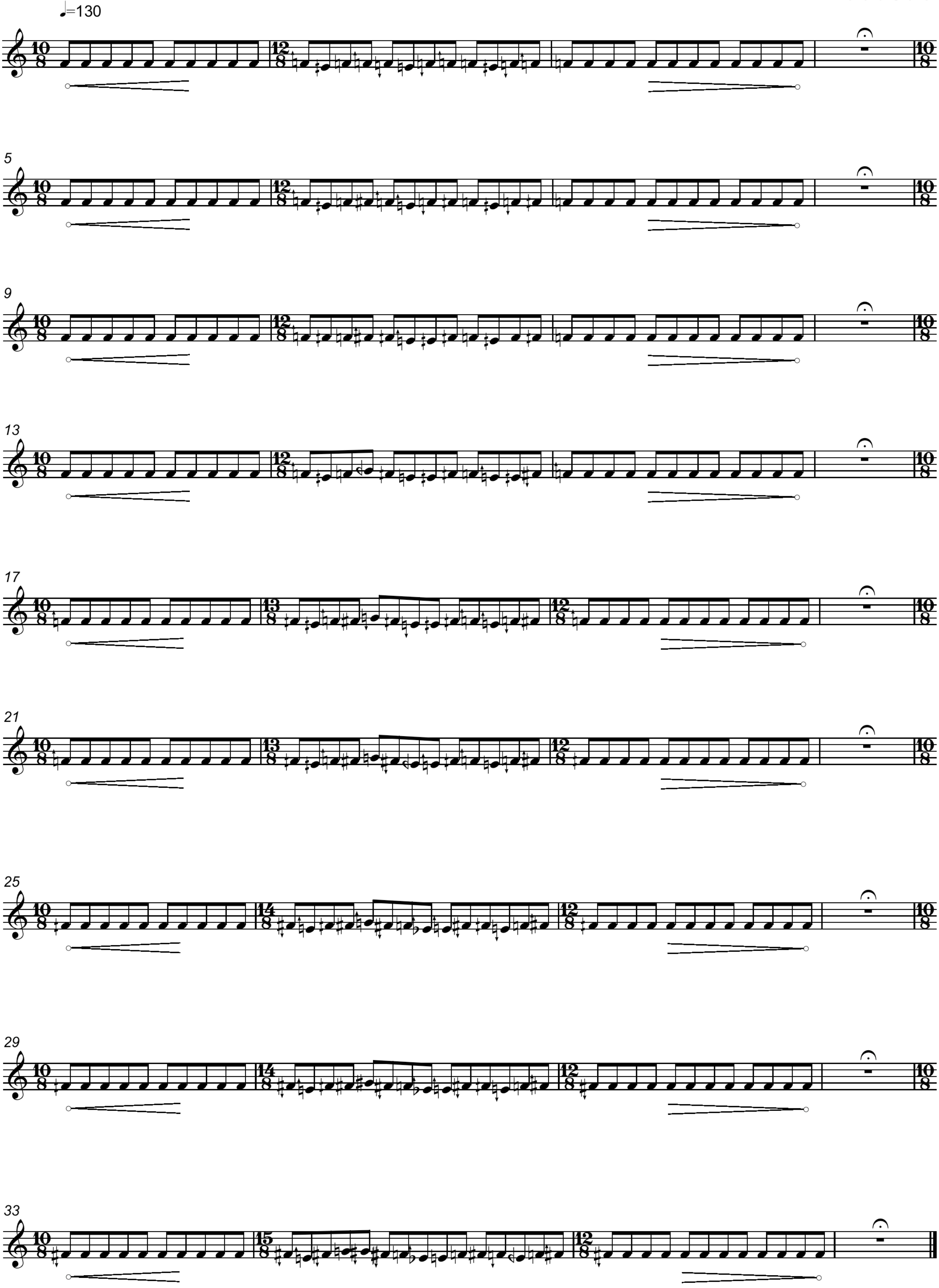
Duration 3'

Performance instructions

Following the crescendo, a medium dynamic should be maintained throughout each line until the following decrescendo.
No emphasis should be given to one line over the others.

Ruptures

Richard Glover


♩=130
5
9
13
17
21
25
29
33

Appendix 3: Strings with Small Ensemble

Instrumentation:
Oboe
Clarinet in Bb (doubling bass clarinet)
Soprano Saxophone (doubling alto and tenor)
Trumpet in Bb
Euphonium
Trombone
Vibraphone
Piano
Violin
Viola
Cello

Programme note

Strings with Small Ensemble is an expanded version of an earlier piece, *Violin with Clarinet and Piano*. Both pieces focus on the relationship between sounds in close proximity to each other, and the acoustic phenomena which arise from this environment. This is complimented in *Strings with Small Ensemble* with enhanced timbral and registral variation, providing greater diversity within the resultant phenomena.

Strings with Small Ensemble was written for the Edges Ensemble and was premiered in St. Paul's Hall on 20 June 2008.

Duration c.25'

Strings with Small Ensemble

Performance instructions

Instruments on the top two staves should enter simultaneously, and where the top instrument is a wind instrument, this note should have a loud attack following by a fade to silence after roughly 6-7 seconds. Once the instrument on the third stave has faded in on a microtonal variant of that pitch after roughly 3-5 seconds, the string player should **very slowly** glissando to where they deem the microtone to be. For example, if the string player hears the microtone as just slightly above the original note, they should slowly glissando up to it. Once this new note is reached, hold for a few seconds before all instruments end the note together (the piano note will have faded away by this point).

Read the score from left to right in the usual fashion. While each note will take a slightly different length of time due to the varying proximity of each microtone to the original note, each cluster should last somewhere in the area of 20-30 seconds with a pause of 5-10 seconds in between each note.

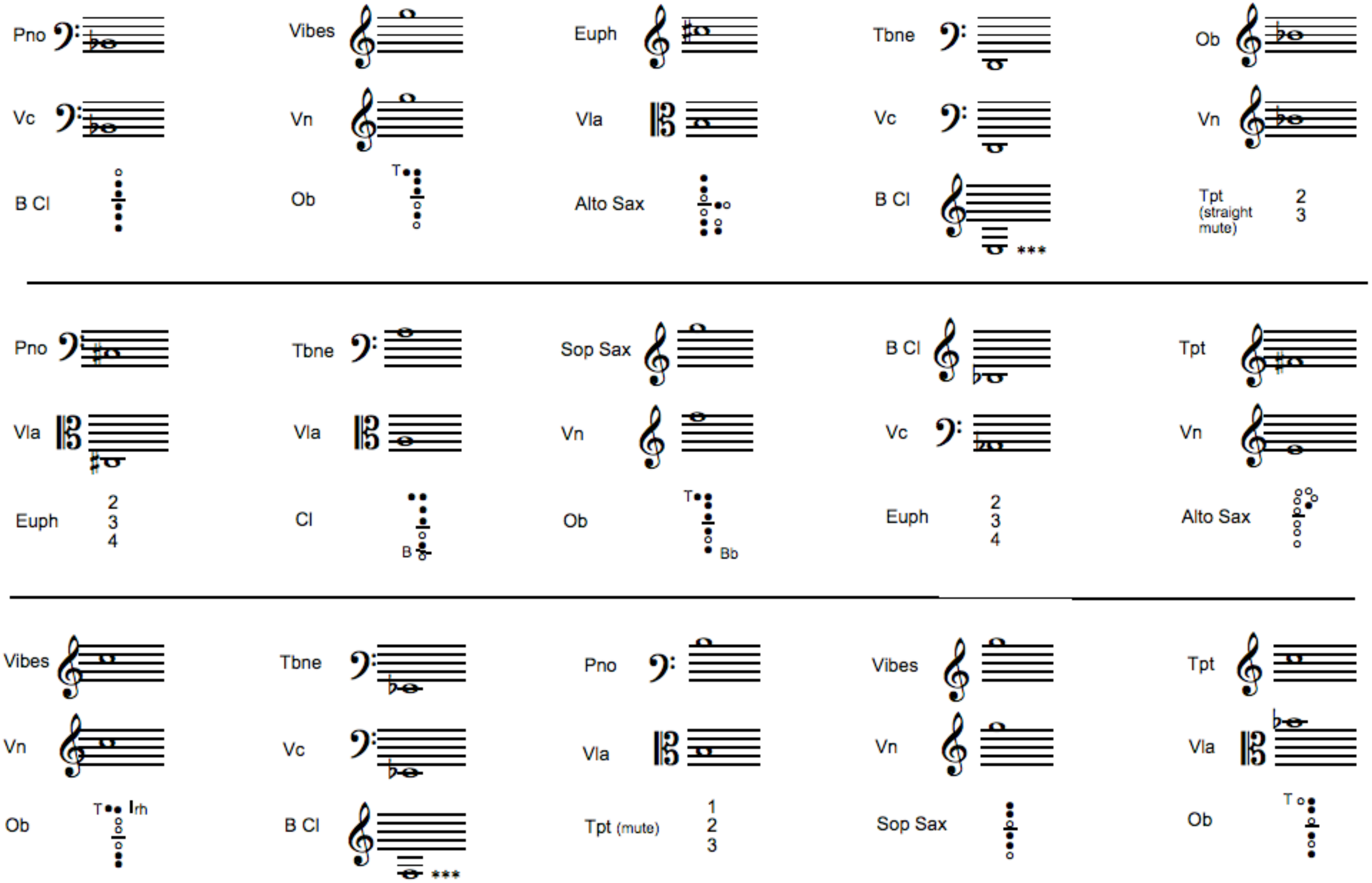
Strings should always play without vibrato.

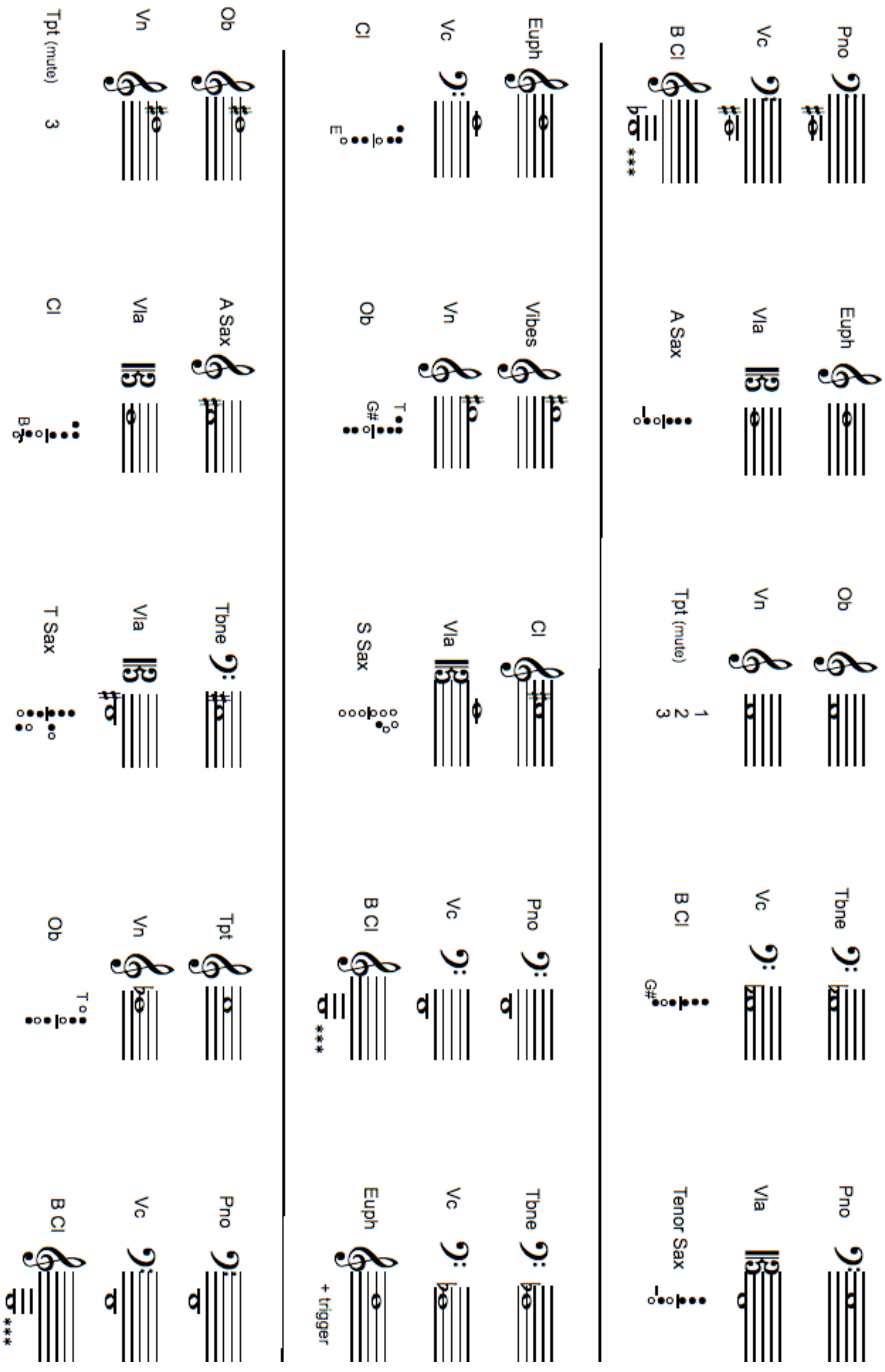
Alternative fingerings and valve combinations are given where appropriate.

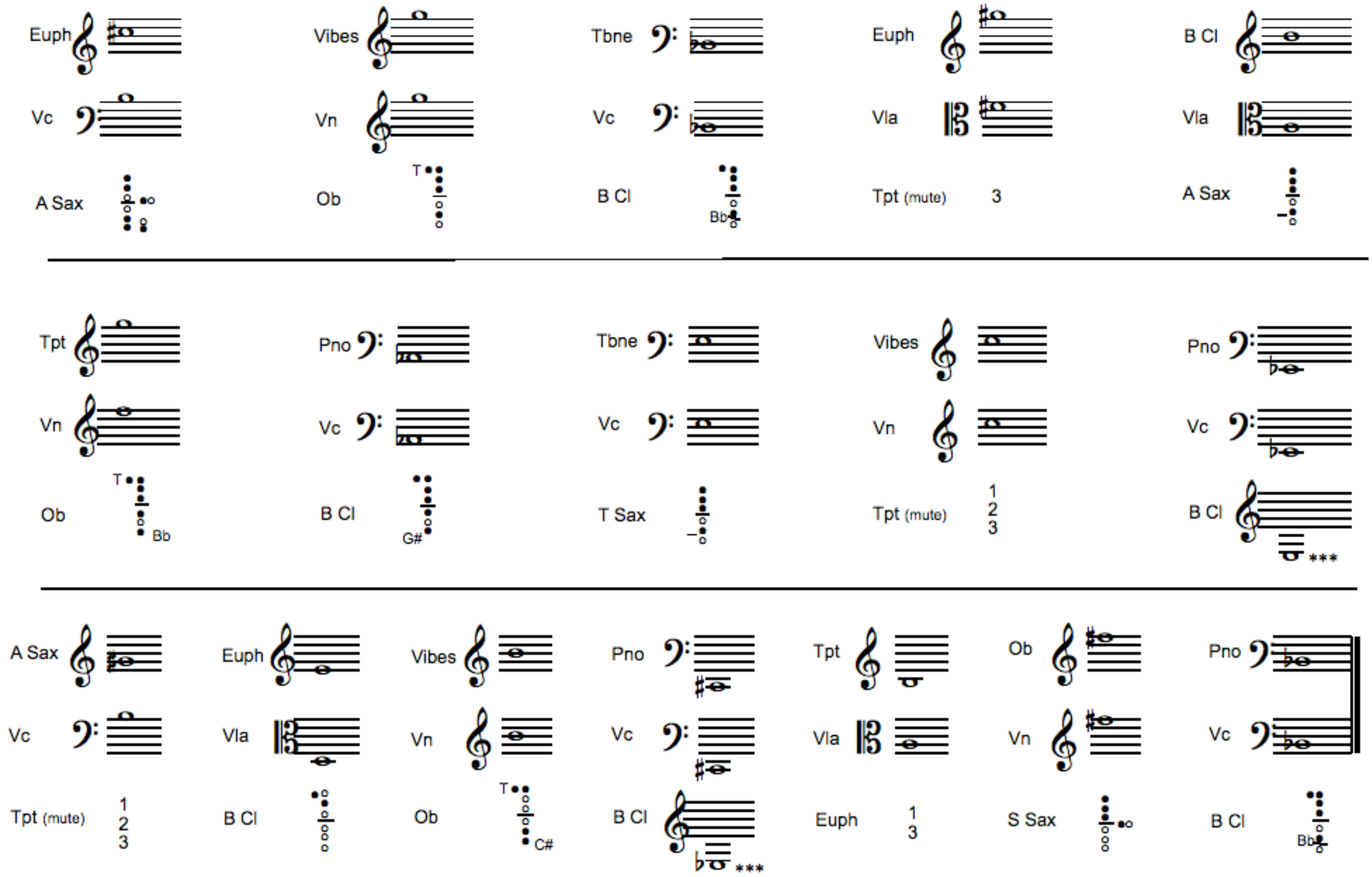
*** in the bass clarinet indicates to revolve the mouthpiece round 45° to create a microtone.

Strings with Small Ensemble

Richard Glover


Pno
Vc
B Cl
Vibes
Vn
Ob
T
Euph
Vla
Alto Sax
Tbne
Vc
B Cl
***
Ob
Vn
Tpt (straight mute)
2
3
Pno
Vla
Euph
2
3
4
Tbne
Vla
Cl
B
Sop Sax
Vn
Ob
T
Bb
B Cl
Vc
Euph
2
3
4
Tpt
Vn
Alto Sax
Vibes
Vn
Ob
T
lrh
Tbne
Vc
B Cl
***
Pno
Vla
Tpt (mute)
1
2
3
Vibes
Vn
Sop Sax
Tpt
Vla
Ob
T


Pno
Vc
B Cl
***
Euph
Vla
A Sax
Ob
Vn
Tpt (mute)
1
2
3
Tbne
Vc
B Cl
G#
Pno
Vla
Tenor Sax
Euph
Vc
Cl
E
Vibes
Vn
Ob
T
G#
Cl
Vla
S Sax
Pno
Vc
B Cl
***
Tbne
Vc
Euph
+ trigger
Ob
Vn
Tpt (mute)
3
A Sax
Vla
Cl
B
Tbne
Vla
T Sax
Tpt
Vn
Ob
T
Pno
Vc
B Cl
****


Euph
Vc
A Sax
Vibes
Vn
Ob
T
Tbne
Vc
B Cl
Bb
Euph
Vla
Tpt (mute)
3
B Cl
Vla
A Sax
Tpt
Vn
Ob
T
Bb
Pno
Vc
B Cl
G#
Tbne
Vc
T Sax
Vibes
Vn
Tpt (mute)
1
2
3
Pno
Vc
B Cl
***
A Sax
Vc
Tpt (mute)
1
2
3
Euph
Vla
B Cl
Vibes
Vn
Ob
T
C#
Pno
Vc
B Cl
***
Tpt
Vla
Euph
1
3
Ob
Vn
S Sax
Pno
Vc
B Cl
Bb

Appendix 4: Performer remarks after *in tones*

Performers were invited to note down remarks following their participation in the *in tones* concert installation. The following are excerpts from the comments:

- 'After seven minutes, started to hear other sounds.'
- '[*in tones*] poses an interesting challenge for us. It's scary in that it's so free; what does a long note mean? […] When the microtones clash and we hear waves, we can feel the vibrations in our lips and instruments. I'm torn between feeling moved and very silly. It's an experience like no other.'
- 'Reminds me of phasing music, same sense of feeling at each minute when everyone is in tune as when the rhythm comes back together in Reich's *Drumming*.'
- 'It [the 20 minute playing experience] was over too quickly! I could have played for an hour!'
- 'Really enjoyed playing, as a performer it gave me a real focus on my sound and how it fit in the mix of all the other tones. Very relaxing and spiritual like to listen to. Good practice of airflow through the instrument, forces musicians to use their ears which often isn't the case in other musical styles. Low dynamics help the focus of a well balanced sound.'
- 'Each tone felt different: sometimes I was completely aware where mine was, sometimes I has no idea; sometimes the smallest slide felt huge, sometimes I couldn't hear any change.'
- 'Time moved very quickly. I tried not to look at the clock too much.'
- 'I was unsure of what dynamic to play as the piece started, but quickly became used to the surroundings.'
- 'It was so easy to lose a specific sound and just lose all concept of everything!'
- '[It] felt like notes were quivering!'
- 'Notes murmuring, could hear own tone above others.'
- 'Had a vibrato without actually doing one.'

Bilinear

for clarinet in Bb and electronics

Richard Glover

Bilinear

for solo clarinet and electronics

Richard Glover

Programme note

The clarinet sits between two sine tones which glissando towards, and then away, from each other. In writing a piece such as this, I want to explore the relationship of the clarinet tone to the continuously shifting sine tones, and also between the high and low clusters whose pitches follow a simple arc contour throughout the piece.

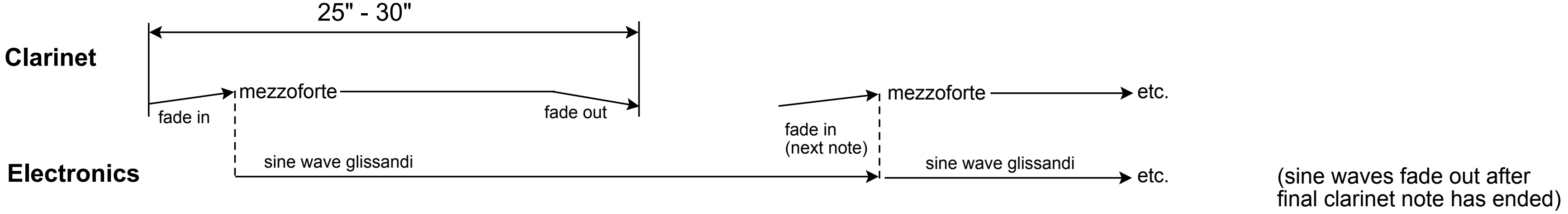
Bilinear was composed for Jonathan Sage and premiered on 21 April 2009 at the Ergodos Festival, National Concert Hall, Dublin.

Duration c.11'

Bilinear

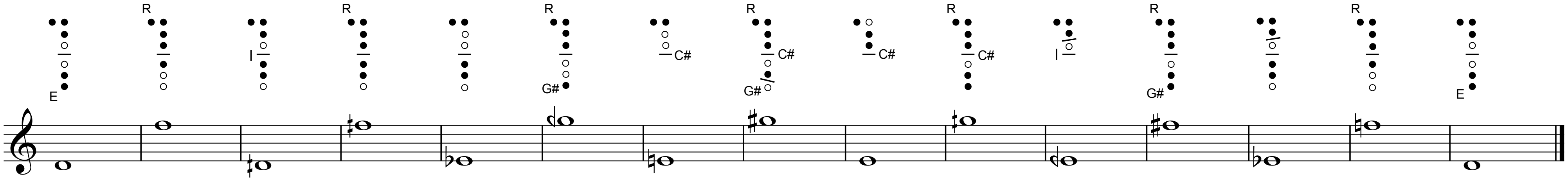
Richard Glover

Schematic shows the structure of each note:



25" - 30"
Clarinet
mezzoforte
fade in
fade out
mezzoforte
etc.
fade in
(next note)
Electronics
sine wave glissandi
sine wave glissandi
etc.
(sine waves fade out after
final clarinet note has ended)

Each note should last between twenty-five and thirty seconds.
Timbral differences between notes should be exposed; retain a sense of moving from a pure sound ⟶ less pure ⟶ pure as you move through the series.
Quarter-tone notation is approximate.



E
R
I
R
R
G#
C#
R
C#
G#
C#
R
C#
I
R
G#
R
E

Clarinet Quartet

Richard Glover

Clarinet Quartet

Richard Glover

Programme note

An ascending glissando is described by sustained clarinets acting in a close cluster. Beating patterns occur when multiple pitches are heard simultaneously, and the transformative densities in *Clarinet* Quartet created from varying dynamics and note-durations affect these beatings to give a continuously undulating surface layer of sound.

Clarinet Quartet was written for the Dunleavy Quartet and premiered on 7 June 2007 in St. Paul's Hall, Huddersfield.

Duration c. 8'10”

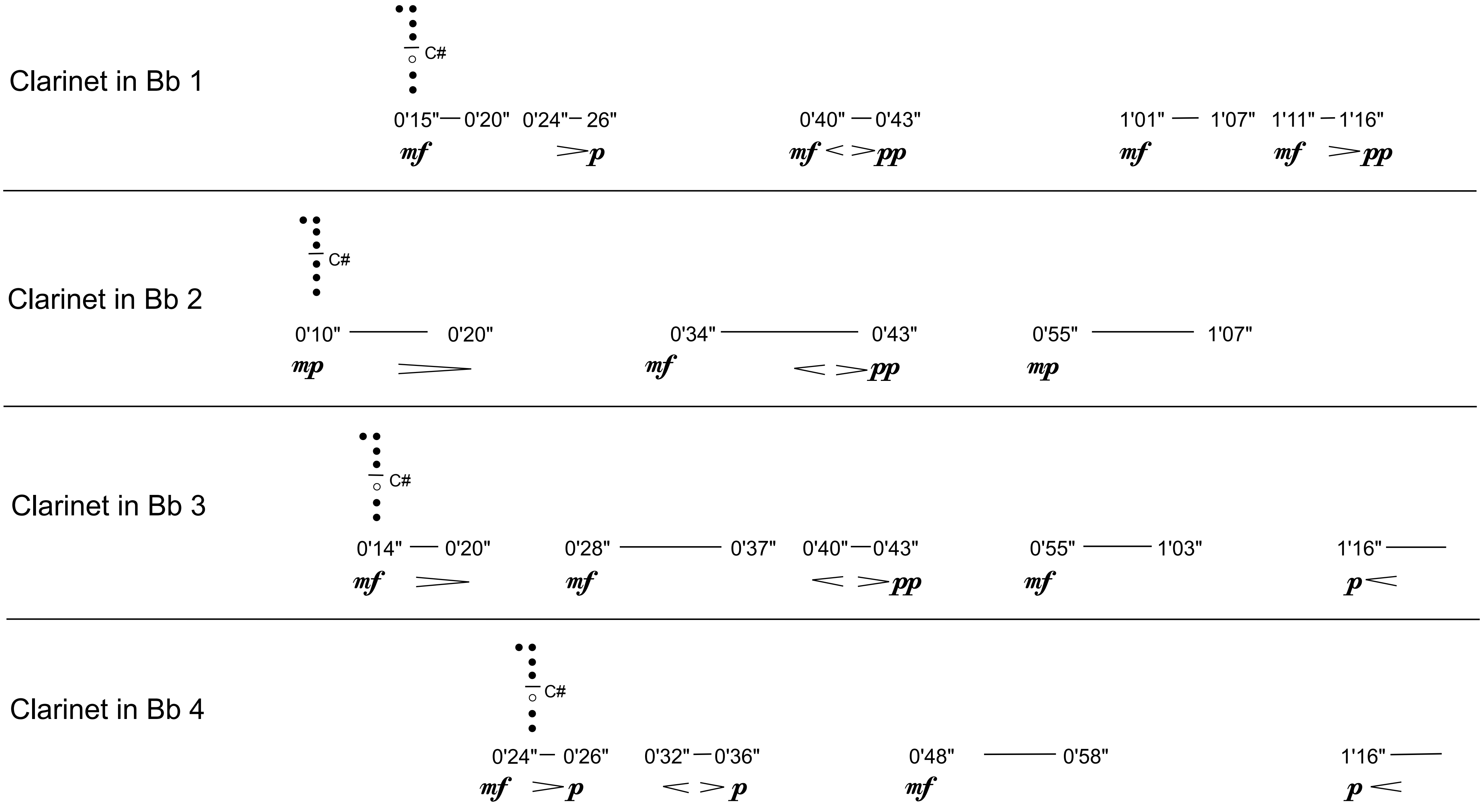
Clarinet Quartet

Performance instructions

Each pitch should be held as steady as possible throughout the full duration of the note.
Avoid accents on note entries; all note should enter begin smoothly as possible.
Each crescendo should not sound louder than *mezzoforte*. When playing the more unstable fingerings, crescendi should not result in a split note; players should ensure the pitch of each note is not compromised by a louder dynamic.

Clarinet Quartet

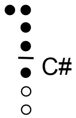
Richard Glover


Clarinet in Bb 1
C#
0'15" — 0'20"
0'24" — 26"
0'40" — 0'43"
1'01" — 1'07"
1'11" — 1'16"
mf
> p
mf < > pp
mf
mf > pp
Clarinet in Bb 2
C#
0'10" — 0'20"
0'34" — 0'43"
0'55" — 1'07"
mp >
mf < > pp
mp
Clarinet in Bb 3
C#
0'14" — 0'20"
0'28" — 0'37"
0'40" — 0'43"
0'55" — 1'03"
1'16" —
mf >
mf
< > pp
mf
p <
Clarinet in Bb 4
C#
0'24" — 0'26"
0'32" — 0'36"
0'48" — 0'58"
1'16" —
mf > p
< > p
mf
p <

Cl 1

1'23"–1'26" 1'30"– 1'36" 1'42"–44" 2'08" 2'15" 2'30" 2'36"

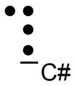
p < > *p* *mf* *p* < > *pp* *p* < > *p*



Cl 2

1'50" 1'59" 2'08" 2'12" 2'20" 2'27" 2'36"

mp > *pp* *p* < *mp* *mf*



Cl 3

–1'23" 1'34"–1'37" 1'44"–1'49" 1'55"–56" 2'00"– 04" 2'30"

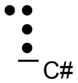
> *p* *mf* *mf*

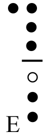
Cl 4

–1'23" 1'38"–1'40" 1'46"–1'49" 1'53"–54" 1'57"–58" 2'02"–04" 2'18" 2'25" 2'28" 2'36"

> *p* *mf* *p* < *mf* *p* < *mf*

Cl 1

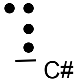




2'41" — 2'47"   2'56" —— 3'07"   3'13" —— 3'21"   3'39" —— 3'47"   3'57" —

mf   *p* < *mf*   *p* < *mf*   *mp*   *mf*

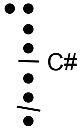
Cl 2



—— 2'43"   2'51" —— 2'58"   3'07" — 3'11"   3'28" — 3'35"   3'47" — 3'52"   3'57" —

mp   *mp* < *mf*   *p* < > *p*   *p* < > *p*   *p* <>

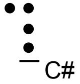
Cl 3



— 2'40" 2'43" —— 2'53"   3'03" —— 3'11"   3'16" — 3'20"   3'26" — 3'33"   3'39" —— 3'47"   3'51" — 3'56"

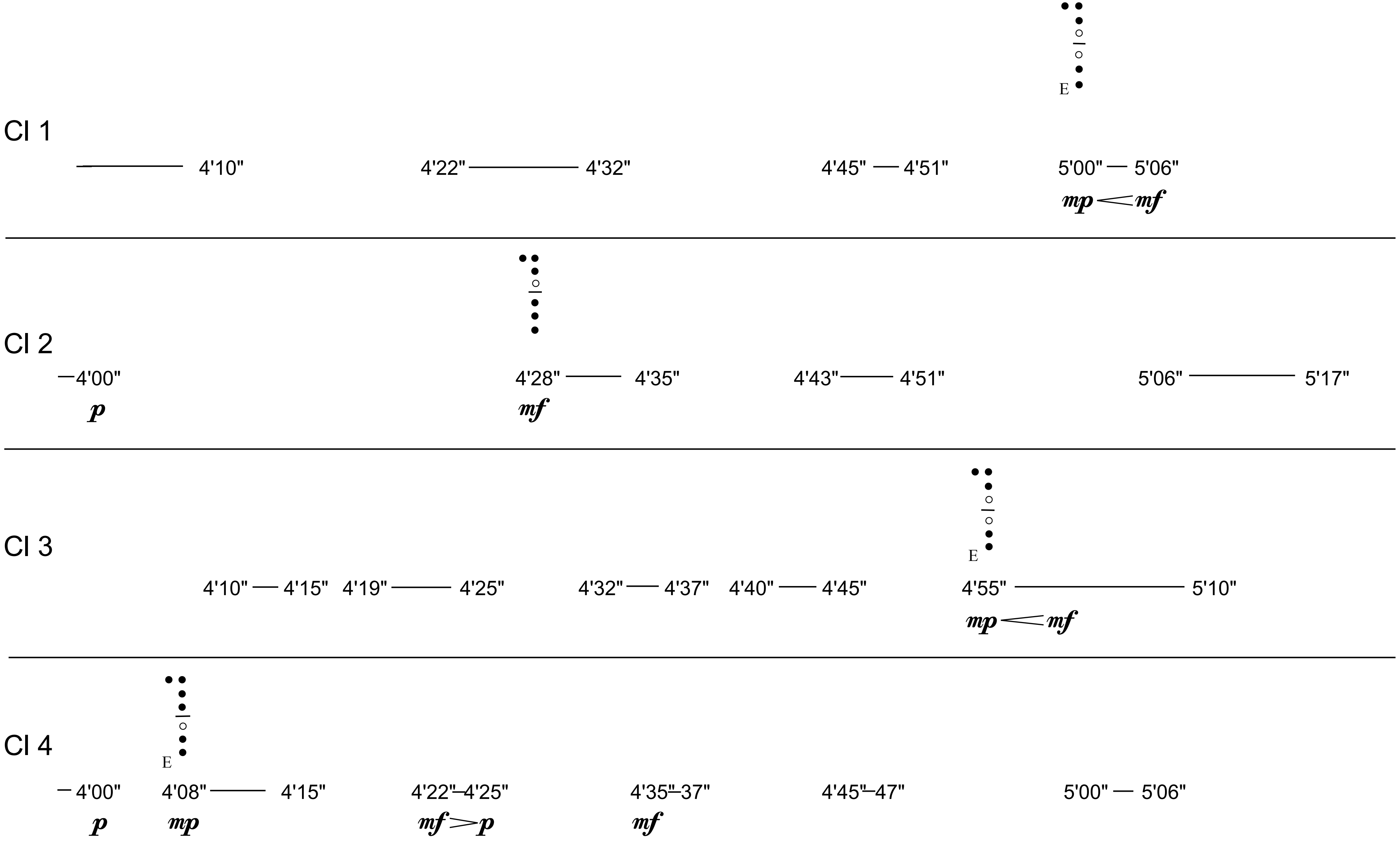
mp < *mf*   *p* < *mf*   *p* < *mf*   *mp*   *mf*

Cl 4



2'50" —— 2'58"   3'10"–11"   3'19" – 3'22"   3'28" — 3'35"   3'47"–3'50"   3'55" ——

> *p*   *p* < *mf*   *p* < *mf*   *p* < > *p*   *p* < > *p*   *p* < >


Cl 1
E
4'10"
4'22"
4'32"
4'45"
4'51"
5'00"
5'06"
mp < mf
Cl 2
4'00"
p
4'28"
mf
4'35"
4'43"
4'51"
5'06"
5'17"
Cl 3
E
4'10"
4'15"
4'19"
4'25"
4'32"
4'37"
4'40"
4'45"
4'55"
5'10"
mp < mf
Cl 4
E
4'00"
p
4'08"
mp
4'15"
4'22"–4'25"
mf > p
4'35"–37"
mf
4'45"–47"
5'00"
5'06"

Cl 1

5'24"–25" 5'33"–5'36" 5'41"— 5'46" 5'53"——6'04" 6'13"–16" 6'23" —— 6'33"

p < *mf* *p* < *mf* *mf* > *p* *mf* *pp* < *mf*

Cl 2

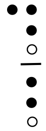
5'22"–24" 5'38"— 5'41" 5'50" — 5'55" 6'03"—6'10" 6'31"– 6'35"

p < *mf* *p* < *mf* *mf* > *p* *mf*

Cl 3

5'24"–25" 5'33"–5'36" 5'41"— 5'46" 6'02"–04" 6'17" —— 6'26"

p < *mf* *p* < *mf* > *p* *mp* *mf*

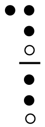


Cl 4

5'20" —— 5'30" 6'00" — 6'06" 6'12"—16" 6'34"–6'37"

mp

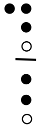
Cl 1



6'45" — 6'51"   7'00" — 7'07"   7'10" — 7'13"   7'16" — 7'20"   7'29" — 7'34"   7'44" — 7'48"   7'54" — 8'00"

p < ***mf***   ***p***   ***mf***

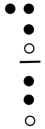
Cl 2



6'49" — 6'57"   7'04" — 7'13"   7'23" — 7'30"   7'37"–39"   7'44" — 7'48"

p < ***mf***   ***p***   ***mf***

Cl 3



6'43" — 6'55"   7'02" — 7'08"   7'16" — 7'25"   7'34" — 7'41"   7'51" — 7'56"

p < ***mf***   ***p***   ***mp*** < ***mf***   ***mf***

Cl 4

6'54" — 7'03"   7'09" — 7'13"   7'16" — 7'20"   7'32"–34"   7'43" – 7'46"

p   ***mf***

Corradiation

for four singers (SATB)

Richard Glover

Corradiation

for four singers (SATB)

Richard Glover

Programme note

Corradiation: a conjunction or concentration of rays in one point.
Conjunction: the *act* of conjoining.

The rays, in this instance, are the individual lines of the singers.

Thanks to Laura for help with the IPA.

Corradiation was written for the Exaudi vocal ensemble and premiered on 9 March 2010 in St. Paul's Hall, Huddersfield.

Duration variable.

Corradiation

Four singers (SATB)

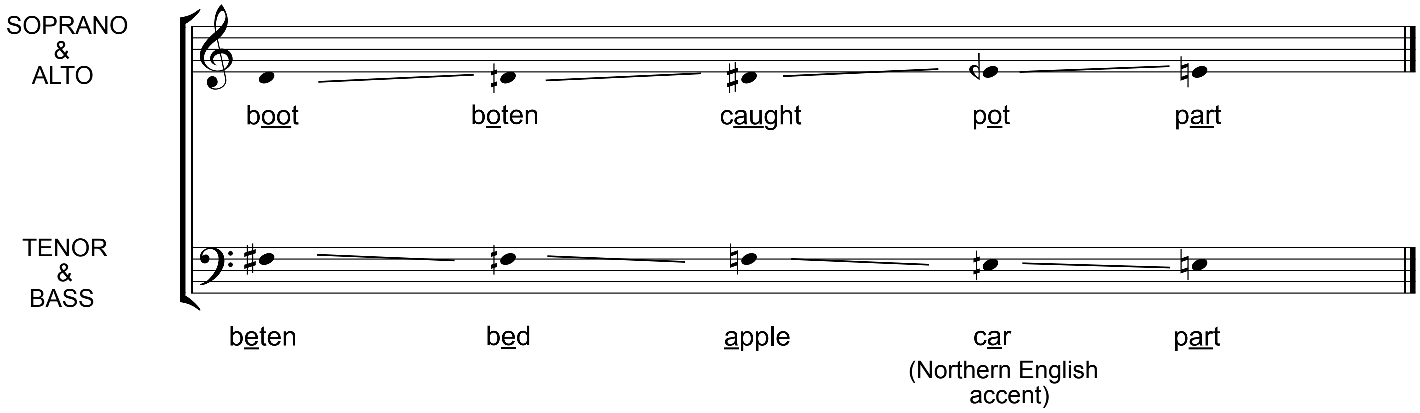
Richard Glover

The length of the piece should be decided prior to performance, dependent on the singers' ability to sustain notes over long durations.

Each singer continues to repeat each sustained note before moving onto the next phoneme.
The pitch of each note should be slightly sharper or flatter than the previous one, depending on the glissando; this pitch should be held for the duration of the note
(do not glissandi through a note). Remain on the E for the final section.
Note duration should be a comfortably long breath.
Fade out at the end of each note, and take a comfortable pause before singing the next note.
Do not synchronise note entries.

Sing the appropriate vowel phoneme (indicated by the underlined letters) with each pitch;
both groups of singers should change phonemes at a similar point, but not during a note.
The same amount of time should be designated to each of the five phoneme sections.
Either visual cues or a stopwatch can be used to indicate the different sections.
There is one word in German in each part: "boten" for soprano and alto, meaning "offered",
and "beten" for tenor and bass meaning "pray".

No vibrato should be used.
Sing at a quiet dynamic, retaining a consistent level throughout each note.
Players should remain independent at all times, except for matching the dynamic of the ensemble.
No one part should stand out over the others.



Gradual Music

for ensemble

Richard Glover

Gradual Music

Richard Glover

Instrumentation:

Trumpet
French Horn
Trombone

Piano (with three eBows)

Violin
Viola
Cello

Programme note

In his 1968 manifesto *Music as a Gradual Process*, Steve Reich describes 'that area of gradual (completely controlled) musical process, where one hears the detail of the sound moving out away from intentions'. The process is controlled, but the sounds themselves are uncontrollable, working 'away from intentions' autonomously.

This uncontrolled surface layer is made manifest in *Gradual Music*; the divisions between sound, process and form become less relevant.

Written for musikFabrik for performance at the Huddersfield Contemporary Music Festival, 28 November 2009.

Duration c. 9 – 12'

Transposed score

Gradual Music

Performance instructions

Trumpet and French Horn

Glissandi may be played using either lip glisses or the moving of tuning/valve slides.
Half-valving should not be used to produce a glissando.
Alternative fingerings may be used as and when necessary; they are not provided in the score as the player may prefer to use tuning slides for glissandi.

Strings

Aim for a similar dynamic between the open-string drone and stopped glissandi tone.
Ensure this dynamic matches the brass.
Use beating patterns where possible to gauge small micro-intervals between the open-string and stopped note.

Piano

The pianist may prefer to use a wedge for the sustain pedal; ensure it can easily be removed for the end of the piece.

Gradual Music

Performance instructions

Black noteheads indicate a short held note, so that there is some overlap between glissandi. Glissandi should last between 15 – 25”, and should be played as linearly as possible. No vibrato should be used throughout the piece.

The ensemble dynamic should be slightly louder than the eBow drones. Players should use a minimum of attack at all times. The focus of the piece is naturally-occurring subtle fluctuations within the surface layer; emphasis should be placed on a steady dynamic throughout.

Both the brass and string families should each act as one instrument. Visual cues should be used to ensure players enter and exit simultaneously.

The open-string drones are played continuously throughout the piece. These drones should end simultaneously with the release of the piano sustain pedal.

The following pairs of instruments continue on from each others' glissandi:

Trumpet – Violin

French Horn – Viola

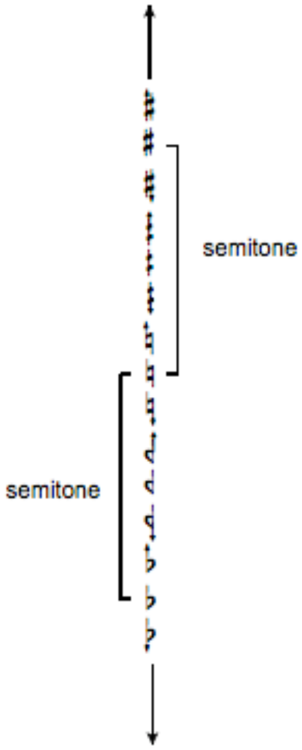
Trombone – Cello

While it is acknowledged that the microtonal pitches will be approximations, players should aim to match the pitch of their instrumental pair at the beginning of each glissando as best as possible.

Gradual Music

Microtonal notation

Gradual Music utilises a twelfth-tone equal-tempered scale, i.e. twelve notes to every whole tone.


semitone
semitone

in tones

for organ and small ensembles

Richard Glover

in tones

for organ and small ensembles

Richard Glover

Programme note

in tones is a concert installation exploring a major third played on an organ, whilst various homogenous ensembles play sustained microtonal variants of the two pitches so that the familiar sounds of these instruments become enmeshed in compact clusters. The concept for the piece comes form wanting to explore how our perceptions process a sustained harmony over an extended duration, how they react to various phenomena arising from the ensemble's interactions, and how the the perception of the harmony is affected by those phenomena.

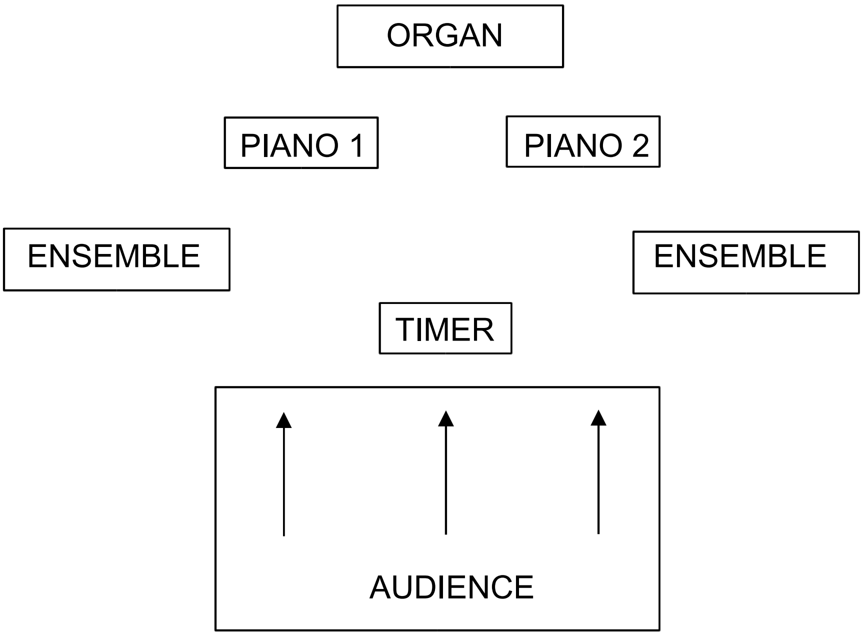
in tones was premiered on 16 January 2010 by University of Huddersfield music students in St. Paul's Hall, Huddersfield.

Duration: 4 hours

in tones

Performance Instructions

Stage setup:



Organ

The organ should be set to a soft flute registration with few partials added.
The notated triad should be sustained throughout each 20 minute section – the corresponding ensemble is indicated for reference purposes. Keys may be held down with weights where suitable.
There should be a few seconds overlap between adjacent triads (when they are in different registers) to soften the section transition.

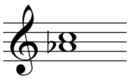
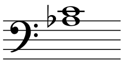
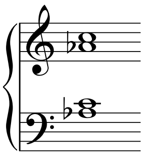
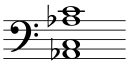
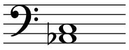
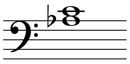
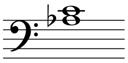
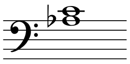
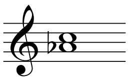
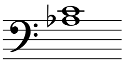
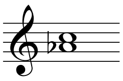
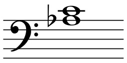
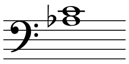
Instrumental ensembles

Each ensemble plays either glissandi or sustained pitches either slightly sharper or flatter than the organ triad, as indicated on each individual part (the one exception being pianos, which repeated triads at the same pitch as the organ).
A clock timer should be set up at the front of the stage, visible from both ensemble positions.
Ensembles should enter the stage quietly within the final two minutes of the previous ensemble's section, take their seats and wait until their new time window begins. Once the new section has begun, the previous ensemble should wait a short time before leaving the stage.
Amplifiers should be set-up before the piece and kept under one set of seats for the ensembles which need them (laptops, signal generators, electric guitars).

in tones

organ score

Richard Glover

1	Trumpets	0hr 00'	
2	Euphoniums	0hr 20'	
3	Pianos	0hr 40'	
		0hr 50'	
4	Cellos	1hr 00'	
5	Clarinets	1hr 20'	
6	Alto saxophones	1hr 40'	
7	Laptops	2hr 00'	
8	Violins	2hr 20'	
9	Signal Generators	2hr 40'	
10	Flutes	3hr 00'	
11	Electric guitars	3hr 20'	
12	Violas	3hr 40'	

Finish 4hr 00'

in tones

Richard Glover

A group consisting of four alto saxophones play alongside an organ drone for 20 minutes

Alto saxophone 1

Select four fingerings for tones just slightly sharper than the A above middle C.
Play comfortable, long tones, using only these fingerings and A, for the first 10 minutes.

Select three fingerings for tones just slightly flatter than the A above middle C.
Play comfortable, long tones, using only these fingerings and A, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchoure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four alto saxophones play alongside an organ drone for 20 minutes

Alto saxophone 2

Select four fingerings for tones just slightly sharper than the A above middle C.
Play comfortable, long tones, using only these fingerings and A, for the first 10 minutes.

Select three fingerings for tones just slightly flatter than the A above middle C.
Play comfortable, long tones, using only these fingerings and A, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchoure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four alto saxophones play alongside an organ drone for 20 minutes

Alto saxophone 3

Select four fingerings for tones just slightly flatter than the F above middle C.
Play comfortable, long tones, using only these fingerings and F, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than the F above middle C.
Play comfortable, long tones, using only these fingerings and F, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four alto saxophones play alongside an organ drone for 20 minutes

Alto saxophone 4

Select four fingerings for tones just slightly flatter than the F above middle C.
Play comfortable, long tones, using only these fingerings and F, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than the F above middle C.
Play comfortable, long tones, using only these fingerings and F, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four cellos play alongside an organ drone for 20 minutes

Cello 1

First 10 minutes

- Begin on either the C an octave below middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four cellos play alongside an organ drone for 20 minutes

Cello 2

First 10 minutes

- Begin on either the C an octave below middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four cellos play alongside an organ drone for 20 minutes

Cello 3

First 10 minutes

- Begin on either the second G# below middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either G# or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four cellos play alongside an organ drone for 20 minutes

Cello 4

First 10 minutes

- Begin on either the second G# below middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either Bb or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four clarinets in Bb play alongside an organ drone for 20 minutes

Clarinet 1

Select four fingerings for tones just slightly sharper than a D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the first 10 minutes.

Select three fingerings for tones just slightly flatter than a D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the final 10 minutes.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four clarinets in Bb play alongside an organ drone for 20 minutes

Clarinet 2

Select four fingerings for tones just slightly sharper than a D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the first 10 minutes.

Select three fingerings for tones just slightly flatter than a D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the final 10 minutes.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four clarinets in Bb play alongside an organ drone for 20 minutes

Clarinet 3

Select four fingerings for tones just slightly flatter than a Bb below middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than a Bb below middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the final 10 minutes.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four clarinets in Bb play alongside an organ drone for 20 minutes

Clarinet 4

Select four fingerings for tones just slightly flatter than a Bb below middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than a Bb below middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the final 10 minutes.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four euphoniums play alongside an organ drone for 20 minutes

Euphonium 1

Select four tones just slightly sharper than the second D above middle C.
Play comfortable, long tones, using only these tones and D, for the first 10 minutes.

Select four tones just slightly flatter than the second D above middle C.
Play comfortable, long tones, using only these tones and D, for the final 10 minutes.

Use alternate fingerings, tuning slide positions and embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four euphoniums play alongside an organ drone for 20 minutes

Euphonium 2

Select four fingerings for tones just slightly sharper than the second D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the first 10 minutes.

Select three fingerings for tones just slightly flatter than the second D above middle C.
Play comfortable, long tones, using only these fingerings and D, for the final 10 minutes.

Use alternate fingerings, tuning slide positions and embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four euphoniums play alongside an organ drone for 20 minutes

Euphonium 3

Select four tones just slightly flatter than the Bb above middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the first 10 minutes.

Select four tones just slightly sharper than the Bb above middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the final 10 minutes.

Use alternate fingerings, tuning slide positions and embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four euphoniums play alongside an organ drone for 20 minutes

Euphonium 4

Select four tones just slightly flatter than the Bb above middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the first 10 minutes.

Select four tones just slightly sharper than the Bb above middle C.
Play comfortable, long tones, using only these fingerings and Bb, for the final 10 minutes.

Use alternate fingerings, tuning slide positions and embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four flutes play alongside an organ drone for 20 minutes

Flute 1

Select four fingerings for tones just slightly sharper than the C an octave above middle C.
Play comfortable, long tones, using only these fingerings and the C, for the first 10 minutes.

Select four fingerings for tones just slightly flatter than the C an octave above middle C.
Play comfortable, long tones, using only these fingerings and C, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four flutes play alongside an organ drone for 20 minutes

Flute 2

Select four fingerings for tones just slightly sharper than the C above middle C.
Play comfortable, long tones, using only these fingerings and the C, for the first 10 minutes.

Select four fingerings for tones just slightly flatter than the C above middle C.
Play comfortable, long tones, using only these fingerings and C, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four flutes play alongside an organ drone for 20 minutes

Flute 3

Select four fingerings for tones just slightly flatter than the Ab above middle C.
Play comfortable, long tones, using only these fingerings and Ab, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than the Ab above middle C.
Play comfortable, long tones, using only these fingerings and Ab, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four flutes play alongside an organ drone for 20 minutes

Flute 4

Select four fingerings for tones just slightly flatter than the Ab above middle C.
Play comfortable, long tones, using only these fingerings and Ab, for the first 10 minutes.

Select three fingerings for tones just slightly sharper than the Ab above middle C.
Play comfortable, long tones, using only these fingerings and Ab, for the final 10 minutes.

If sufficient fingerings cannot be obtained, players can use alternative embouchure control to attain microtonal inflections.

Each note should have as pure and sonorous a tone as possible, and should be played with a minimum of attack. Aim to hold a consistent pitch throughout the full duration of the note.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four electric guitars running through individual amplifiers play alongside an organ drone for 20 minutes.

Guitar 1

For the first 10 minutes, play sustained tones on middle C, and pitches slightly sharper than it.

For the final 10 minutes, play sustained tones on middle C, and pitches slightly flatter than it.

Using the volume control, fade the notes in so that the plucked attack is hidden.
The notes should have as long a duration as possible.

Use a distortion which supports the tone, rather than overshadows it. Aim for as pure a tone as possible.
The ensemble dynamic should be slightly quieter than the organ. Once faded in, maintain a consistent dynamic throughout each pitch, allowing the tone to naturally fade out.

in tones

Richard Glover

A group consisting of four electric guitars running through individual amplifiers play alongside an organ drone for 20 minutes.

Guitar 2

For the first 10 minutes, play sustained tones on middle C, and pitches slightly sharper than it.

For the final 10 minutes, play sustained tones on middle C, and pitches slightly flatter than it.

Using the volume control, fade the notes in so that the plucked attack is hidden.
The notes should have as long a duration as possible.

Use a distortion which supports the tone, rather than overshadows it. Aim for as pure a tone as possible.
The ensemble dynamic should be slightly quieter than the organ. Once faded in, maintain a consistent dynamic throughout each pitch, allowing the tone to naturally fade out.

in tones

Richard Glover

A group consisting of four electric guitars running through individual amplifiers play alongside an organ drone for 20 minutes.

Guitar 3

For the first 10 minutes, play sustained tones on the Ab below middle C, and pitches slightly flatter than it.

For the final 10 minutes, play sustained tones on the Ab below middle C, and pitches slightly sharper than it.

Using the volume control, fade the notes in so that the plucked attack is hidden.
The notes should have as long a duration as possible.

Use a distortion which supports the tone, rather than overshadows it. Aim for as pure a tone as possible.
The ensemble dynamic should be slightly quieter than the organ. Once faded in, maintain a consistent dynamic throughout each pitch, allowing the tone to naturally fade out.

in tones

Richard Glover

A group consisting of four electric guitars running through individual amplifiers play alongside an organ drone for 20 minutes.

Guitar 4

For the first 10 minutes, play sustained tones on the Ab below middle C, and pitches slightly flatter than it.

For the final 10 minutes, play sustained tones on the Ab below middle C, and pitches slightly sharper than it.

Using the volume control, fade the notes in so that the plucked attack is hidden.
The notes should have as long a duration as possible.

Use a distortion which supports the tone, rather than overshadows it. Aim for as pure a tone as possible.
The ensemble dynamic should be slightly quieter than the organ. Once faded in, maintain a consistent dynamic throughout each pitch, allowing the tone to naturally fade out.

in tones

Richard Glover

A group consisting of four laptops running through individual amplifiers play alongside an organ drone for 20 minutes

Laptop 1

Sample one sustained note from Clarinet 1 from their first 10-minute long section, and one note from their final 10-minute long section, before the performance.
Edit these samples beforehand, removing any attack and decay.

Gliss:

- For the first 10 minutes, the first sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.

- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the first 10 minutes, using slightly different pitches to which to glissando each time.

- Only begin this next stage after the final glissando of the first section has ended. For the final 10 minutes, the second sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.

- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the final 10 minutes, using slightly different pitches to which to glissando each time.

Use a fade out if required to finish after 20 minutes.

There should be no silence in between repetitions of the sample.

The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four laptops running through individual amplifiers play alongside an organ drone for 20 minutes

Laptop 2

Sample one sustained note from Clarinet 1 from their first 10-minute long section, and one note from their final 10-minute long section, before the performance.
Edit these samples beforehand, removing any attack and decay.

Gliss:

- For the first 10 minutes, the first sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the first 10 minutes, using slightly different pitches to which to glissando each time.

- Only begin this next stage after the final glissando of the first section has ended. For the final 10 minutes, the second sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the final 10 minutes, using slightly different pitches to which to glissando each time.

Use a fade out if required to finish after 20 minutes.

There should be no silence in between repetitions of the sample.

The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four laptops running through individual amplifiers play alongside an organ drone for 20 minutes

Laptop 3

Sample one sustained note from Clarinet 3 from their first 10-minute long section, and one note from their final 10-minute long section, before the performance.
Edit these samples beforehand, removing any attack and decay.

Gliss:

- For the first 10 minutes, the first sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the first 10 minutes, using slightly different pitches to which to glissando each time.

- Only begin this next stage after the final glissando of the first section has ended. For the final 10 minutes, the second sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the final 10 minutes, using slightly different pitches to which to glissando each time.

Use a fade out if required to finish after 20 minutes.

There should be no silence in between repetitions of the sample.

The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four laptops running through individual amplifiers play alongside an organ drone for 20 minutes

Laptop 4

Sample one sustained note from Clarinet 3 from their first 10-minute long section, and one note from their final 10-minute long section, before the performance.
Edit these samples beforehand, removing any attack and decay.

Gliss:

- For the first 10 minutes, the first sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the first 10 minutes, using slightly different pitches to which to glissando each time.

- Only begin this next stage after the final glissando of the first section has ended. For the final 10 minutes, the second sample should be processed through a pitch-shifter to glissando from its initial pitch to a pitch slightly sharper or flatter, within 50 cents. The glissando should last the entire length of the sample.
- As soon as the sample has ended, the sample should be played again with a glissando from this new pitch back to its original pitch.

This process should be repeated for the final 10 minutes, using slightly different pitches to which to glissando each time.

Use a fade out if required to finish after 20 minutes.

There should be no silence in between repetitions of the sample.

The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of two pianos play alongside an organ drone for 20 minutes

Piano 1

For the first 10 minutes, repeatedly play the major third Ab + C on middle C and the octave above. The two dyads should be played simultaneously, always allowing due time for the sonority to ring before replaying the dyads.

For the final 10 minutes, play the major third Ab + C on middle C and the octave below. The two dyads should be played simultaneously, always allowing due time for the sonority to ring before replaying the dyads.

Do not focus your listening on the notes either you or pianist 2 plays, except to ensure synchronicity between your own two hands.

Play with pedal on.

The ensemble dynamic should be slightly quieter than the organ, and notes should be played with as minimum of attack as is possible at this dynamic.

in tones

Richard Glover

A group consisting of two pianos play alongside an organ drone for 20 minutes

Piano 2

For the first 10 minutes, repeatedly play the major third Ab + C on middle C and the octave above. The two dyads should be played simultaneously, always allowing due time for the sonority to ring before replaying the dyads.

For the final 10 minutes, play the major third Ab + C on middle C and the octave below. The two dyads should be played simultaneously, always allowing due time for the sonority to ring before replaying the dyads.

Do not focus your listening on the notes either you or pianist 2 plays, except to ensure synchronicity between your own two hands.

Play with pedal on.

The ensemble dynamic should be slightly quieter than the organ, and notes should be played with as minimum of attack as is possible at this dynamic.

in tones

Richard Glover

A group consisting of four signal generators (two with digital read-outs, two without) running through individual amplifiers, play alongside an organ drone for 20 minutes

Signal generator 1 (digital read-out)

First 10 minutes

- Select a frequency between 263.6Hz and 277.2Hz. Beginning on either this frequency or 261.6Hz, glissando to the other option over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 261.6 Hz each time. On the final glissando, glissando **down** to either 261.6Hz or a frequency between 259.6 Hz and 246 Hz.

Final 10 minutes

- Continuing from the previous pitch, glissando to either 263.6Hz, or a frequency between 259.6Hz and 246 Hz (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 263.6 Hz each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four signal generators (two with digital read-outs, two without) running through individual amplifiers, play alongside an organ drone for 20 minutes

Signal generator 2 (non-digital read-out)

First 10 minutes

- Select a frequency between 263.6Hz and 277.2Hz. Beginning on either this frequency or 261.6Hz, glissando to the other option over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 261.6 Hz each time. On the final glissando, glissando **down** to either 261.6Hz or a frequency between 259.6 Hz and 246 Hz.

Final 10 minutes

- Continuing from the previous pitch, glissando to either 263.6Hz, or a frequency between 259.6Hz and 246 Hz (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 263.6 Hz each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four signal generators (two with digital read-outs, two without) running through individual amplifiers, play alongside an organ drone for 20 minutes

Signal generator 3 (digital read-out)

First 10 minutes

- Select a frequency between 204.6Hz and 196Hz. Beginning on either this frequency or 207.6 Hz, glissando to the other option over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 207.6Hz each time. On the final glissando, glissando **up** to either 207.6 Hz or a frequency between 204.6Hz and 220Hz.

Final 10 minutes

- Continuing from the previous pitch, glissando to either 207.6Hz, or a frequency between 210.6Hz and 220Hz (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of the next minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from 207.6Hz each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four signal generators (two with digital read-outs, two without) running through individual amplifiers, play alongside an organ drone for 20 minutes

Signal generator 4 (non-digital read-out)

First 10 minutes

- Select a frequency between 204.6Hz and 196Hz. Beginning on either this frequency or 207.6 Hz, glissando to the other option over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of a minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from [Bb] Hz each time. On the final glissando, glissando **down** to either [Bb] Hz or a frequency between ___ Hz and ___ Hz.

Final 10 minutes

- Continuing from the previous pitch, glissando to either [Bb]Hz, or a frequency between [Bb]Hz and ___ Hz [more than A] (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination frequency, glissando back to your original starting frequency over the course of a minute.

Repeat this process four times, using slightly different frequencies within the set range to glissando to/from [Bb] Hz each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four trumpets in Bb play alongside an organ drone for 20 minutes

Trumpet 1

For the first 10 minutes, glissando between the second D above middle C and pitches slightly sharper than it.
A single glissando between these two points should last the length of a comfortable, long breath.

For the final 10 minutes, glissando between the second D above middle C and pitches slightly flatter than it.

Glissandi can be controlled by either the tuning slide or embouchure; they should be played as smooth and as linear as possible.
Notes should be played with a minimum of attack. Maintain a consistent dynamic throughout each pitch.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four trumpets in Bb play alongside an organ drone for 20 minutes

Trumpet 2

For the first 10 minutes, glissando between the second D above middle C and pitches slightly sharper than it.
A single glissando between these two points should last the length of a comfortable, long breath.

For the final 10 minutes, glissando between the second D above middle C and pitches slightly flatter than it.

Glissandi can be controlled by either the tuning slide or embouchure; they should be played as smooth and as linear as possible.
Notes should be played with a minimum of attack. Maintain a consistent dynamic throughout each pitch.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four trumpets in Bb play alongside an organ drone for 20 minutes

Trumpet 3

For the first 10 minutes, glissando between the Bb above middle C and pitches slightly flatter than it. A single glissando between these two points should last the length of a comfortable, long breath.

For the final 10 minutes, glissando between the Bb above middle C and pitches slightly sharper than it.

Glissandi can be controlled by either the tuning slide or embouchure; they should be played as smooth and as linear as possible.
Notes should be played with a minimum of attack. Maintain a consistent dynamic throughout each pitch.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four trumpets in Bb play alongside an organ drone for 20 minutes

Trumpet 4

For the first 10 minutes, repeatedly glissando between the Bb above middle C and pitches slightly flatter than it. A single glissando between these two points should last the length of a comfortable, long breath.

For the final 10 minutes, glissando between the Bb above middle C and pitches slightly sharper than it.

Glissandi can be controlled by either the tuning slide or embouchure; they should be played as smooth and as linear as possible.
Notes should be played with a minimum of attack. Maintain a consistent dynamic throughout each pitch.
The ensemble dynamic should be slightly quieter than the organ.

in tones

Richard Glover

A group consisting of four violas play alongside an organ drone for 20 minutes

Viola 1

First 10 minutes

- Begin on either middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violas play alongside an organ drone for 20 minutes

Viola 2

First 10 minutes

- Begin on either middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violas play alongside an organ drone for 20 minutes

Viola 3

First 10 minutes

- Begin on either the G# below middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either G# or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violas play alongside an organ drone for 20 minutes

Viola 4

First 10 minutes

- Begin on either the G# below middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either G# or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violins play alongside an organ drone for 20 minutes

Violin 1

First 10 minutes

- Begin on either the C an octave above middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violins play alongside an organ drone for 20 minutes

Violin 2

First 10 minutes

- Begin on either the C an octave above middle C, or a pitch slightly sharper than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time. On the final glissando, glissando **down** to either C or a pitch slightly flatter than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the C, or a pitch slightly flatter than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the C each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violins play alongside an organ drone for 20 minutes

Violin 3

First 10 minutes

- Begin on either the G# above middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either G# or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

in tones

Richard Glover

A group consisting of four violins play alongside an organ drone for 20 minutes

Violin 4

First 10 minutes

- Begin on either the G# above middle C, or a pitch slightly flatter than it. Over a period of one minute, glissando to the other option.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time. On the final glissando, glissando **up** to either G# or a pitch slightly sharper than it.

Final 10 minutes

- Continuing from the previous pitch, glissando to either the G#, or a pitch slightly sharper than it (whichever you are not already playing), over a period of one minute.
- Once you arrive at your destination pitch, glissando back to your original starting pitch over the course of the next minute.

Repeat this process four times, using slightly different notes to glissando to/from the G# each time.

Glissandi should be as smooth and as linear as possible.
The ensemble dynamic should be slightly quieter than the organ. Maintain a consistent dynamic throughout each pitch.

Inversions in Retrograde (cent-deviation version)

for string quartet

Richard Glover

Inversions in Retrograde (cent-deviation version)

for string quartet

Richard Glover

Programme note

An alternative version of functional harmony, utilising a series of discrete just-intoned consonances.

Inversions in Retrograde was written for the Jack Quartet and premiered on 26 March 2009 in St. Paul's Hall, Huddersfield.

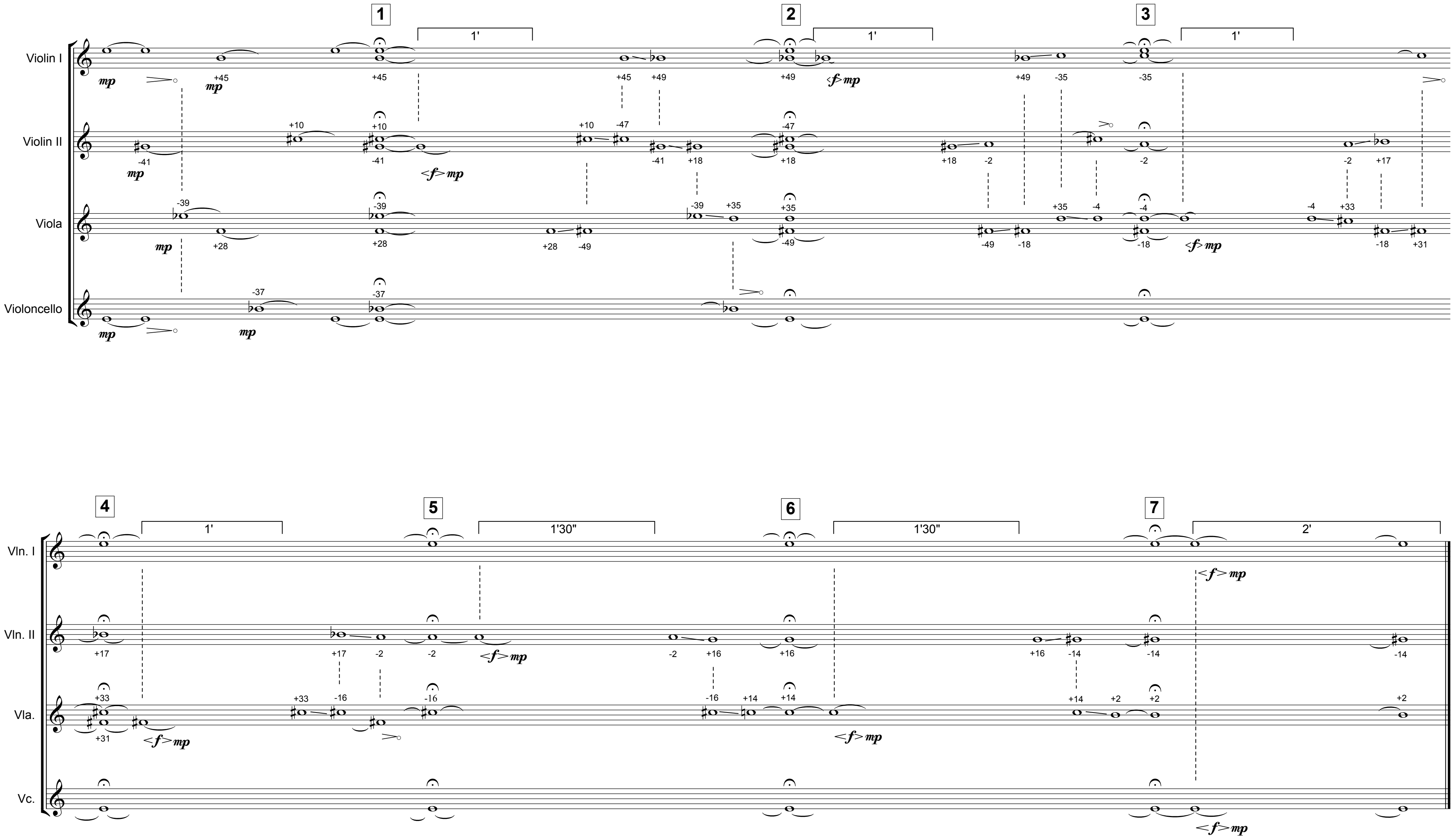
Duration c.12-14'

Inversions in Retrograde

(cent-deviation version)

- All timings are approximate
- All glissandi should be played at the same, very gradual speed lasting a minimum of one bow
- Synchronise the beginning of each glissando with the end of the previous one

Richard Glover


1
2
3
1'
1'
1'
Violin I
mp
+45
mp
+45
+45
+49
+49
<f> mp
+49
-35
-35
Violin II
-41
mp
+10
+10
-41
<f> mp
+10
-47
-41
+18
-47
+18
+18
-2
-2
-2
+17
Viola
-39
mp
+28
-39
+28
+28
-49
-39
+35
+35
-49
-49
-18
+35
-4
-4
-18
<f> mp
-4
+33
-18
+31
Violoncello
mp
-37
mp
-37
4
5
6
7
1'
1'30"
1'30"
2'
Vln. I
<f> mp
Vln. II
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+17
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+33
+31
<f> mp
+33
-16
-16
-16
+14
-16
+14
<f> mp
+14
+2
+2
+2
Vc.
<f> mp

Inversions in Retrograde (just intonation version)

for string quartet

Richard Glover

Inversions in Retrograde (just intonation version)

for string quartet

Richard Glover

Programme note

An alternative version of functional harmony, utilising a series of discrete just-intoned consonances.

Inversions in Retrograde was written for the Jack Quartet and premiered on 26 March 2009 in St. Paul's Hall, Huddersfield.

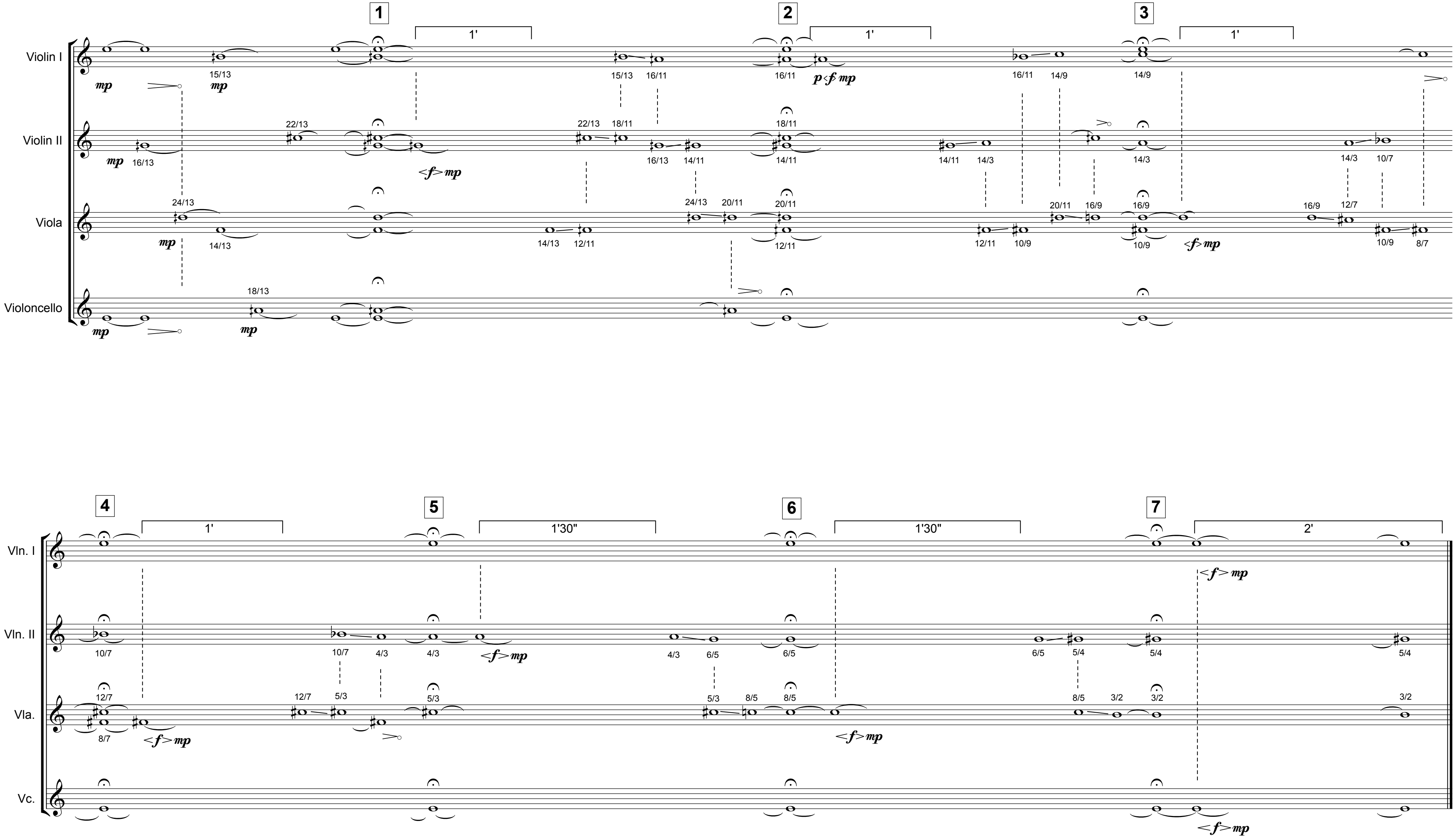
Duration c.12-14'

Inversions in Retrograde

(just intonation version)

- All timings are approximate
- All glissandi should be played at the same, very gradual speed lasting a minimum of one bow
- Synchronise the beginning of each glissando with the end of the previous one

Richard Glover



Violin I
Violin II
Viola
Violoncello
1
2
3
1'
15/13
16/11
14/9
22/13
18/11
16/13
14/11
14/3
10/7
24/13
20/11
14/13
12/11
20/11
16/9
10/9
12/7
8/7
18/13
mp
p < f mp
< f > mp
Vln. I
Vln. II
Vla.
Vc.
4
5
6
7
1'30"
2'
4/3
6/5
5/4
5/3
8/5
3/2

Like a Continuum

for saxophone ensemble

Richard Glover

Like a Continuum

for saxophone ensemble

Richard Glover

Programme note

A gradual ascending glissando is played across four octaves by the four different sections of the ensemble. As the glissandi for each instrument move at slightly different rates, unisons and octave unisons continually transform, and beating patterns result from pitches in close proximity.

Like a Continuum was written for the University of Huddersfield Saxophone Ensemble and premiered on 12 March 2008 in St. Paul's Hall, Huddersfield.

Duration 11'

Like a Continuum

Performance instructions

Sopranos and tenors can read off the same score.

For each time section, players play any of the available fingerings (tempered notes represented by underlined capitals)

Each singer continues to repeat each sustained note before moving onto the next phoneme.
The pitch of each note should be slightly sharper or flatter than the previous one,
this pitch should be held for the duration of the note
(do not glissandi through a note). Remain on the E for the final section.
Note duration should be a comfortably long breath.
Fade out at the end of each note, and take a comfortable pause before singing the next note.
Do not synchronise note entries.

Each part includes three tempered pitches, which are indicated by their letter name underlined.

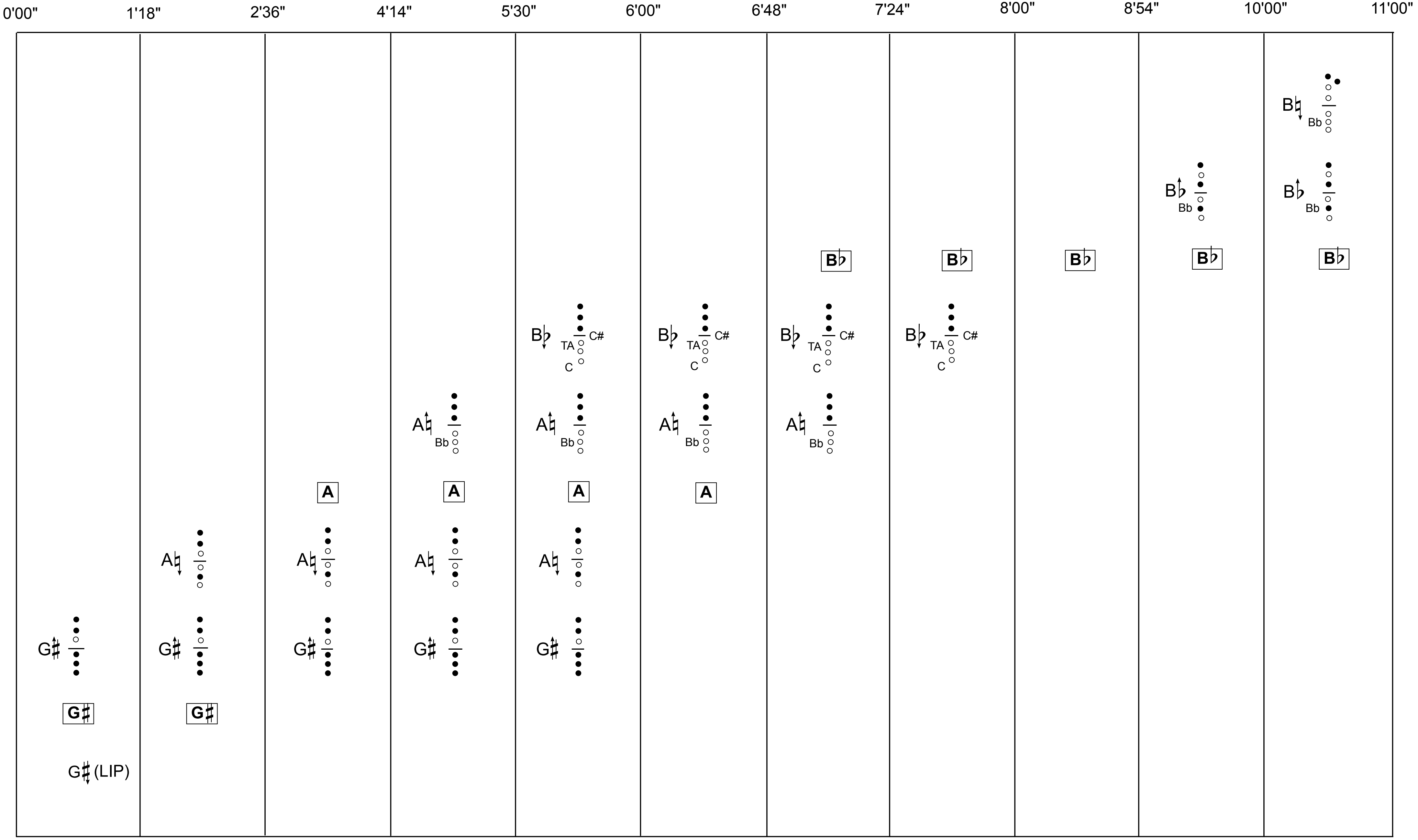
The same amount of time should be designated to each of the five phoneme sections.
A stopwatch can be used to indicate the different sections.

No vibrato should be used.
Sing at a quiet dynamic, retaining a consistent level throughout each note.
Players should remain independent at all times, except for matching the dynamic of the ensemble.
No one part should stand out over the others.

Soprano and
tenor saxophones

Like a Continuum

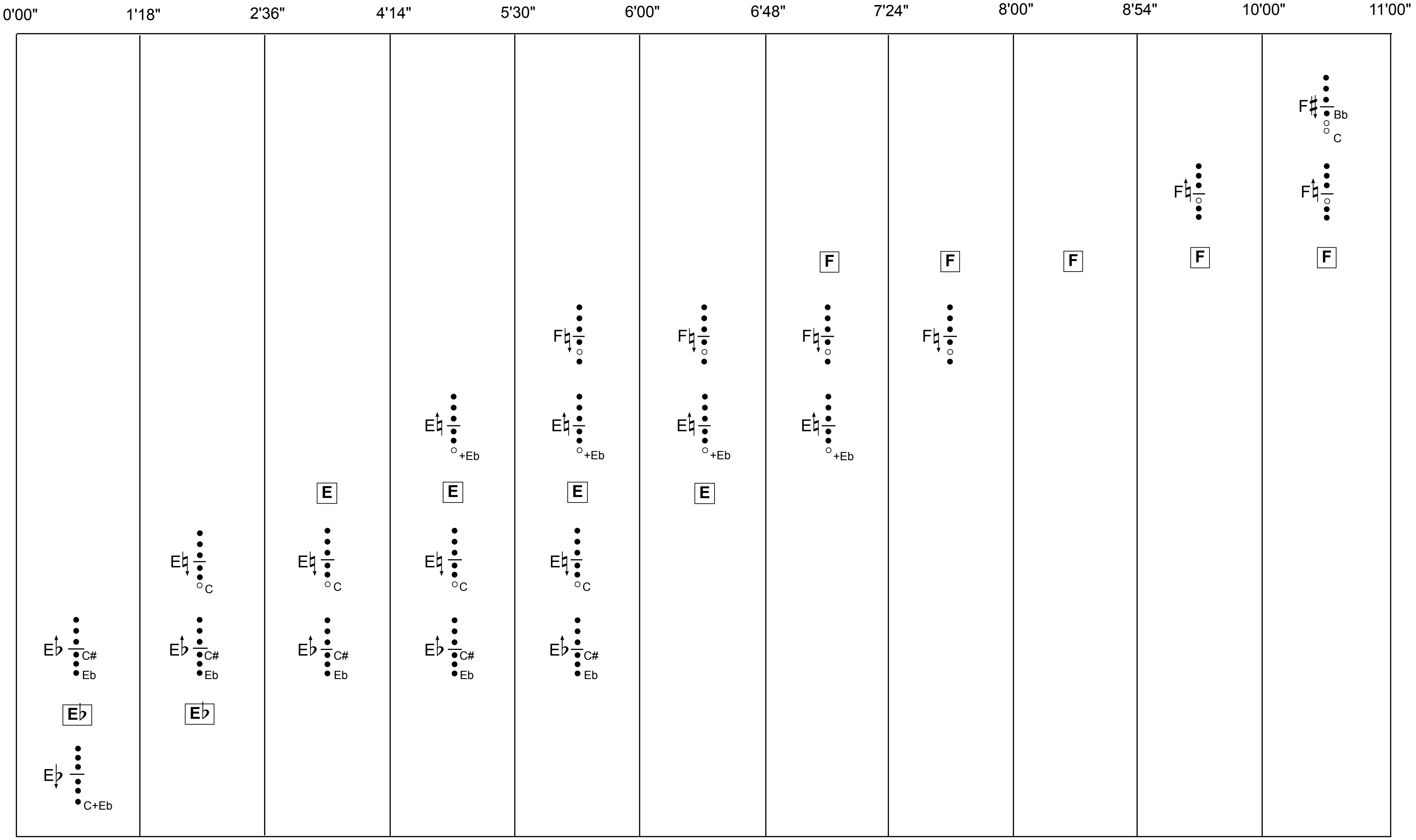
Richard Glover


0'00"
1'18"
2'36"
4'14"
5'30"
6'00"
6'48"
7'24"
8'00"
8'54"
10'00"
11'00"
G♯
G♯
G♯ (LIP)
A♮
G♯
G♯
A
A♮
G♯
A
A♮
Bb
A♮
G♯
B♭
TA
C
C#
A
A♮
Bb
A♮
G♯
B♭
TA
C
C#
A♮
Bb
A
B♭
B♭
TA
C
C#
A♮
Bb
B♭
B♭
TA
C
C#
B♭
B♭
Bb
B♭
B♮
Bb
B♭
Bb
B♭

Alto saxophones

Like a Continuum

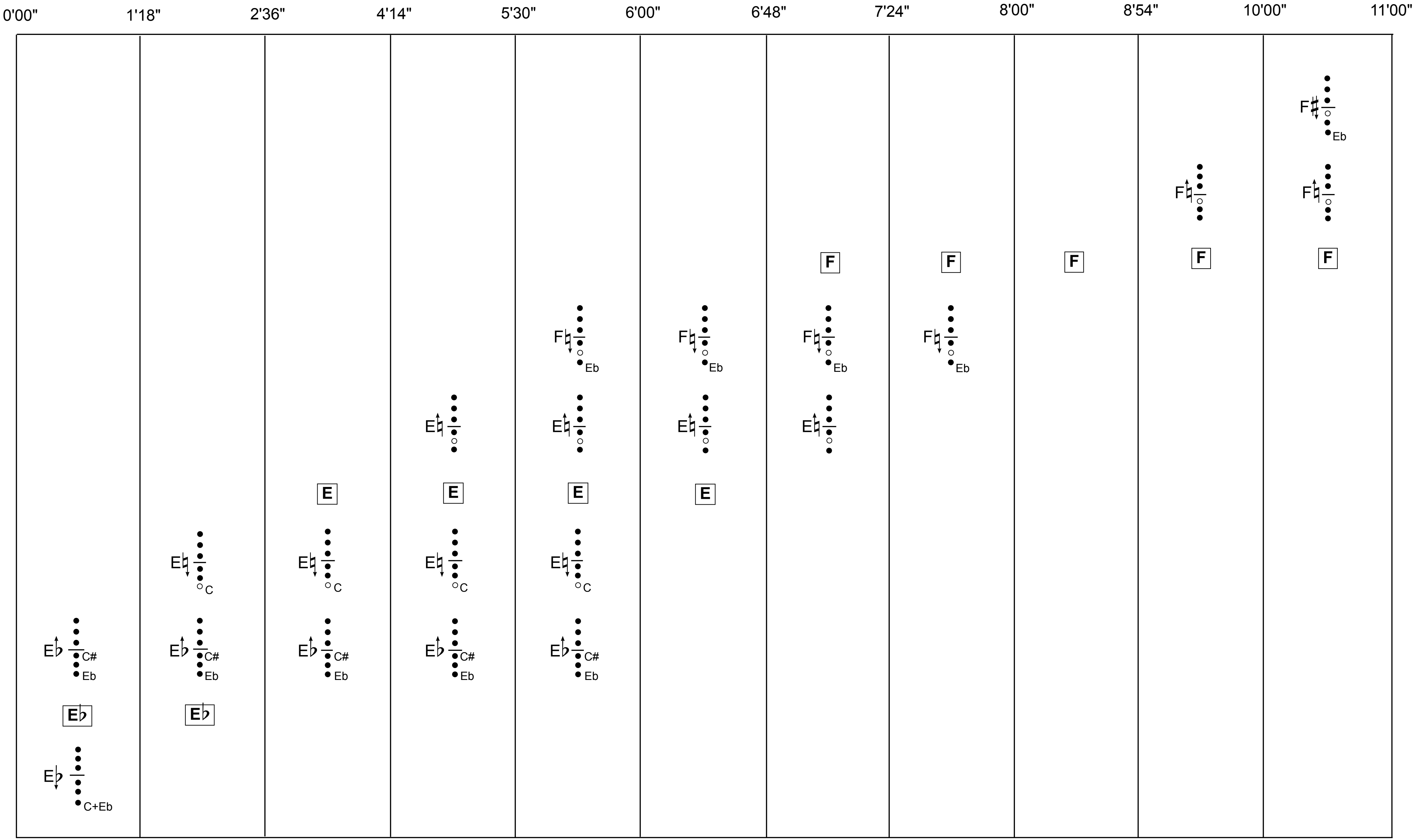
Richard Glover


0'00"
1'18"
2'36"
4'14"
5'30"
6'00"
6'48"
7'24"
8'00"
8'54"
10'00"
11'00"
E♭ C# Eb
E♭
E♭ C+Eb
E♮ C
E♭ C# Eb
E♭
E
E♮ C
E♭ C# Eb
E♮ +Eb
E
E♮ C
E♭ C# Eb
F♮
E♮ +Eb
E
E♮ C
E♭ C# Eb
F♮
E♮ +Eb
E
F
F♮
E♮ +Eb
F
F♮
F
F♮
F
F♯ Bb C
F♮
F

Baritone saxophones

Like a Continuum

Richard Glover


0'00"
1'18"
2'36"
4'14"
5'30"
6'00"
6'48"
7'24"
8'00"
8'54"
10'00"
11'00"
E♭
C#
Eb
E♭
E♭
C+Eb
E♮
C
E
F♮
F
F♯

Proximity Stream

for saxophone quartet and string ensemble

Richard Glover

Proximity Stream

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Instrumentation:
2 alto saxophones
2 tenor saxophone

Strings:
4.3.2.2.1

Programme note

Our perceptual grouping processes operate by streaming different sets information into groups, and evaluating the groups separately and their relationship to each other. Streaming becomes difficult once certain parameters reach a particular state: the sustained saxophone cluster in *Proximity Stream* continuously blurs the streaming process due to proximity in pitch and dynamic, and beating process which arise from the cluster interfere further with our grouping process. The string ensemble provides supplementary material in three distinct sections: articulating the spectra of the saxophone cluster, transforming the cluster into first and second order harmonics, and permeating the cluster with microtonal inflections within.

Proximity Stream was written for the Apollo Saxophone Quartet and the Goldberg String Ensemble and premiered on 12 May 2007 in St. Paul's Hall, Huddersfield.

Duration c. 7'00”

Transposed score

Proximity Stream

Performance instructions

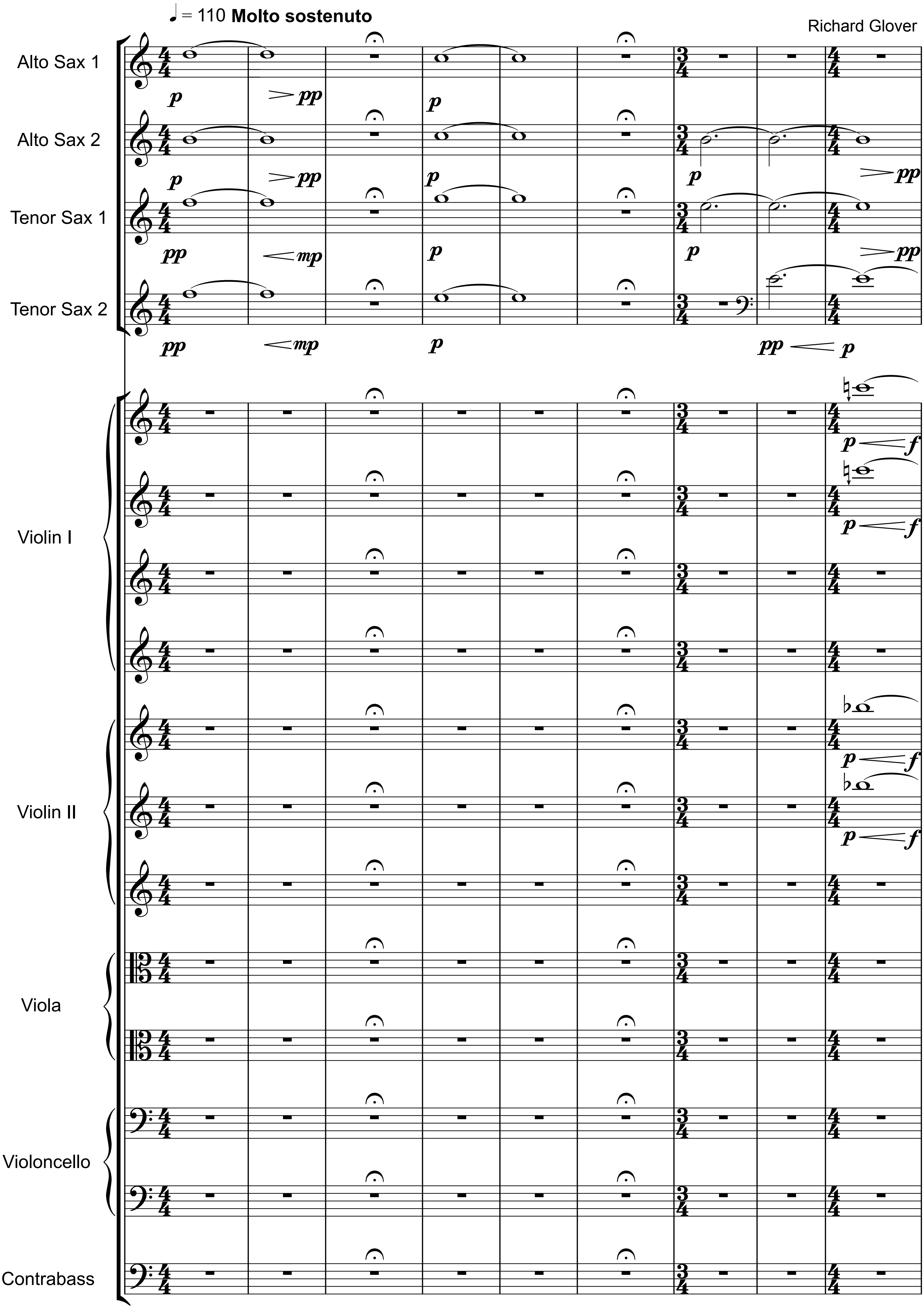
The entire piece should be played without vibrato on all instruments.
Each performer should aim to keep the pitch and dynamic of every note they play as controlled as possible, except where specifically indicated with dynamic instructions.
All entries should be unaccented, except where marked otherwise.
If a note ends without a crescendo or decrescendo, sustain the given dynamic through to the end of the note.
All dynamic changes should be performed in a uniform manner throughout the note, not increasing towards the end.

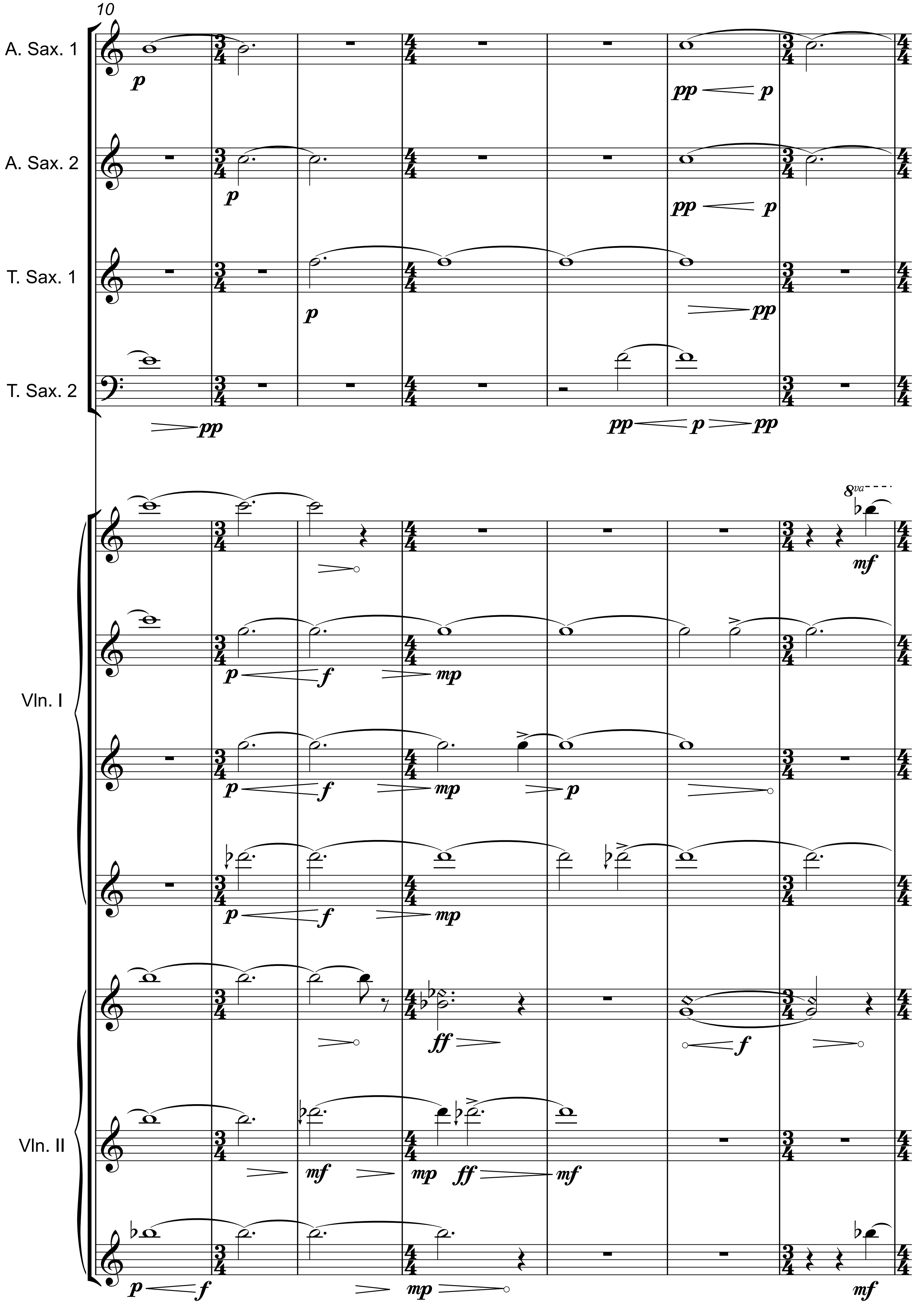
The following sixth-tone notation is employed in *Proximity Stream*:

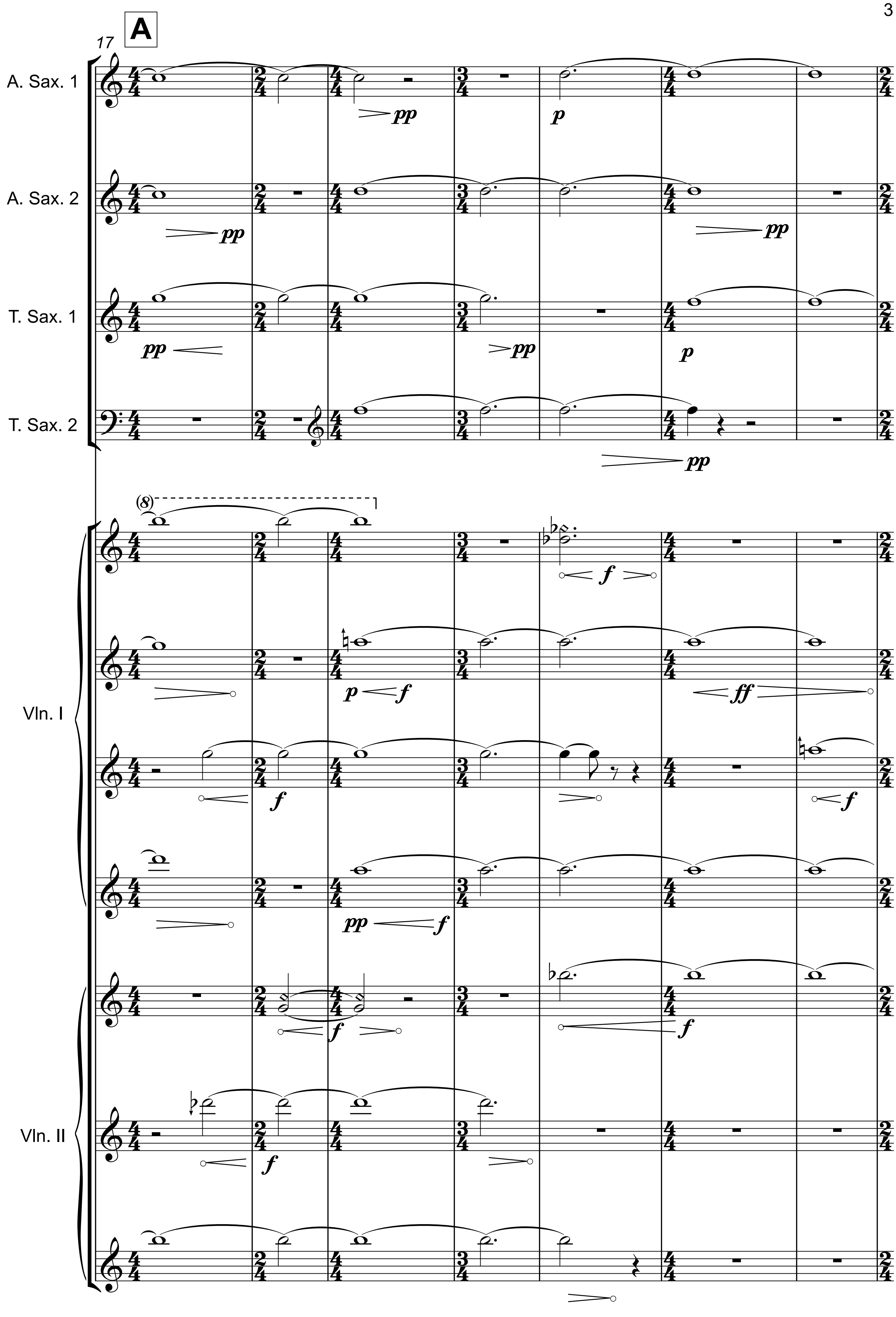
♯↑	Slightly sharper than a sharp
♯↓	Slightly flatter than a sharp
♮↑	Slightly sharper than a natural
♮↓	Slightly flatter than a natural
♭↑	Slightly sharper than a flat
♭↓	Slightly flatter than a flat

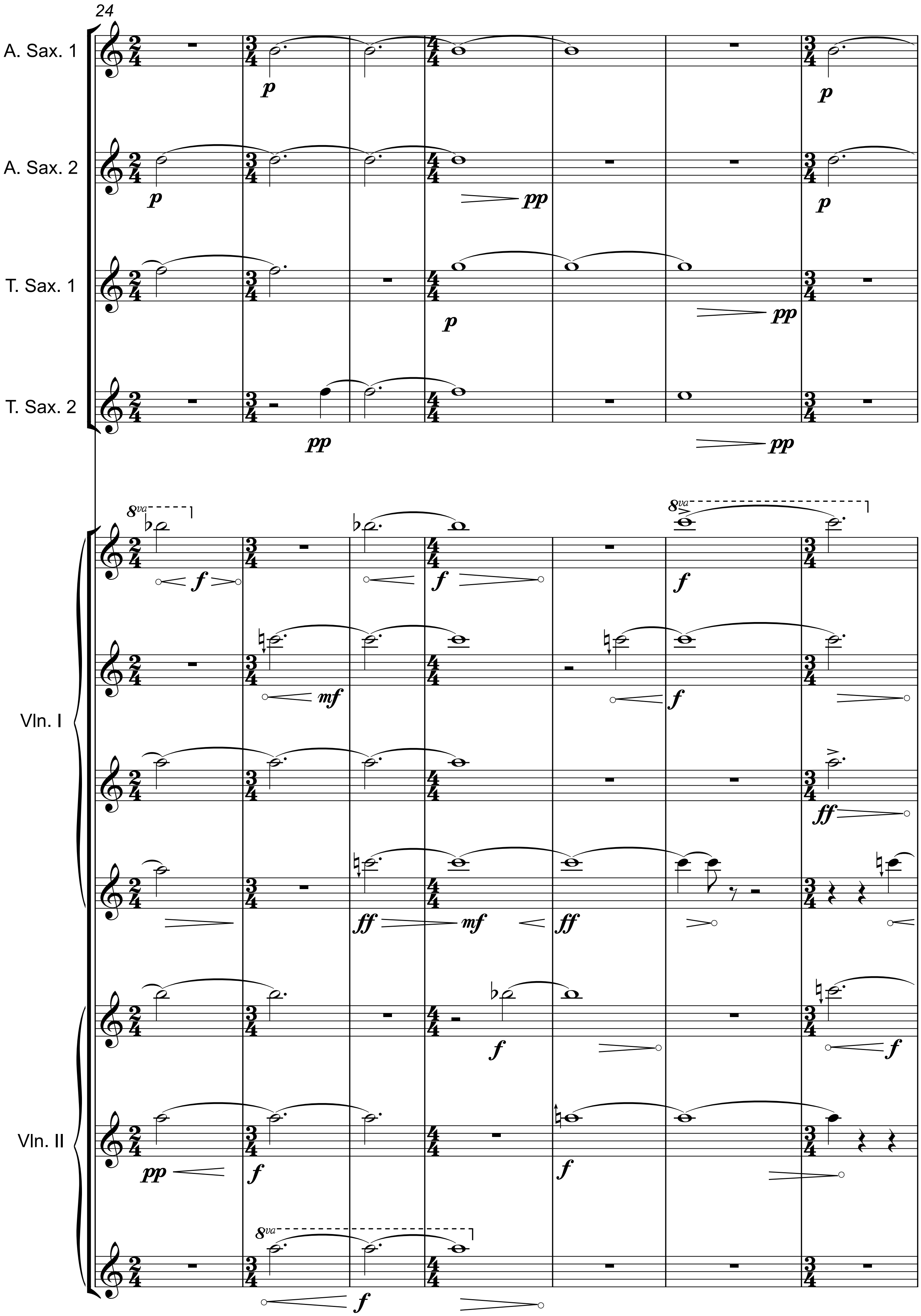
Proximity Stream

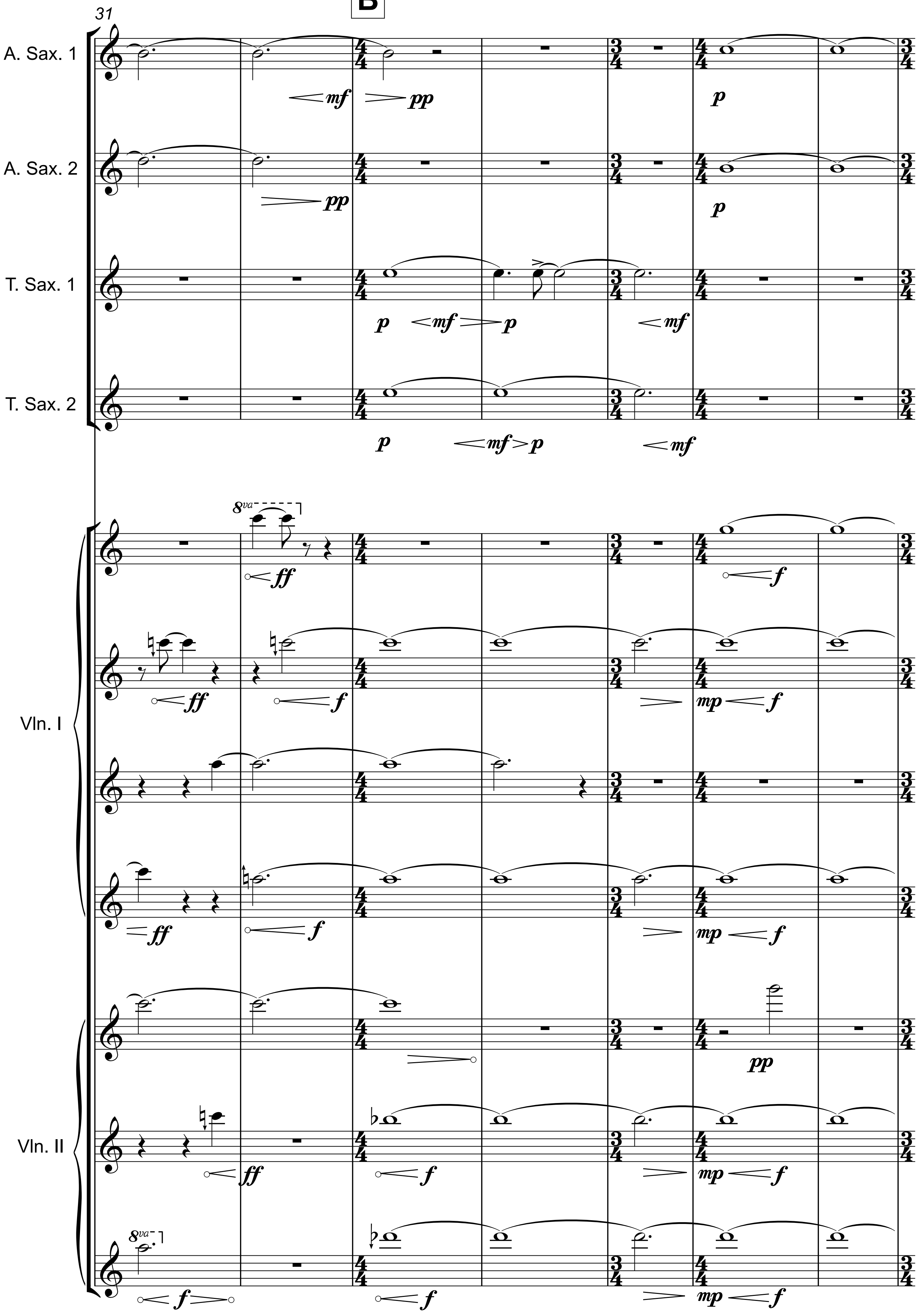
Richard Glover

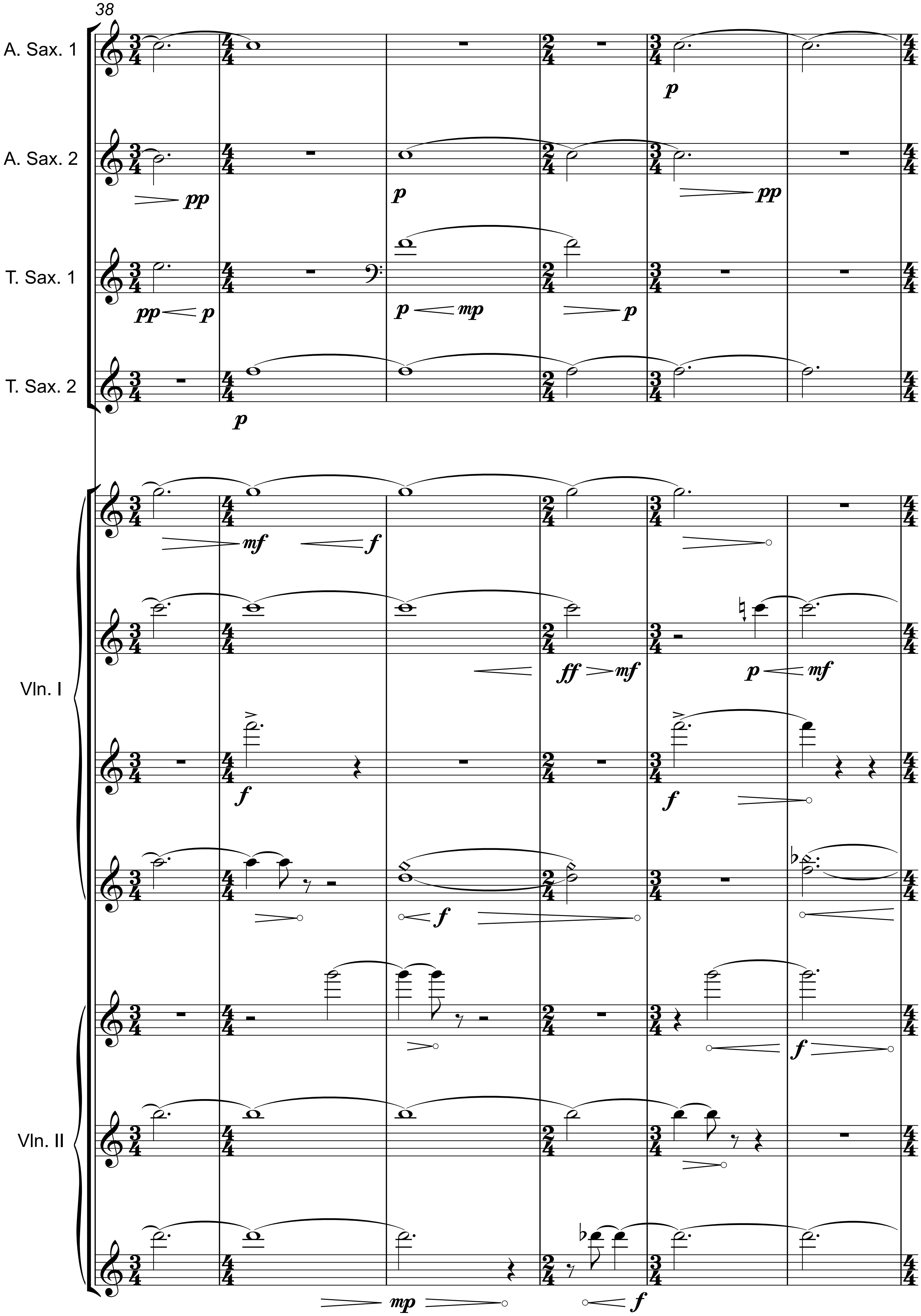

♩ = 110 Molto sostenuto
Alto Sax 1
Alto Sax 2
Tenor Sax 1
Tenor Sax 2
Violin I
Violin II
Viola
Violoncello
Contrabass
p
pp
mp
f

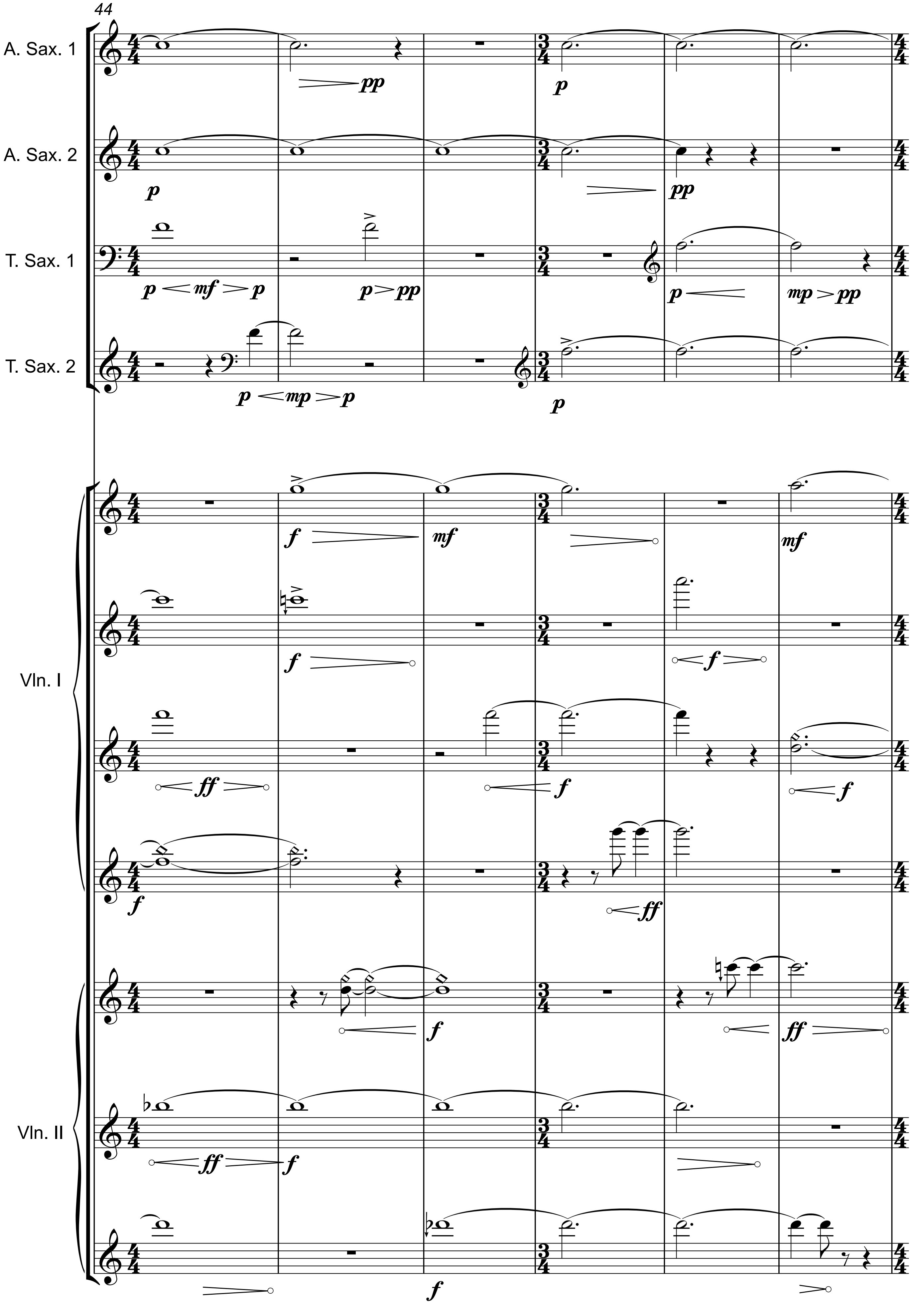

10
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
p
pp
mp
mf
f
ff
8va

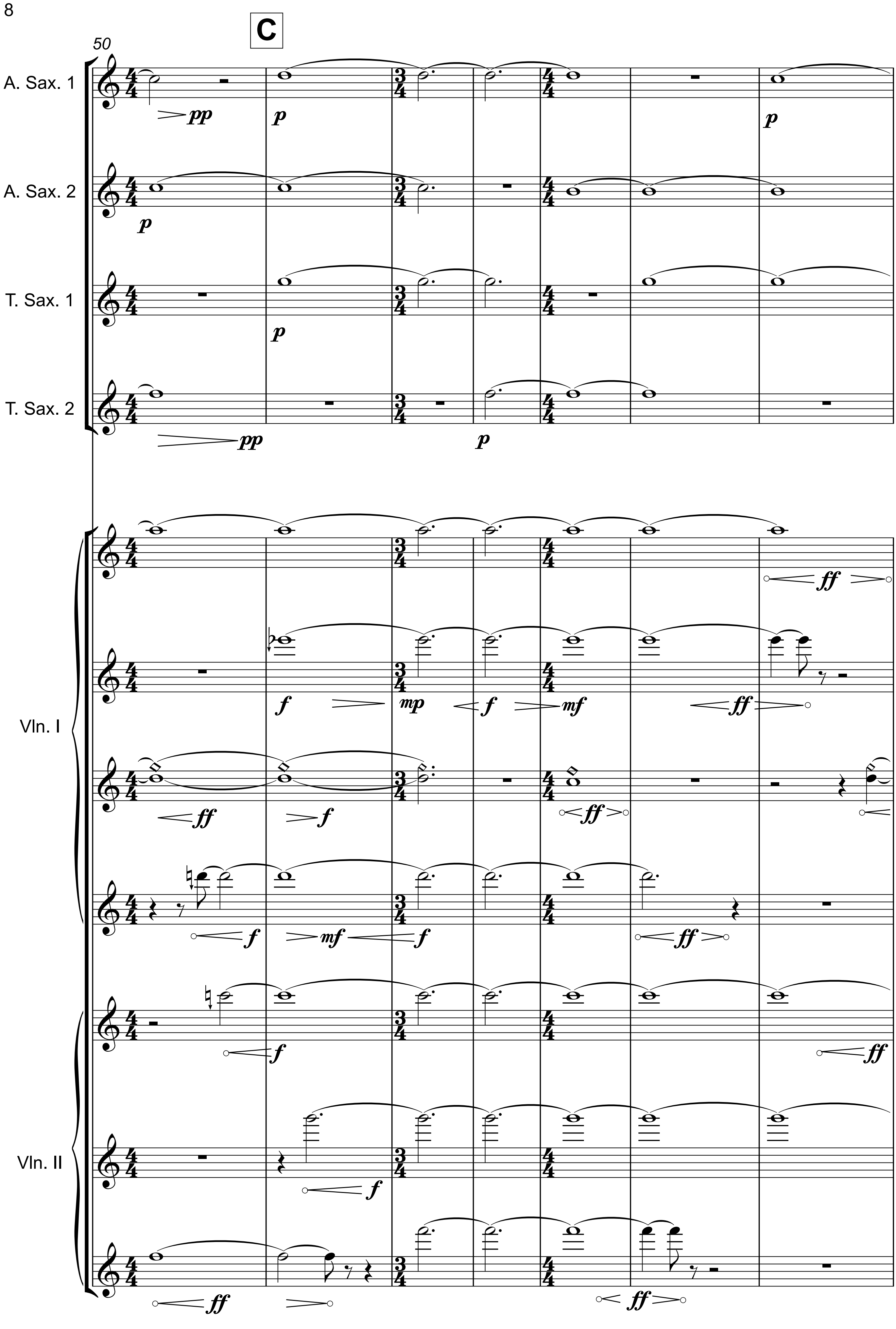

A
17
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
(8)
pp
p
f
ff

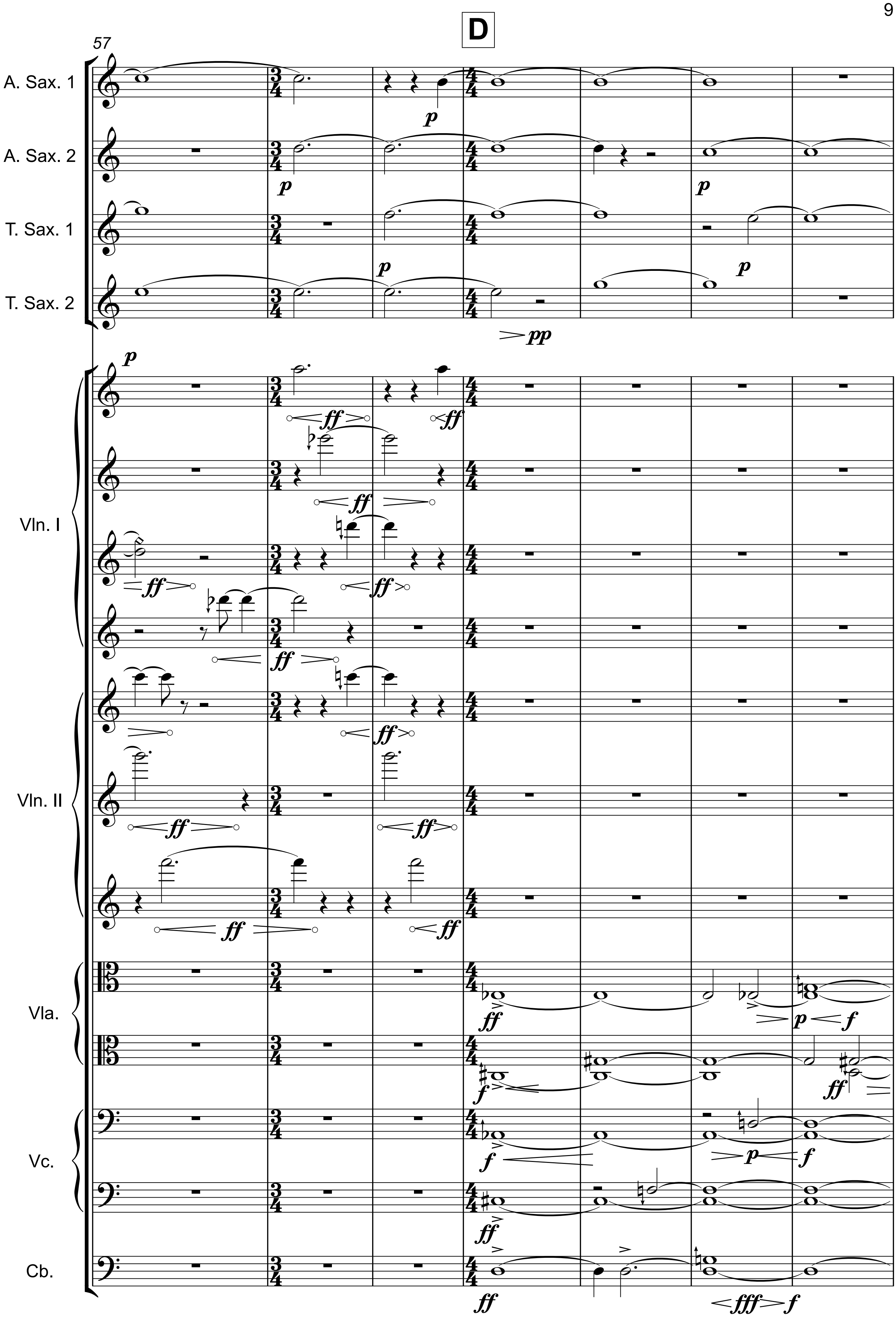

24
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
p
pp
f
mf
ff
8va

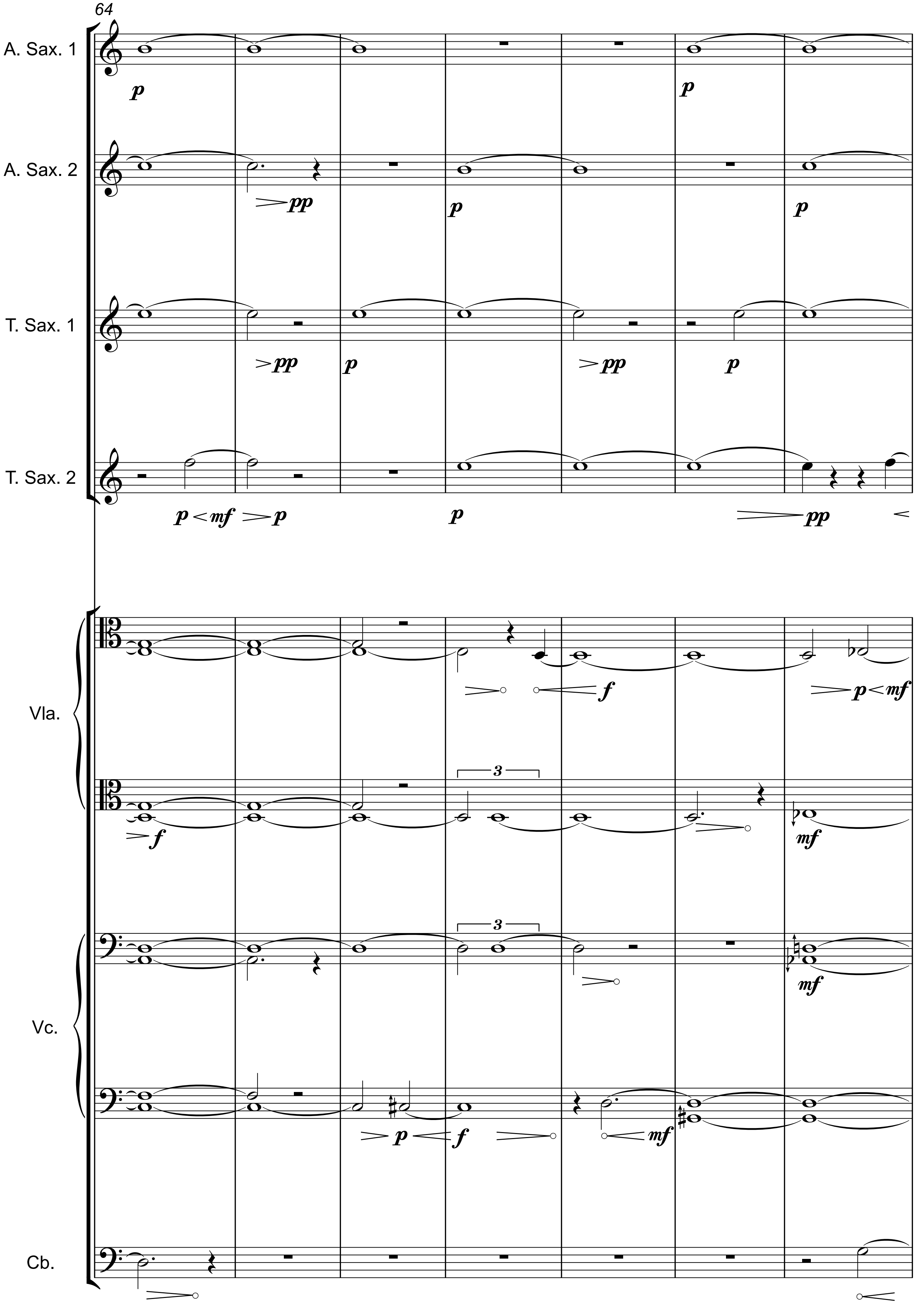

B
31
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
8va
mf
pp
p
ff
f
mp

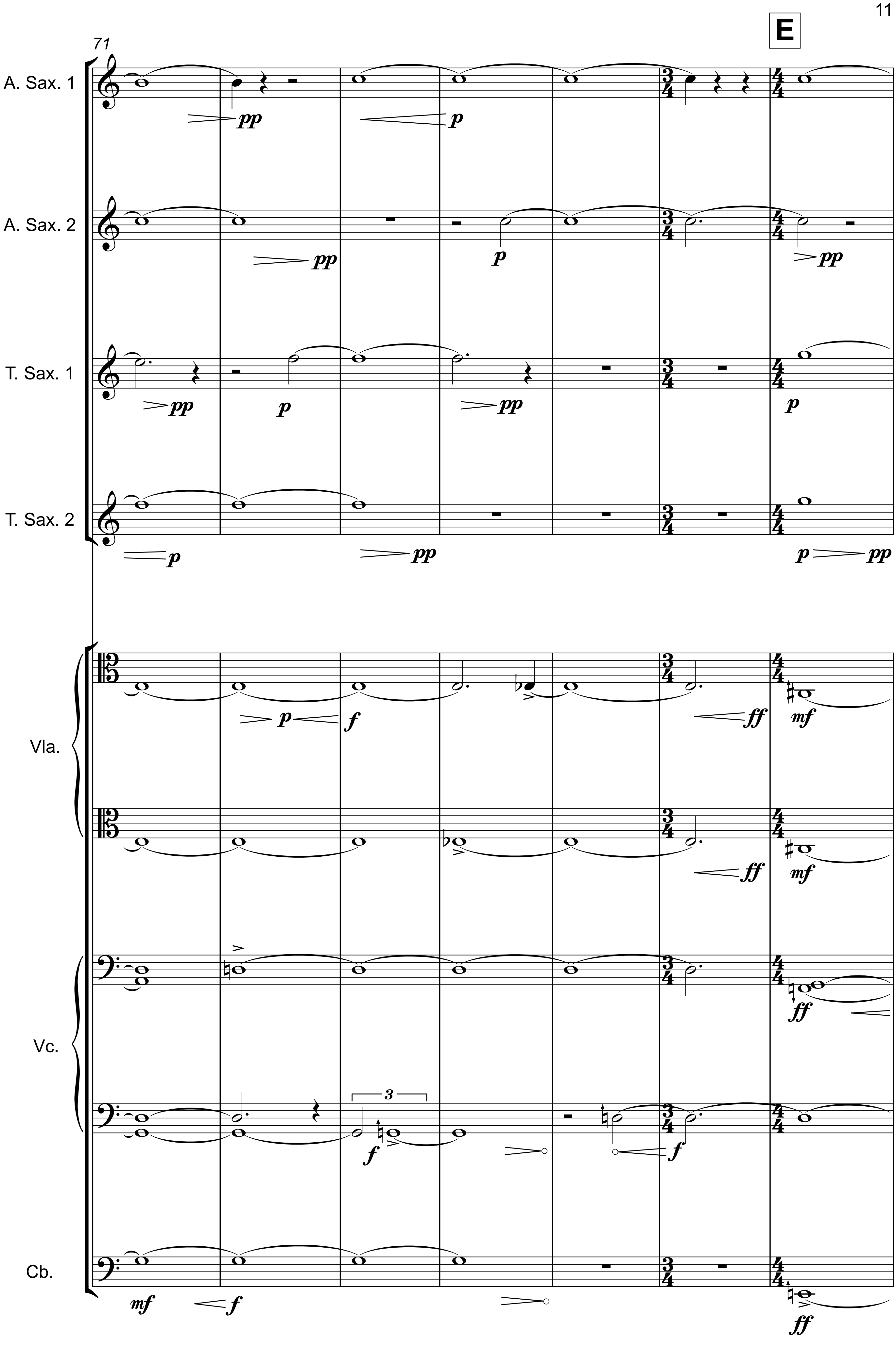

38
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
p
pp
p
pp
pp p
p mp
p
p
mf
f
ff mf
p mf
f
f
f
f
mp
f

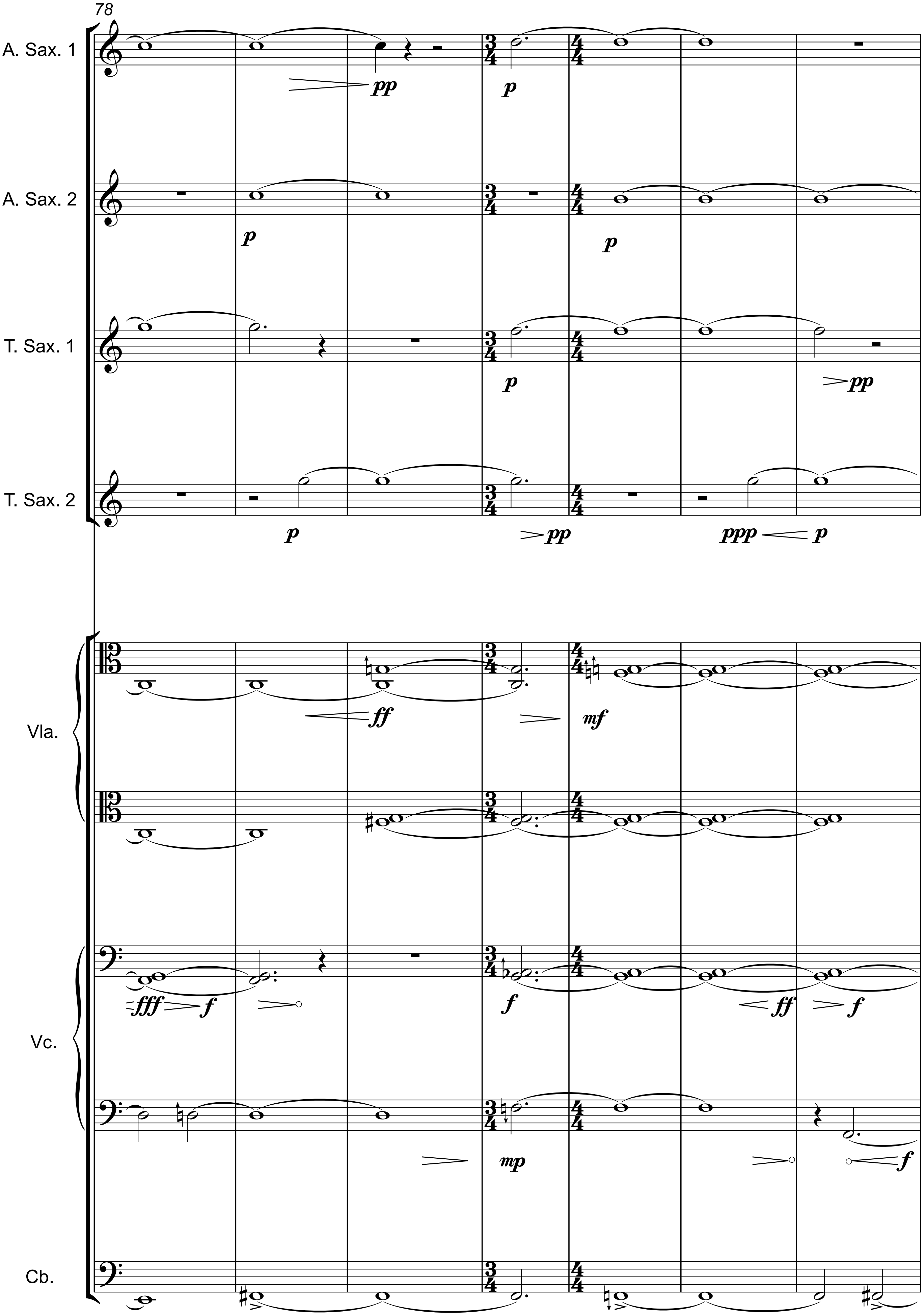

44
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
pp
p
p
pp
p mf p
p pp
p mp pp
p mp p
p
f mf
mf
f
f
ff
f
f
f
ff
f
ff
ff
ff f
f

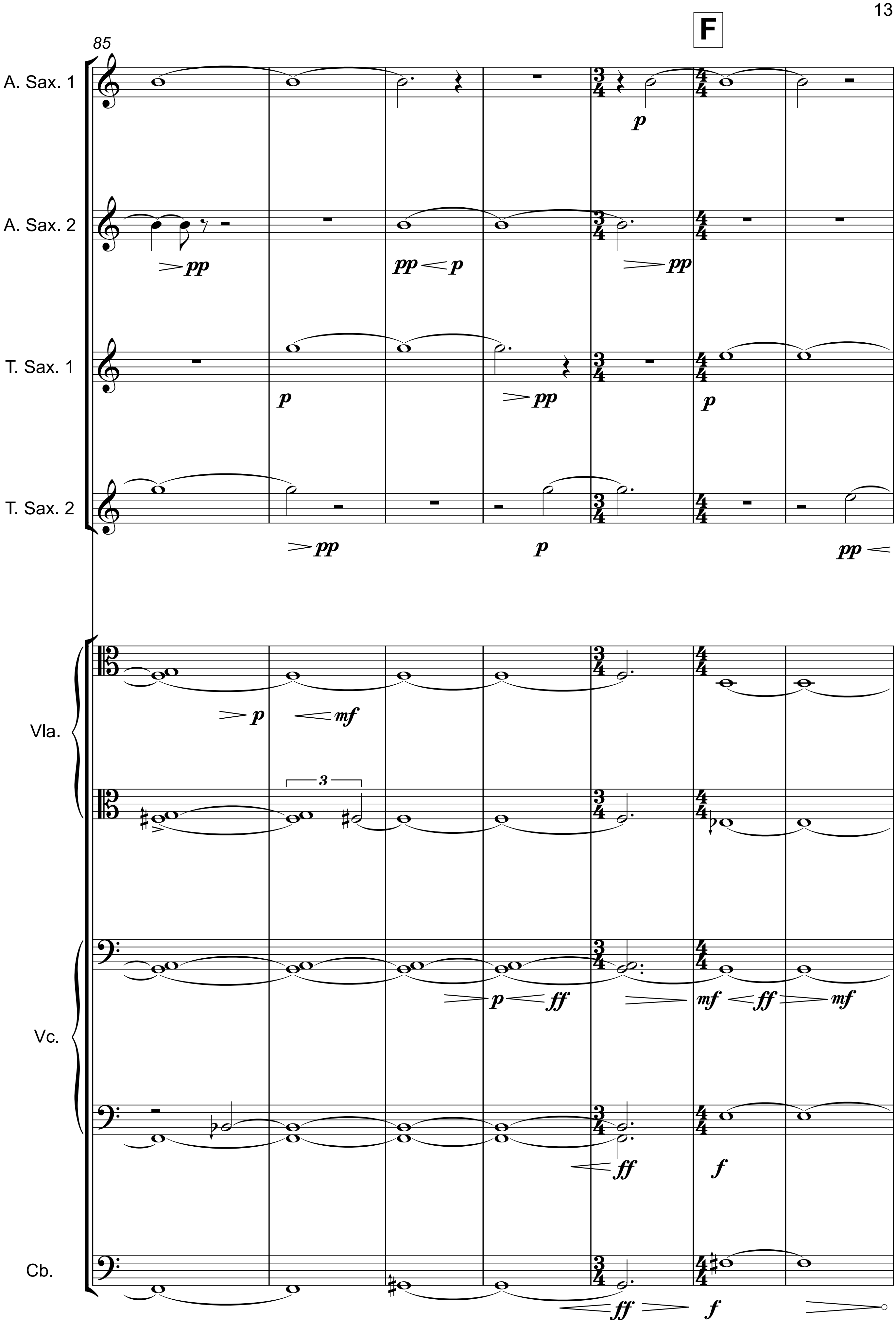

C
50
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
pp
p
mp
mf
f
ff

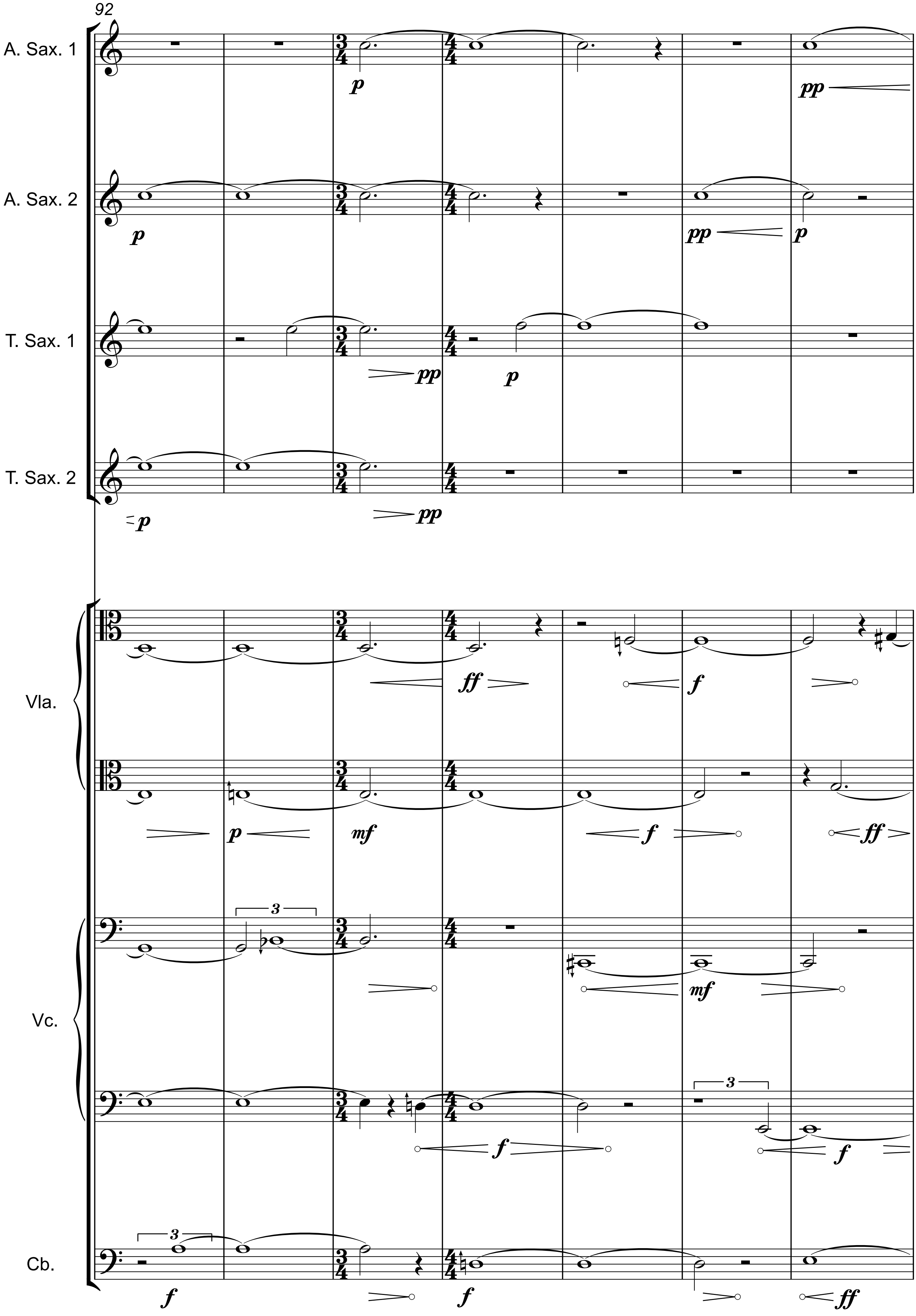

D
57
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
Cb.
p
pp
ff
fff
f

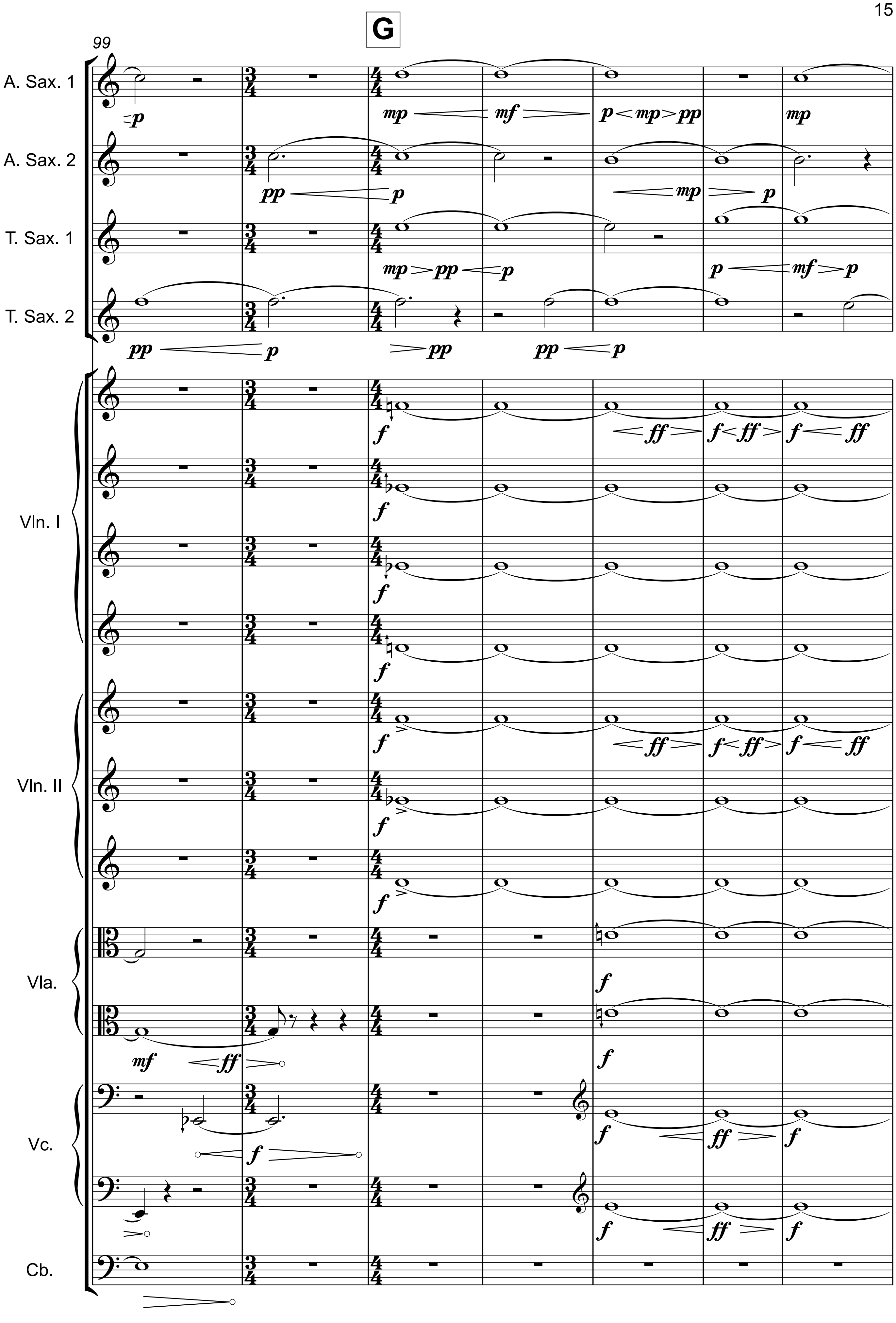

64
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vla.
Vc.
Cb.
p
pp
p < mf
mf
f
3

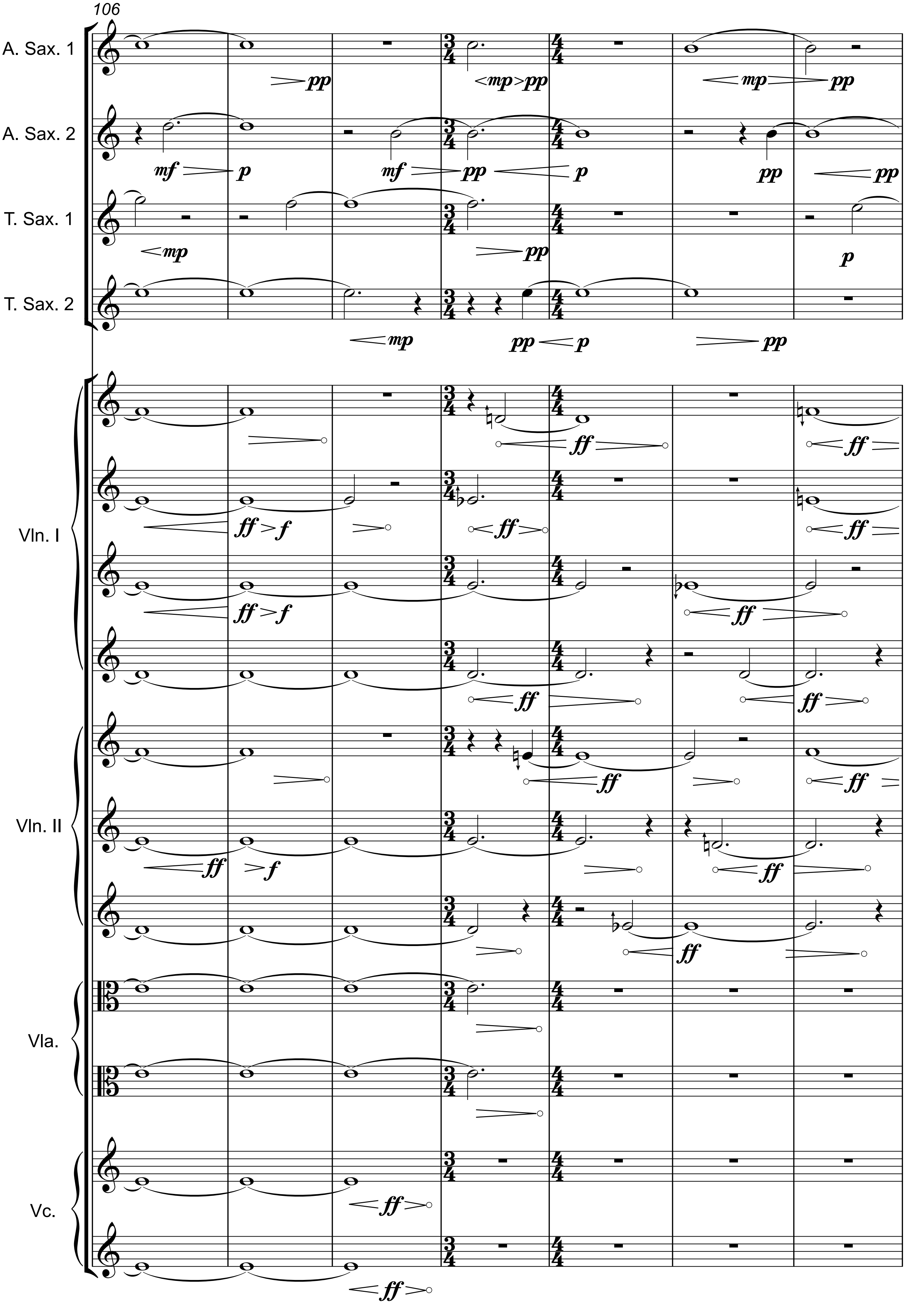

E
71
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vla.
Vc.
Cb.
pp
p
f
ff
mf
3

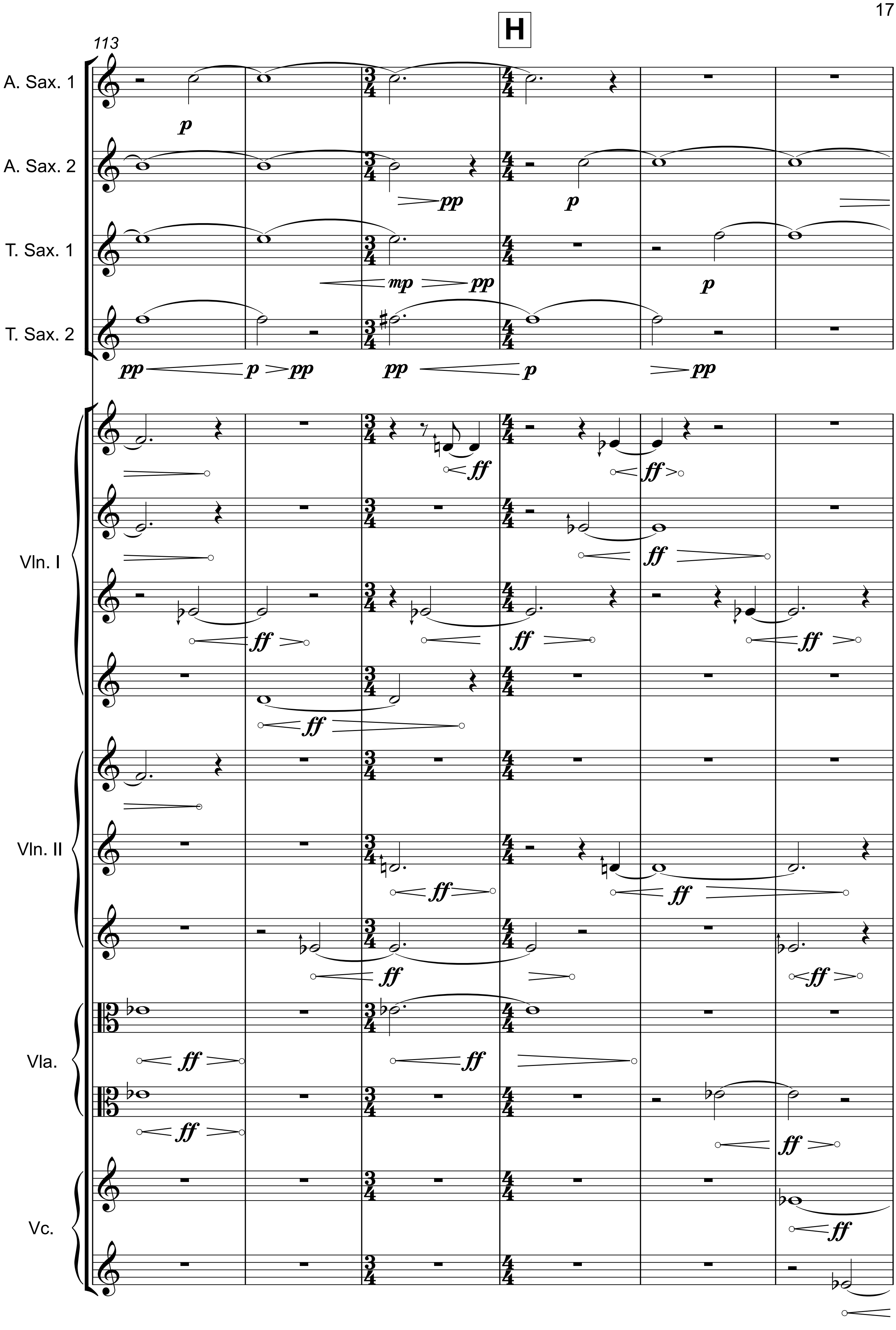

78
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vla.
Vc.
Cb.
pp
p
p
p
p
pp
p
pp
ppp
p
ff
mf
fff
f
f
ff
f
mp
f

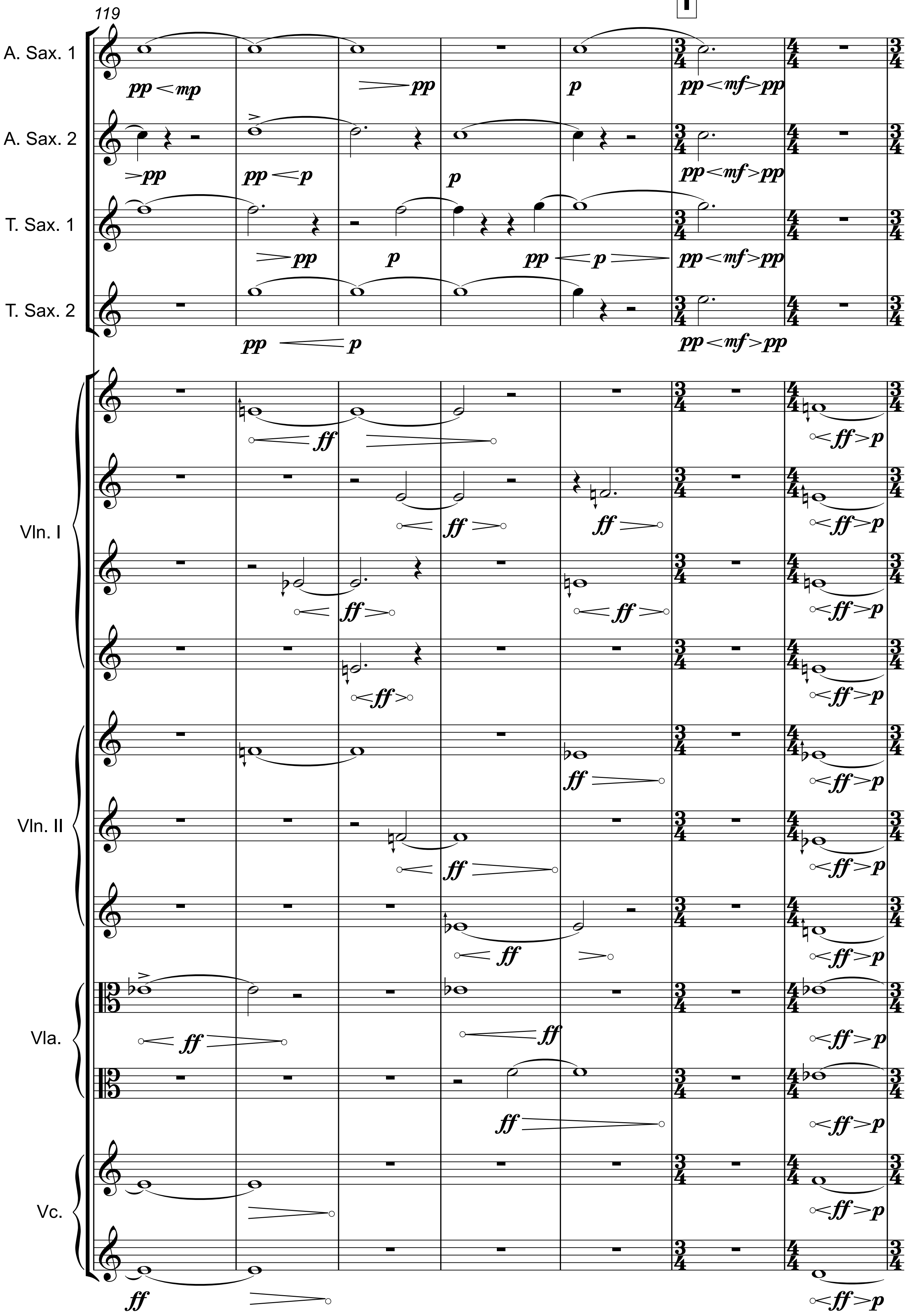

F
85
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vla.
Vc.
Cb.
p
pp
pp p
pp
p
pp
p
pp
p
pp
p mf
3
p ff
mf ff mf
ff
f
ff
f

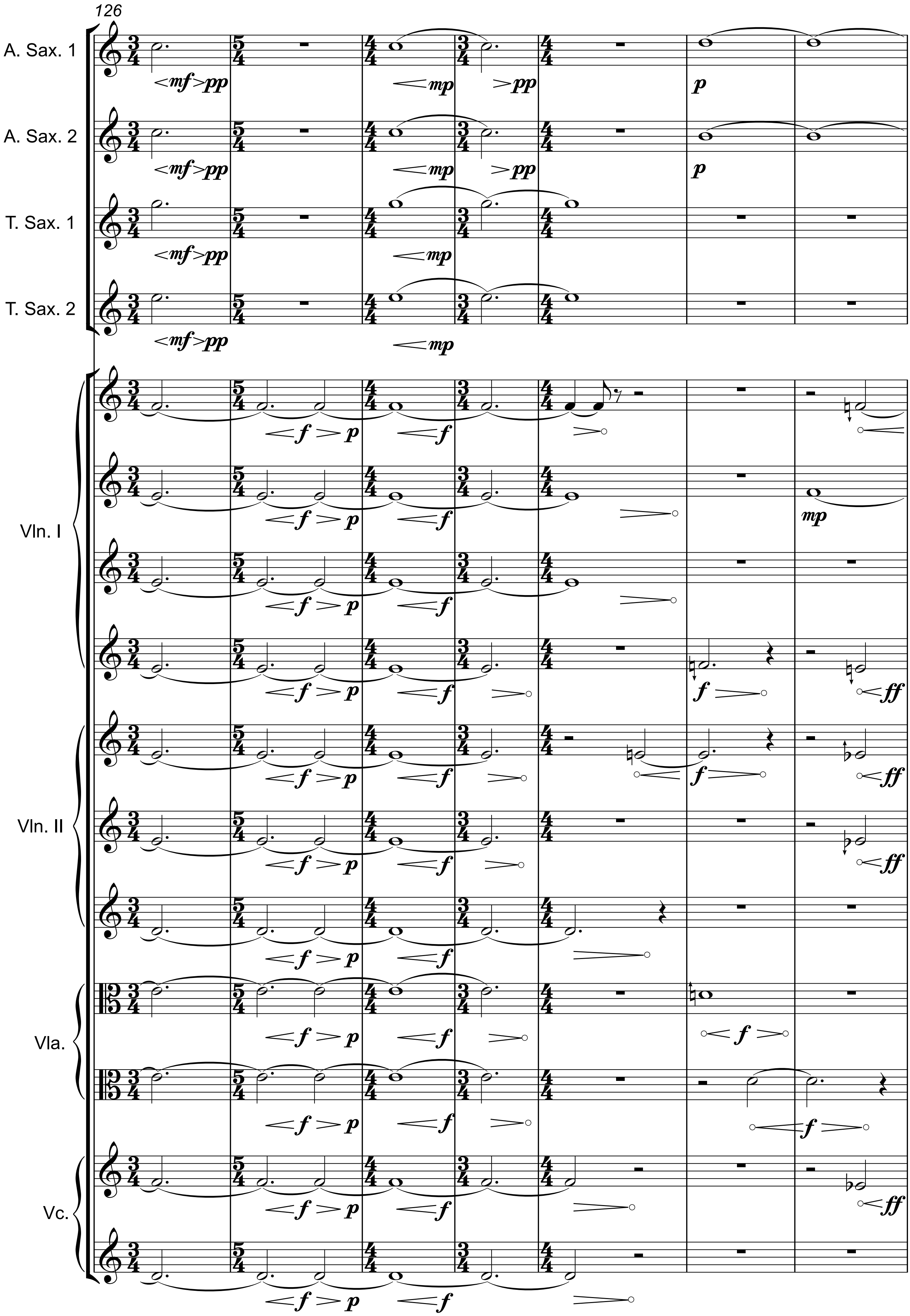

92
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vla.
Vc.
Cb.
p
pp
ff
f
mf
3

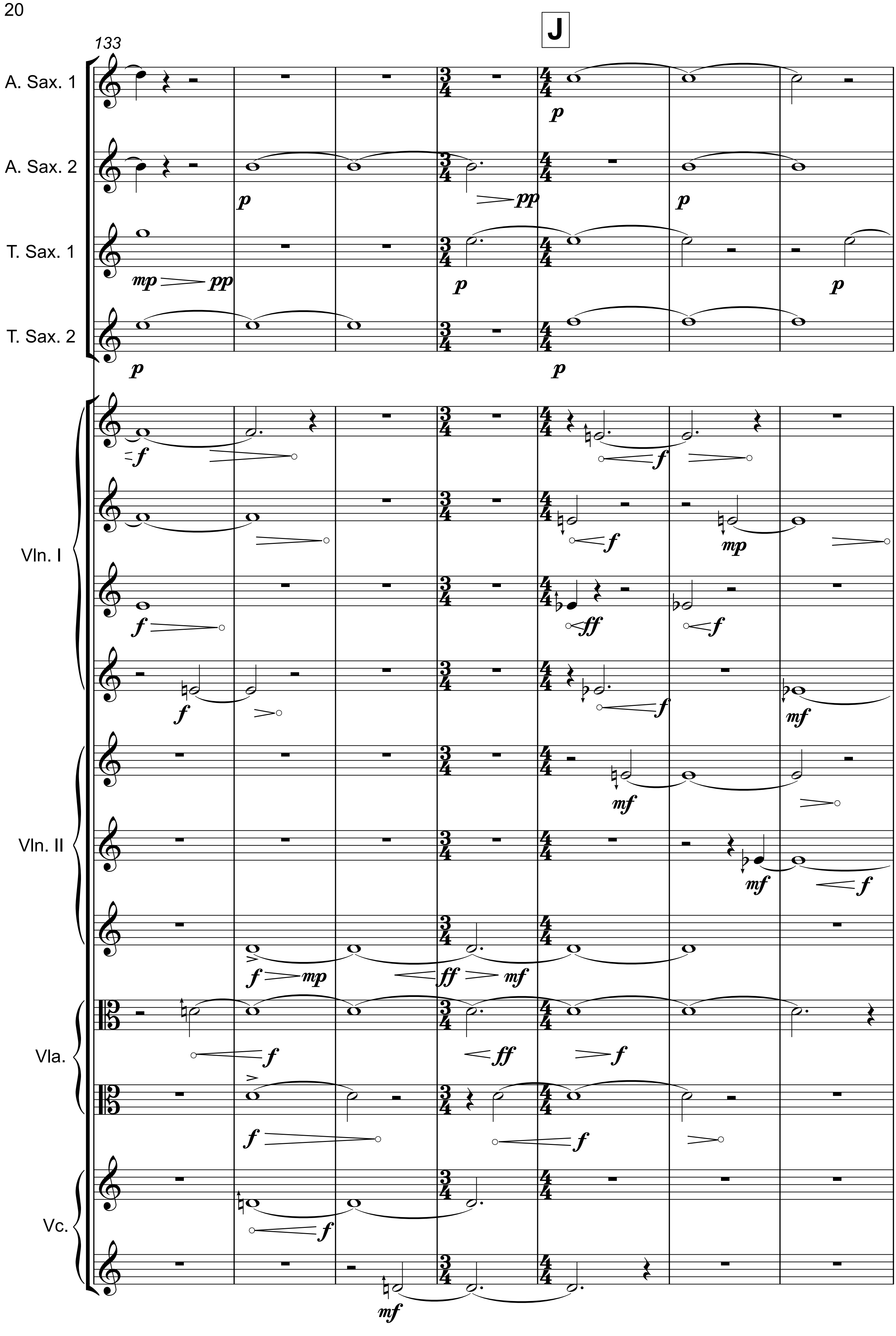

G
99
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
Cb.
p
mp
mf
p
mp
pp
mp
pp
p
mp
p
mp
pp
p
p
mf
p
pp
p
pp
pp
p
f
ff
f
ff
f
ff
f
f
f
f
ff
f
ff
f
ff
f
f
f
f
mf
ff
f
f
f
ff
f
f
ff
f

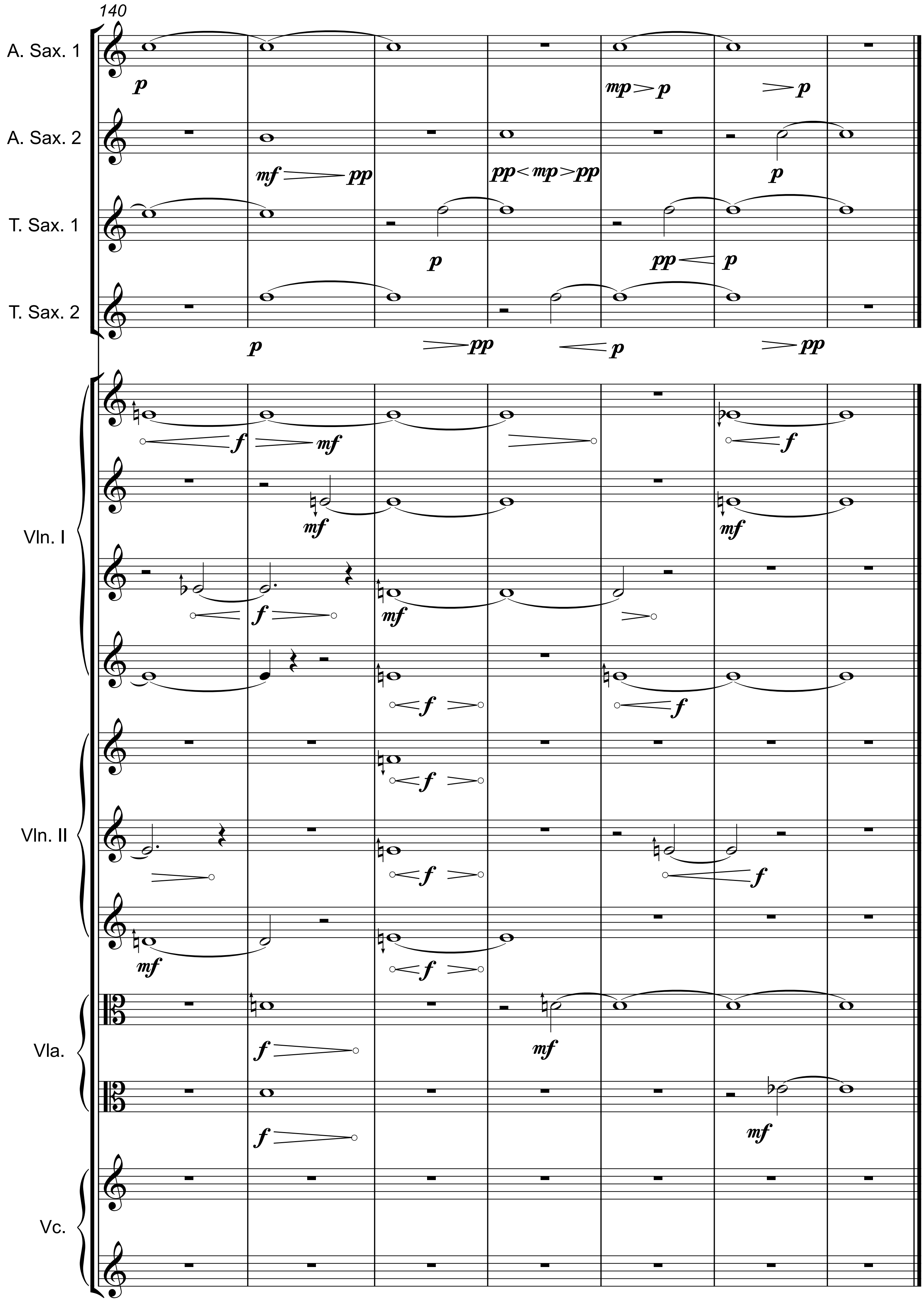

106
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
pp
mp
pp
mp
pp
mf
p
mf
pp
p
pp
pp
mp
pp
p
mp
pp
p
pp
ff
ff
ff
f
ff
ff
f
ff
ff
ff
ff
ff
ff
ff
ff
ff
f
ff
ff
ff


H
113
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
p
pp
mp
ff


119
I
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
pp
mp
p
mf
ff


126
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
mf
pp
mp
p
f
ff


J
133
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
p
pp
mp
mf
f
ff


140
A. Sax. 1
A. Sax. 2
T. Sax. 1
T. Sax. 2
Vln. I
Vln. II
Vla.
Vc.
p
mp > p
> p
mf > pp
pp < mp > pp
p
p
pp < p
p
> pp
< p
> pp
f
mf
mf
f
mf
f
f
f
f
f
mf
f
f
mf
mf

Slide Movement

for trumpet trio

Richard Glover

Slide Movement

for trumpet trio

Richard Glover

Programme note

Three trumpets trace a triangle wave across an augmented fourth; this process is then repeated. Distractor tones are played across the two waves to induce beating patterns.

Slide Movement was written for the Split trumpet trio and premiered on 13 November 2008 in St. Paul's Hall, Huddersfield.

Duration 8'10”

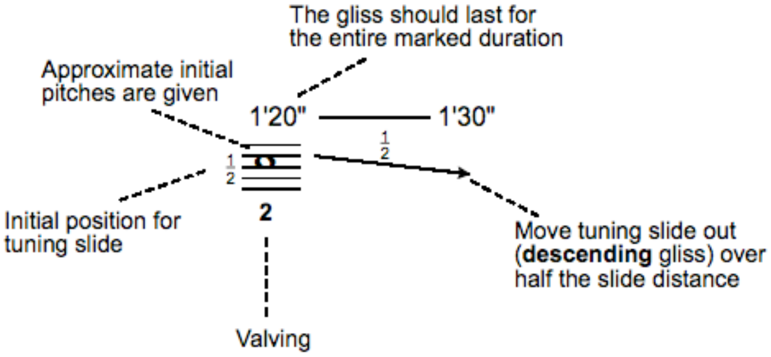
Slide Movement

Performance instructions

Where there is no arrow marked, the pitch remains constant throughout.

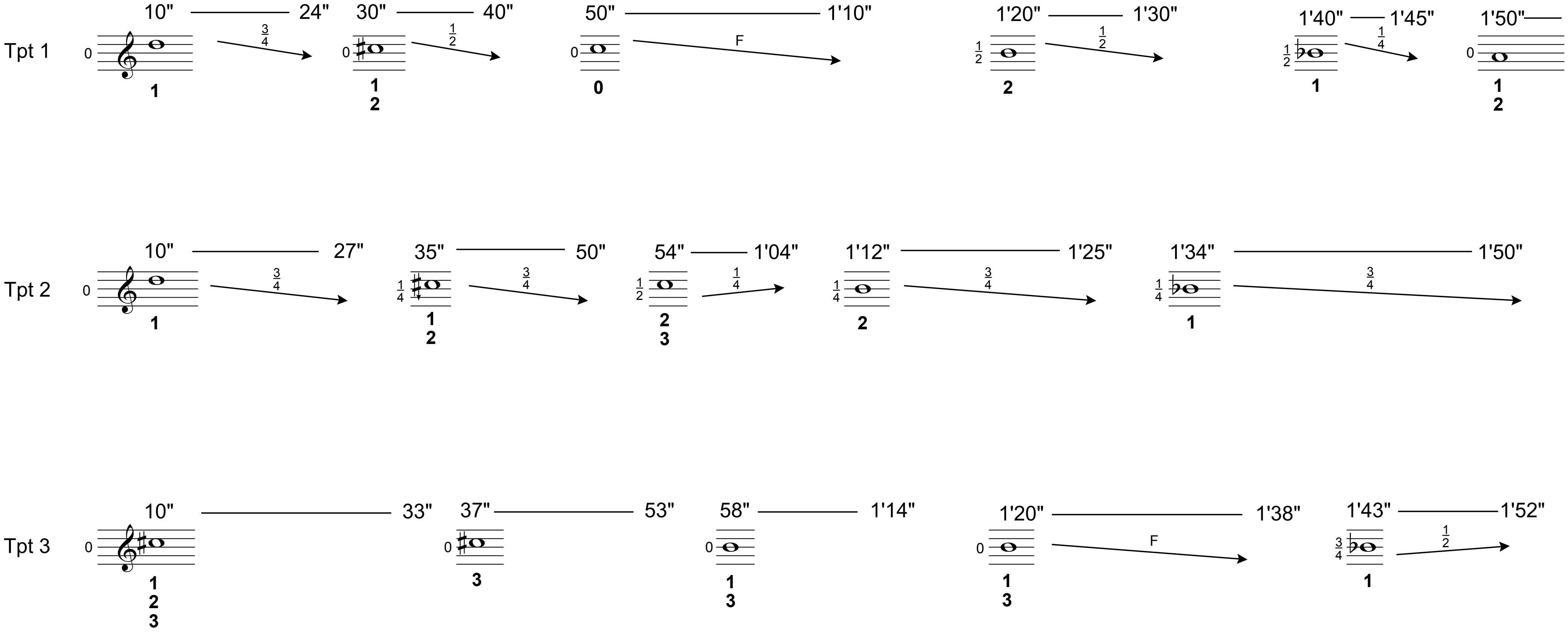
The main tuning slide is divided into five positions, in four equal divisions:
0 – Fully closed
¼ – Extended by a quarter
½ – Extended by a half
¾ – Extended by three quarters
F – Fully extended

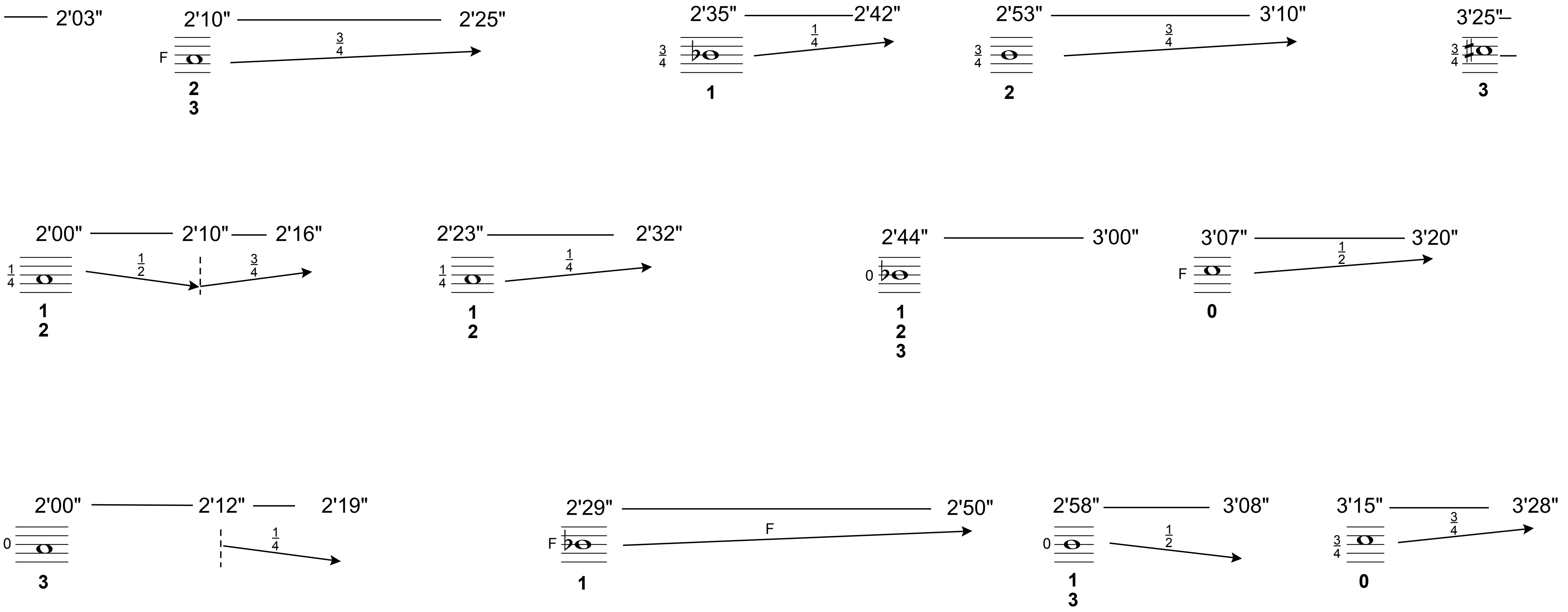
These slide positions are used both as starting points for notes, and amounts that the slide should move through during the note.
Players should all play at an equal dynamics: the ensemble dynamic should be medium soft.
Dynamics should be held constant throughout the duration of each note.
Slide Movement in glissandi should be a controlled as possible, lasting throughout the note,
Where glissandi are absent, players should aim to hold a constant pitch throughout the duration of the note.
Descending glissandi, represented by downward arrows, indicate that the tuning slide should be extended. The reverse is true for ascending glissandi.
No vibrato.

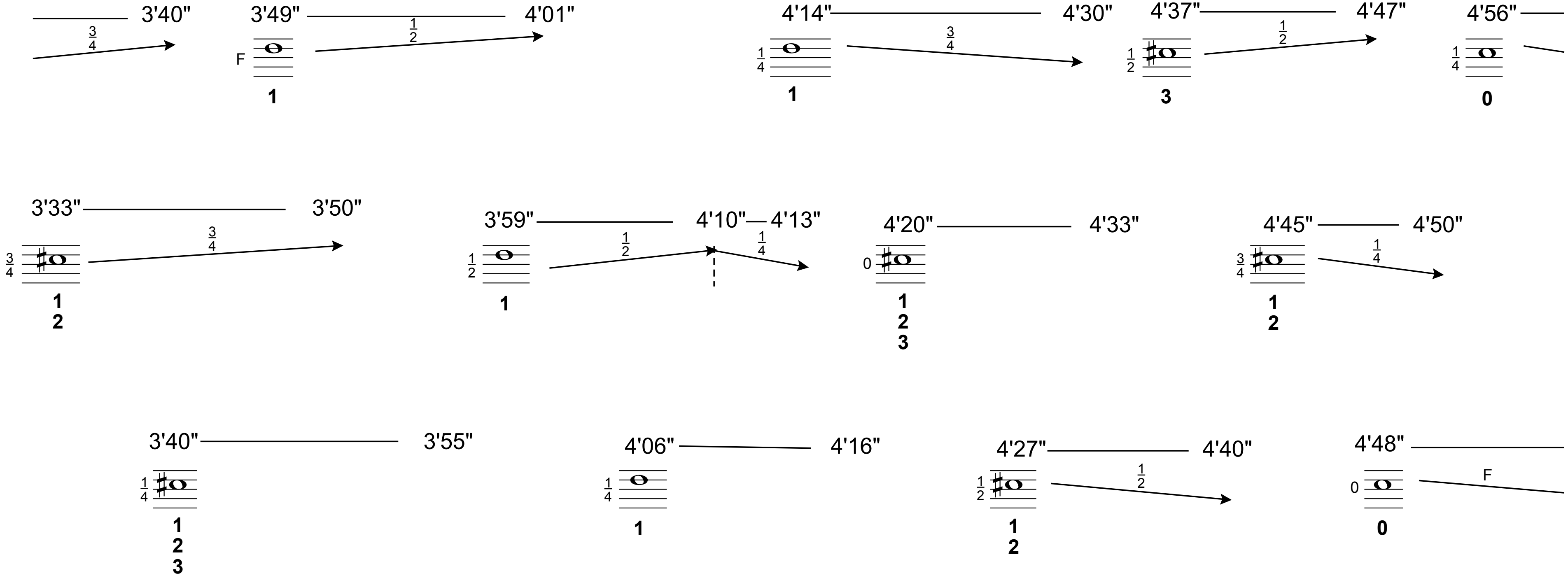

The gliss should last for the entire marked duration
Approximate initial pitches are given
1'20"
1'30"
$\frac{1}{2}$
$\frac{1}{2}$
2
Initial position for tuning slide
Move tuning slide out (**descending** gliss) over half the slide distance
Valving

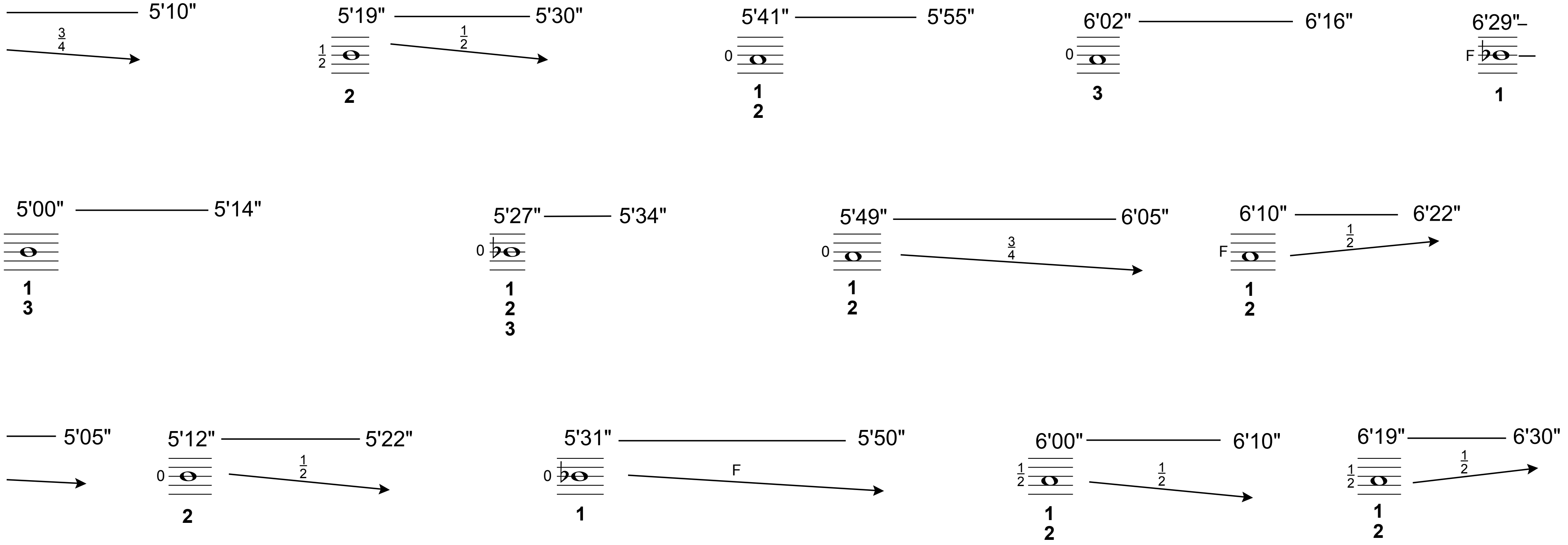
Slide Movement

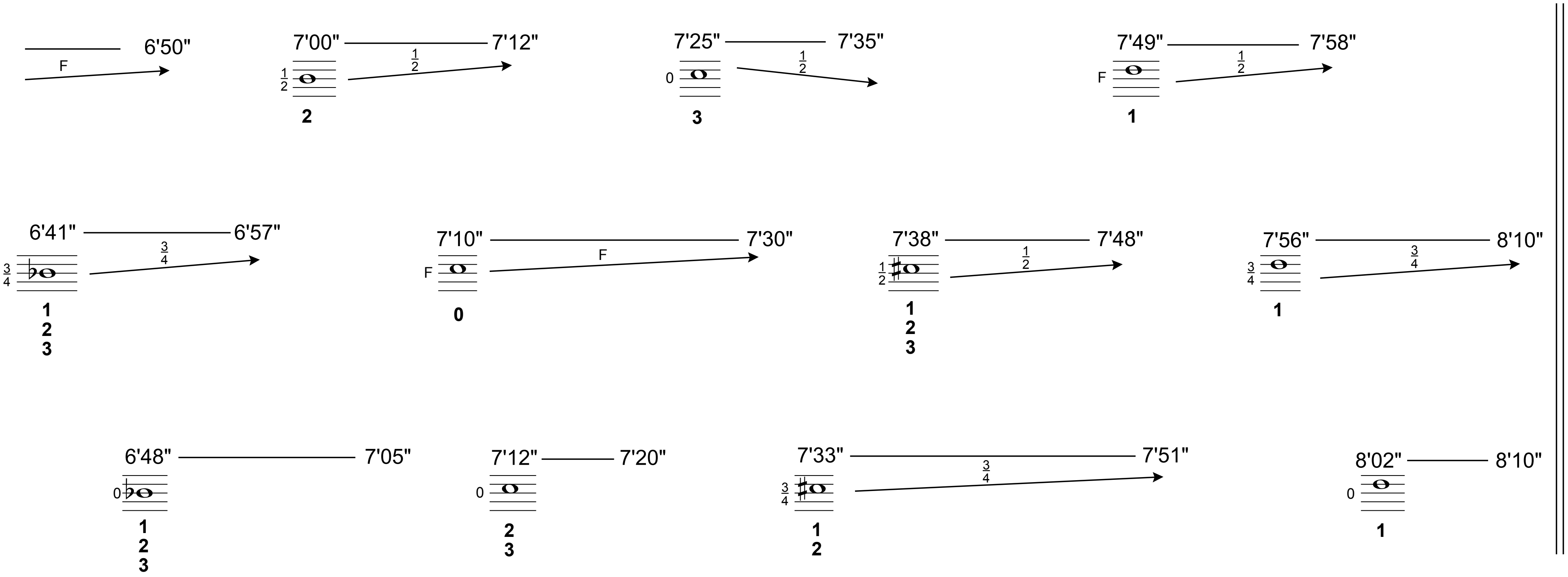
Richard Glover


Tpt 1
10" 24" 30" 40" 50" 1'10" 1'20" 1'30" 1'40" 1'45" 1'50"
0 1 3/4
0 1 2 1/2
0 0 F
1/2 2 1/2
1/2 1 1/4
0 1 2
Tpt 2
10" 27" 35" 50" 54" 1'04" 1'12" 1'25" 1'34" 1'50"
0 1 3/4
1/4 1 2 3/4
1/2 2 3 1/4
1/4 2 3/4
1/4 1 3/4
Tpt 3
10" 33" 37" 53" 58" 1'14" 1'20" 1'38" 1'43" 1'52"
0 1 2 3
0 3
0 1 3
0 1 3 F
3/4 1 1/2


2'03"
2'10"
2'25"
F
3/4
2
3
2'35"
2'42"
3/4
1/4
1
2'53"
3'10"
3/4
3/4
2
3'25"
3/4
3
2'00"
2'10"
2'16"
1/4
1/2
3/4
1
2
2'23"
2'32"
1/4
1/4
1
2
2'44"
3'00"
0
1
2
3
3'07"
3'20"
F
1/2
0
2'00"
2'12"
2'19"
0
1/4
3
2'29"
2'50"
F
F
1
2'58"
3'08"
0
1/2
1
3
3'15"
3'28"
3/4
3/4
0


3'40"
3/4
3'49"
4'01"
1/2
F
1
4'14"
4'30"
1/4
3/4
1
4'37"
4'47"
1/2
1/2
3
4'56"
1/4
0
3'33"
3'50"
3/4
3/4
1
2
3'59"
4'10"
4'13"
1/2
1/2
1/4
1
4'20"
4'33"
0
1
2
3
4'45"
4'50"
3/4
1/4
1
2
3'40"
3'55"
1/4
1
2
3
4'06"
4'16"
1/4
1
4'27"
4'40"
1/2
1/2
1
2
4'48"
0
F
0


5'10"
3/4
5'19"
5'30"
1/2
1/2
2
5'41"
5'55"
0
1
2
6'02"
6'16"
0
3
6'29"
F
1
5'00"
5'14"
0
1
3
5'27"
5'34"
0
1
2
3
5'49"
6'05"
0
3/4
1
2
6'10"
6'22"
F
1/2
1
2
5'05"
5'12"
5'22"
0
1/2
2
5'31"
5'50"
0
F
1
6'00"
6'10"
1/2
1/2
1
2
6'19"
6'30"
1/2
1/2
1
2


F
6'50"
7'00"
1/2
7'12"
1/2
2
7'25"
7'35"
0
1/2
3
7'49"
7'58"
F
1/2
1
6'41"
6'57"
3/4
3/4
1
2
3
7'10"
7'30"
F
F
0
7'38"
7'48"
1/2
1/2
1
2
3
7'56"
8'10"
3/4
3/4
1
6'48"
7'05"
0
1
2
3
7'12"
7'20"
0
2
3
7'33"
7'51"
3/4
3/4
1
2
8'02"
8'10"
0
1

Sonotron

for four pianos

Richard Glover

Sonotron

for four pianos

Richard Glover

Programme note

Making use of the sympathetic vibrations attainable within pianos, *Sonotron* is constructed from a single tone catapulted around a circle of pianos at speeds which are constantly in transition. A logarithmic cellular pattern controls the acceleration and the consequent mirrored deceleration so that only one rhythmic construct exists throughout the composition, repeated three times. As the piece progresses, more tones are included into the whirling pattern creating every changing resonances within the overall texture.

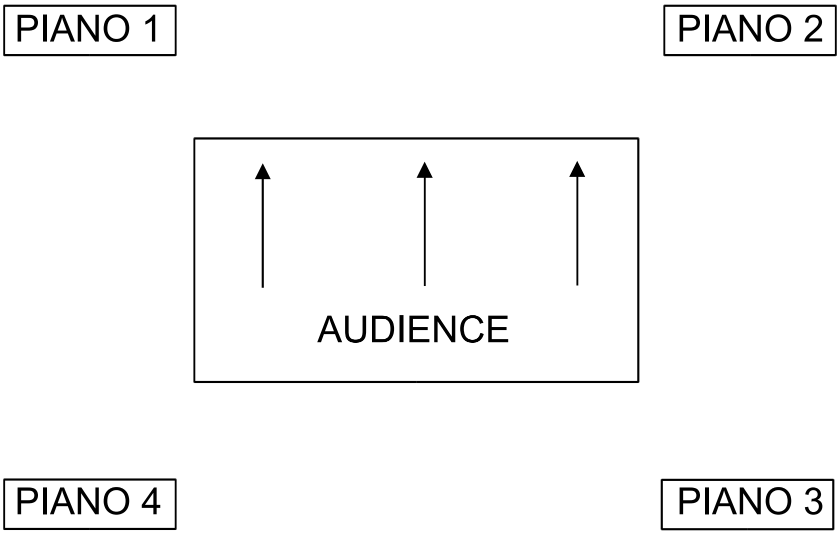
Sonotron was commissioned by spnm and fuseLeeds06 for performance as part of Rolf Hind's artistic season 2005/06. The piece was premiered on 7 May 2006 at the Corn Exchange, Leeds, by Rolf Hind, Sarah Nicholls, Daniel Becker and Andrew Ball

Duration c. 3'30”

Sonotron

Performance instructions

Stage arrangement:

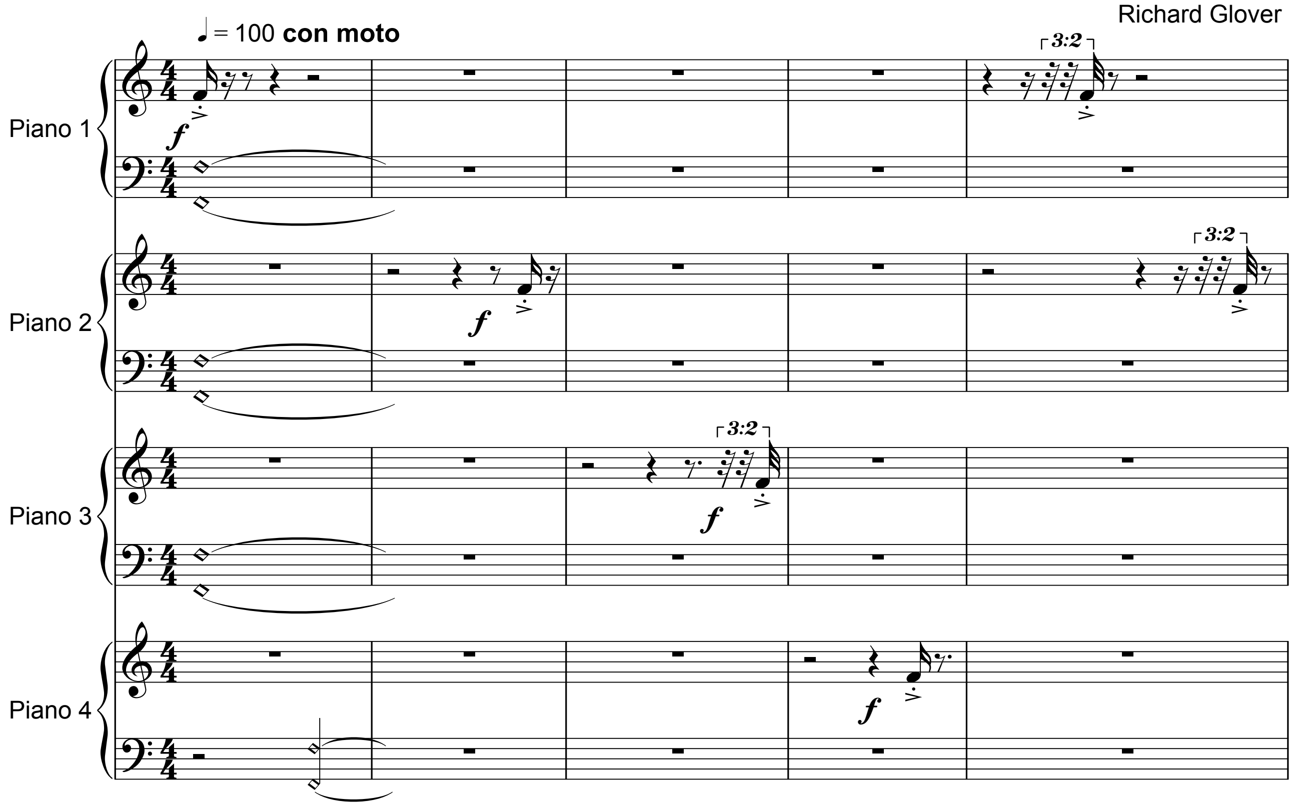


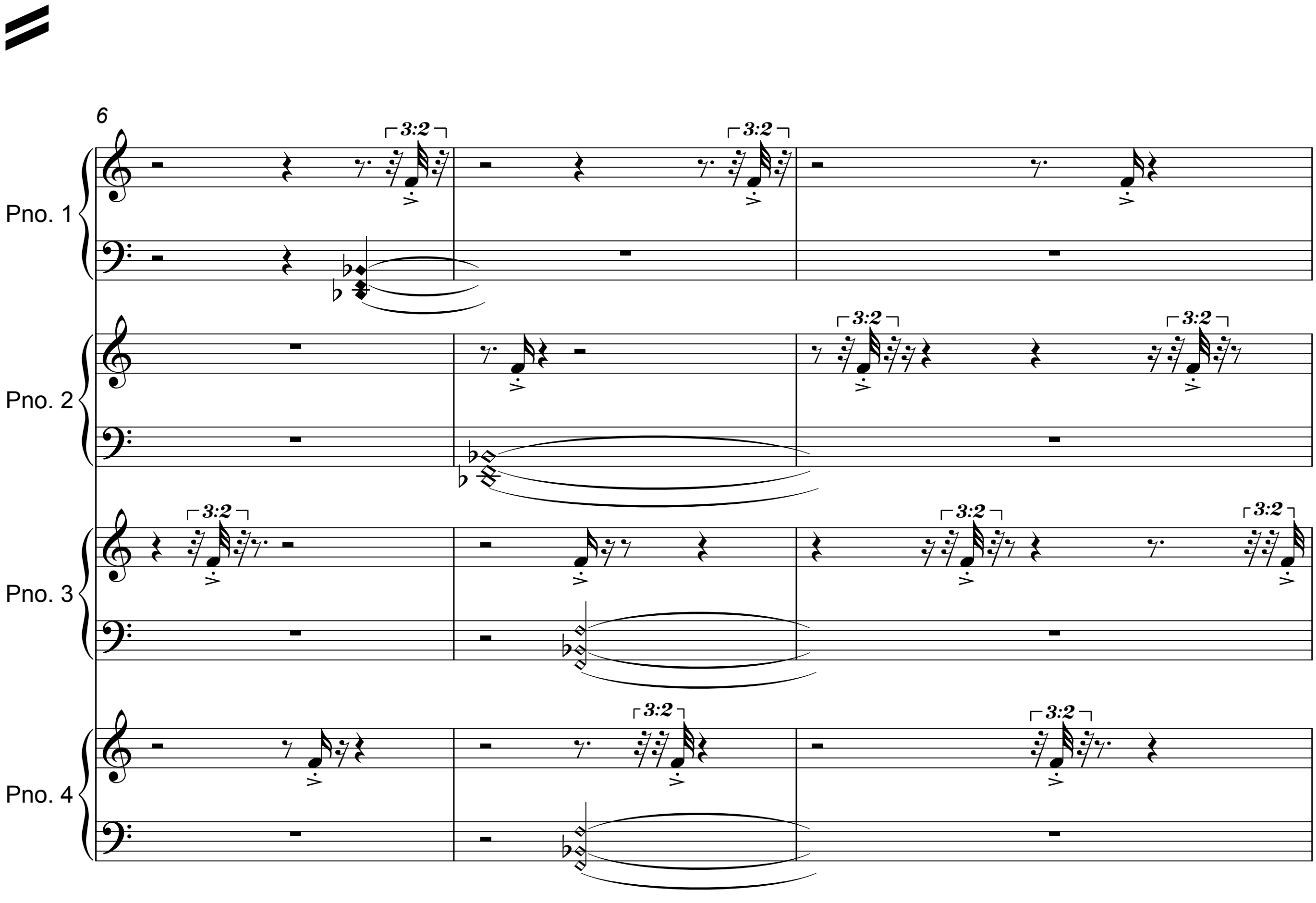
The four pianos should be arranged in such a way that they circle the audience, so that the one-note pattern can be heard revolving around the listener. The pianos should be arranged from 1 to 4 in a clockwise fashion, although it does not matter whether there are two pianos at the front and two at the back (as shown above), or one piano is at the front, two at the sides and one at the back, or other similar arrangements.

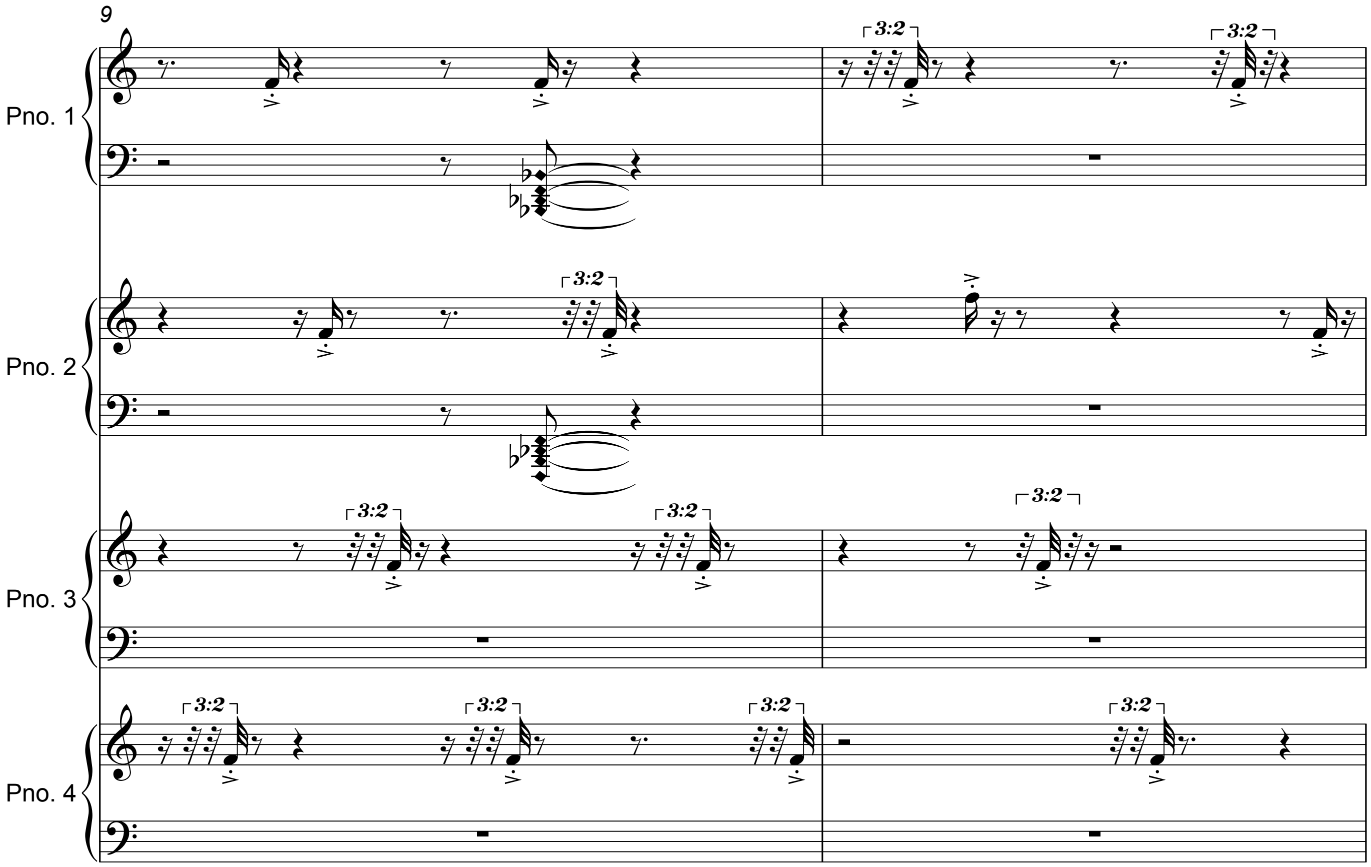
Lids and front of pianos should be removed where possible.
Dynamic levels should be kept consistent throughout the piece.
Pedals should not be used in the performance.
A diamond notehead indicates that a key should be silently depressed. It should be held down until the next note or chord in that hand. The silent keys should be depressed slightly before the beat s that the sympathetic vibrations sound fully when the non-silent note is struck.

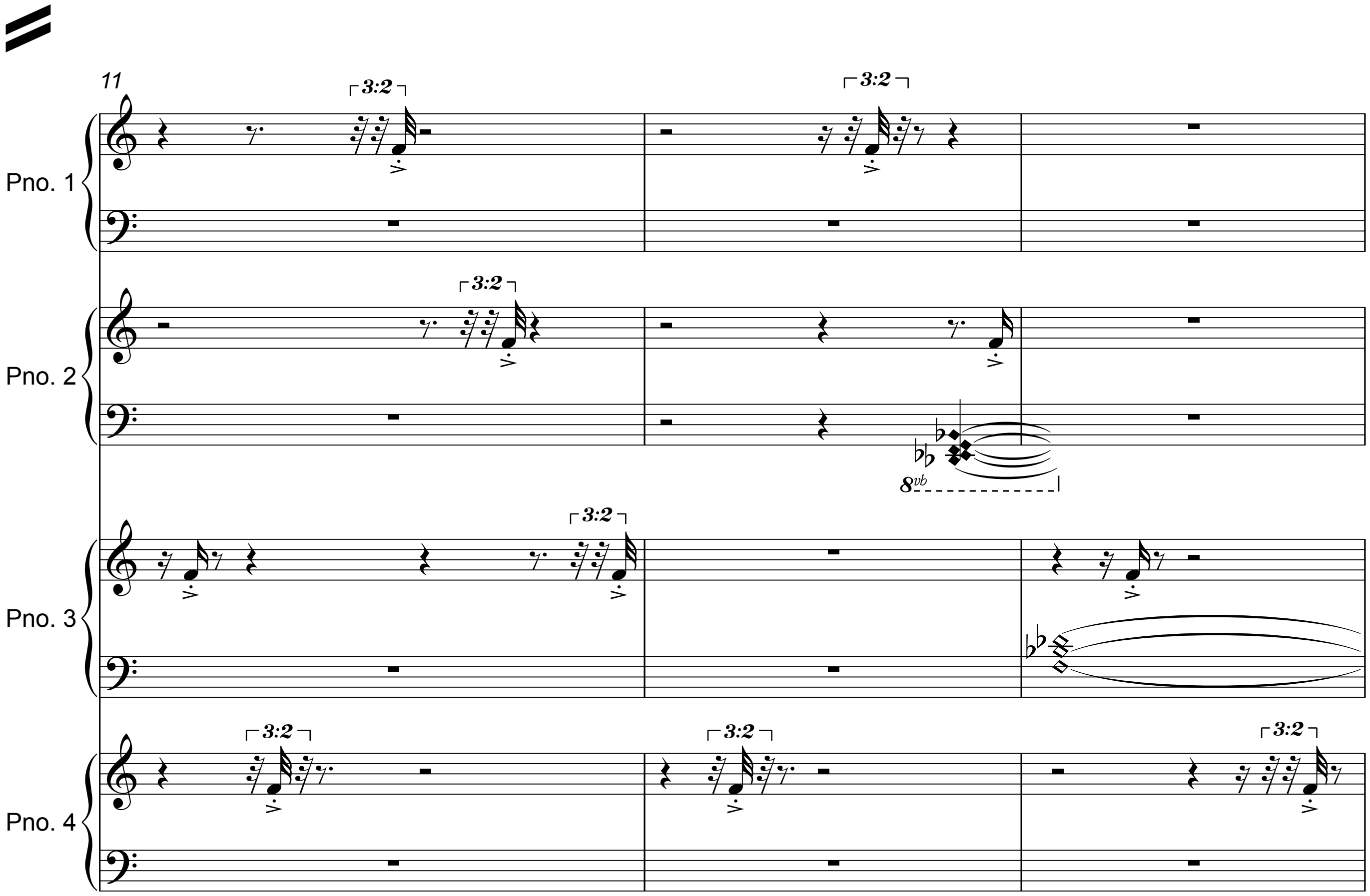
Sonotron

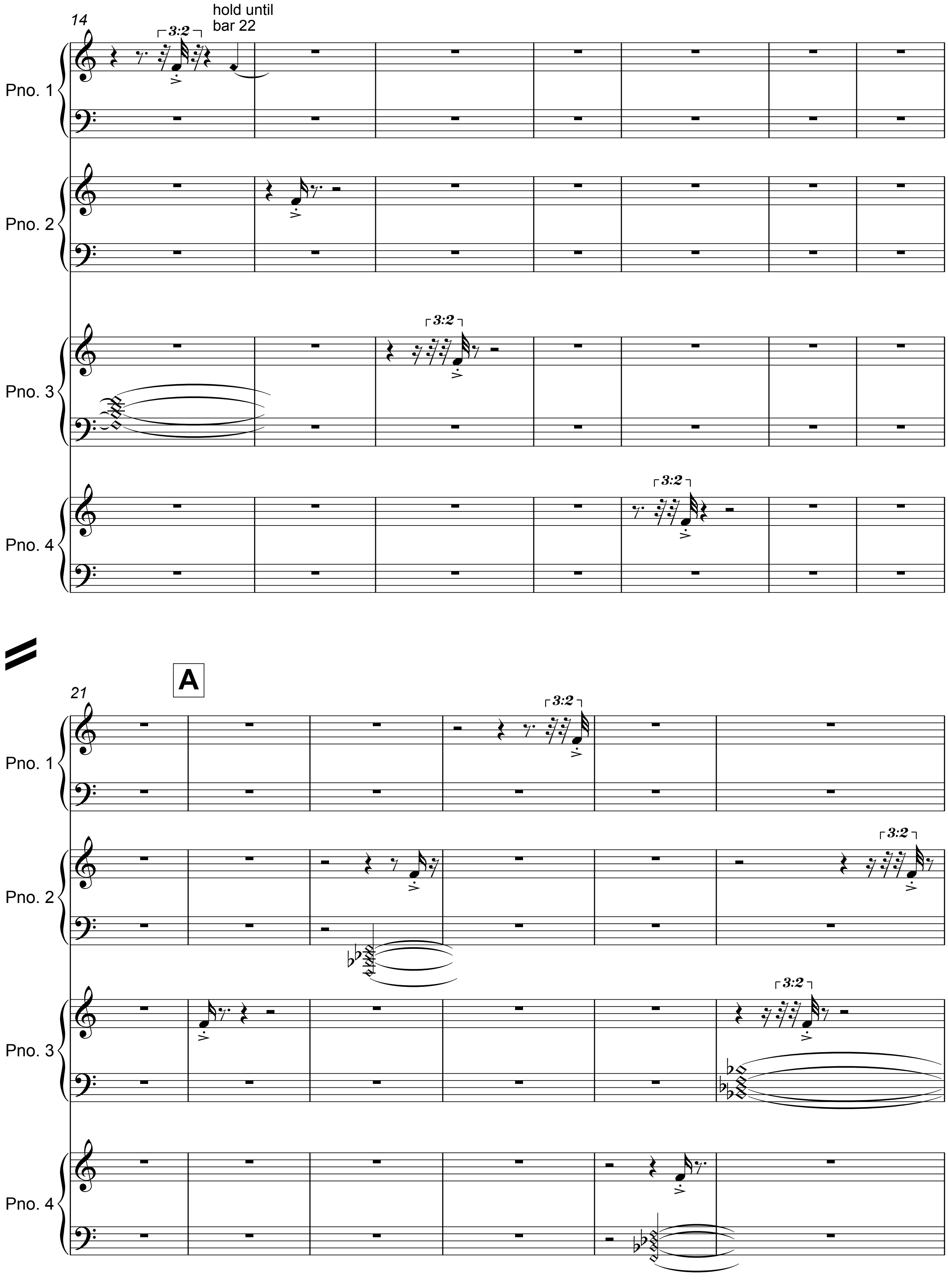
Richard Glover

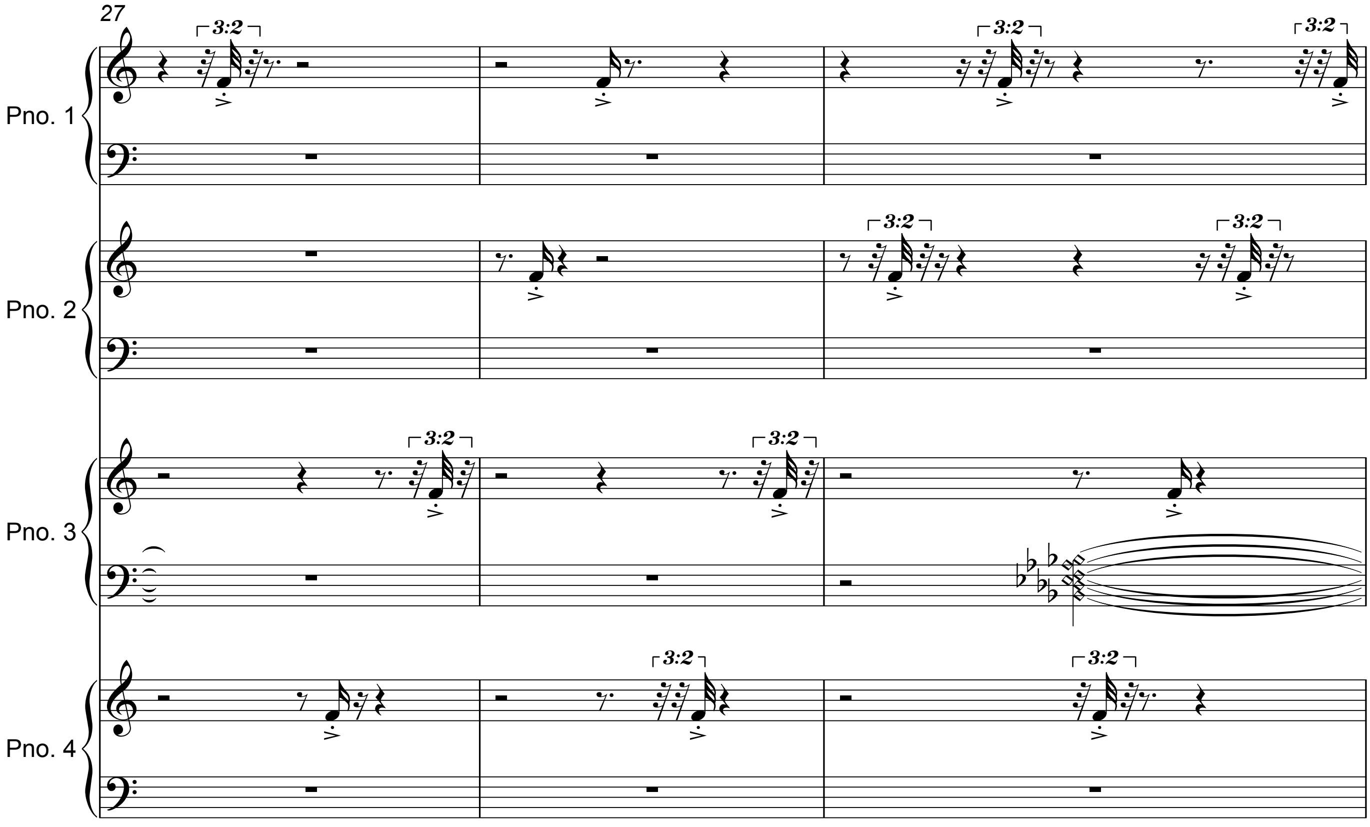

♩ = 100 con moto
Piano 1
Piano 2
Piano 3
Piano 4
3:2
f

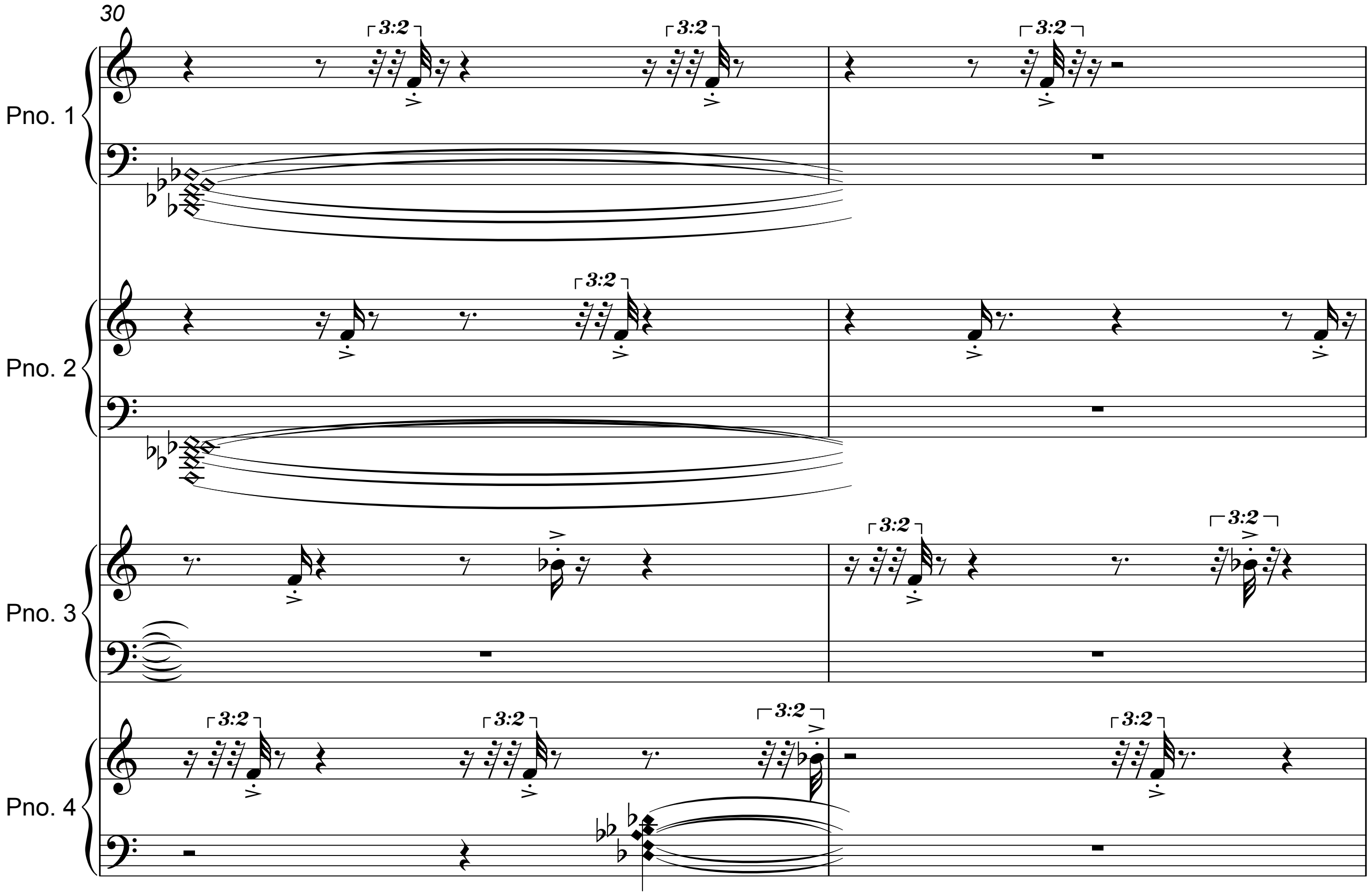

6
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2

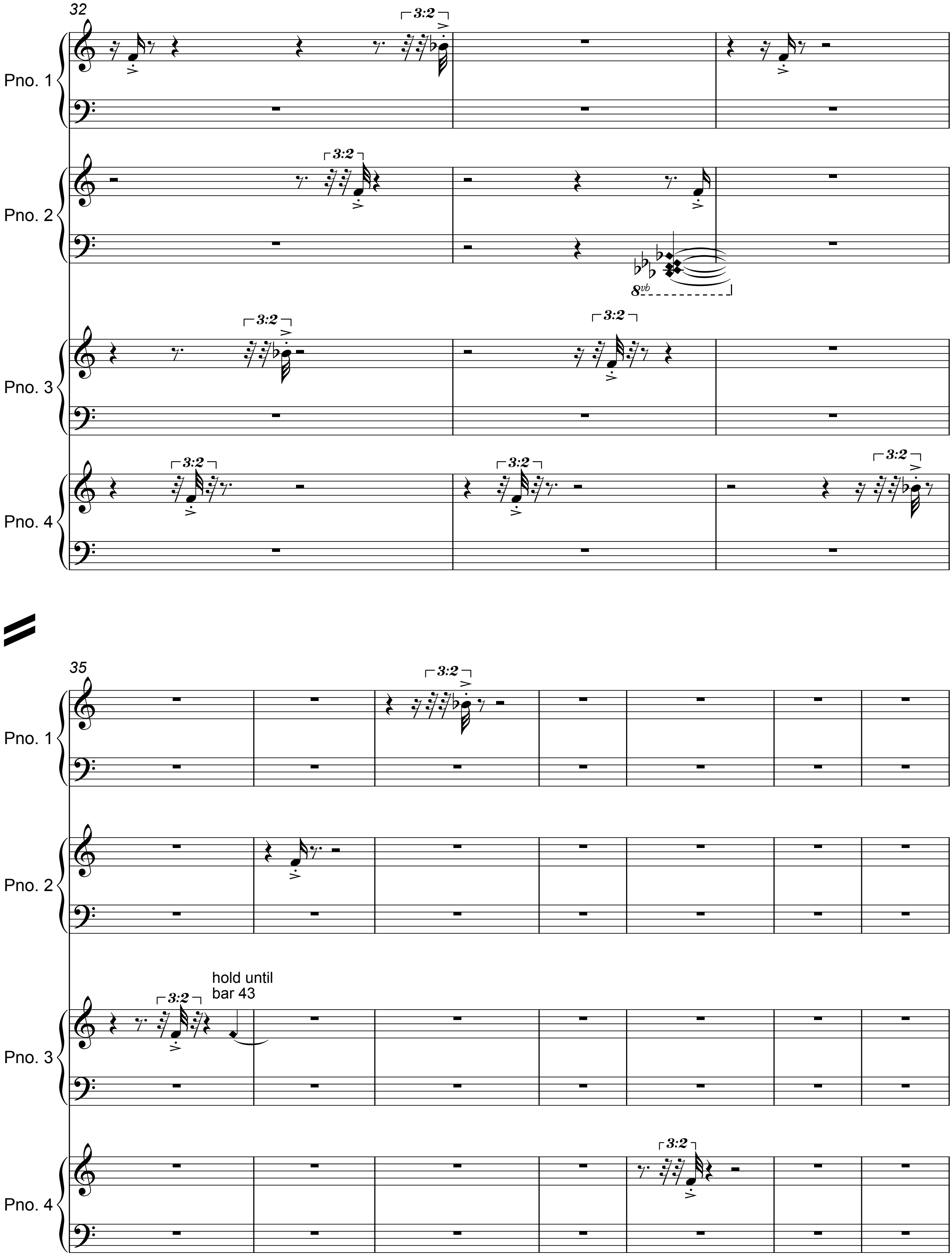

9
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2

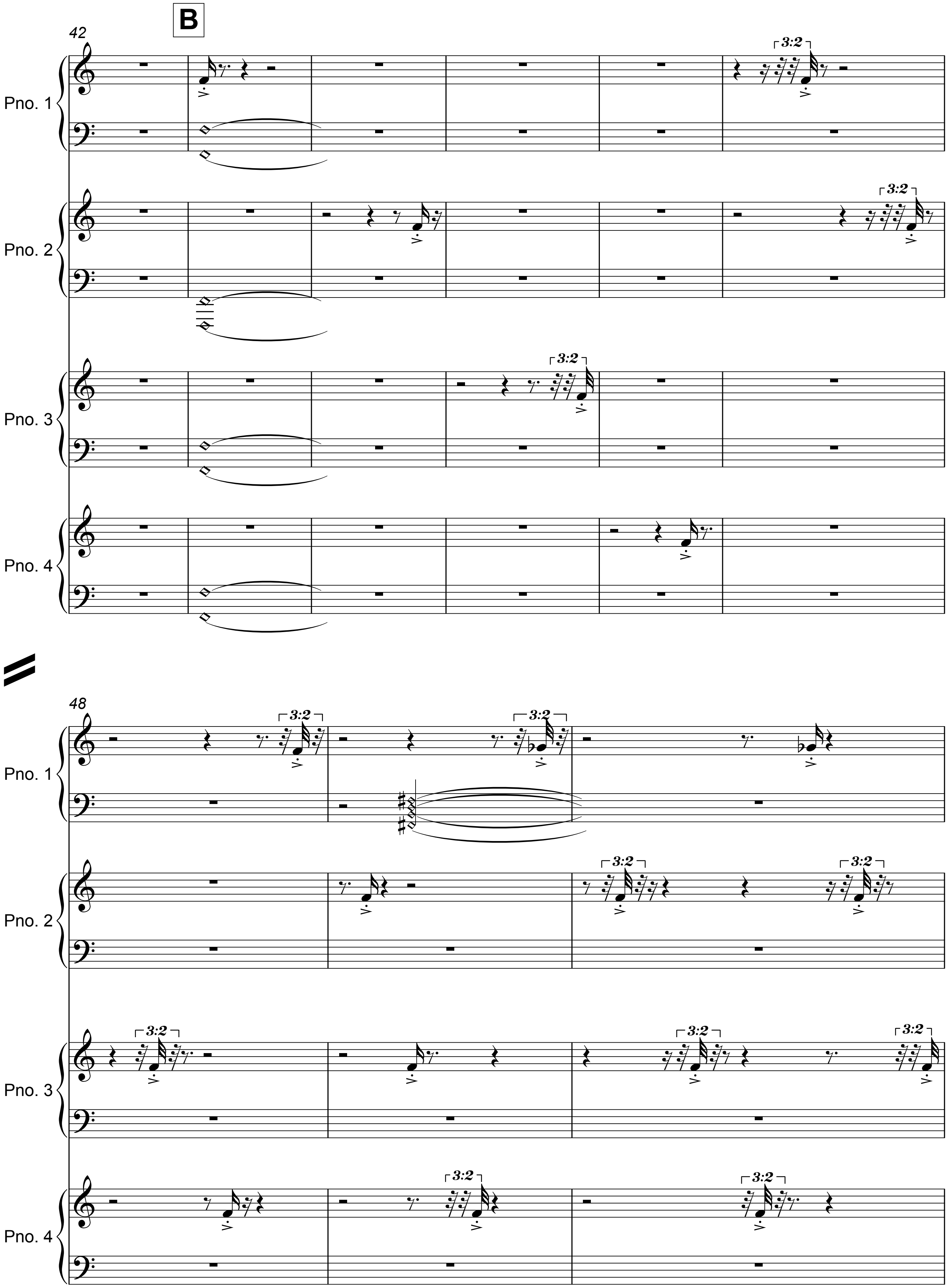

11
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2
8vb

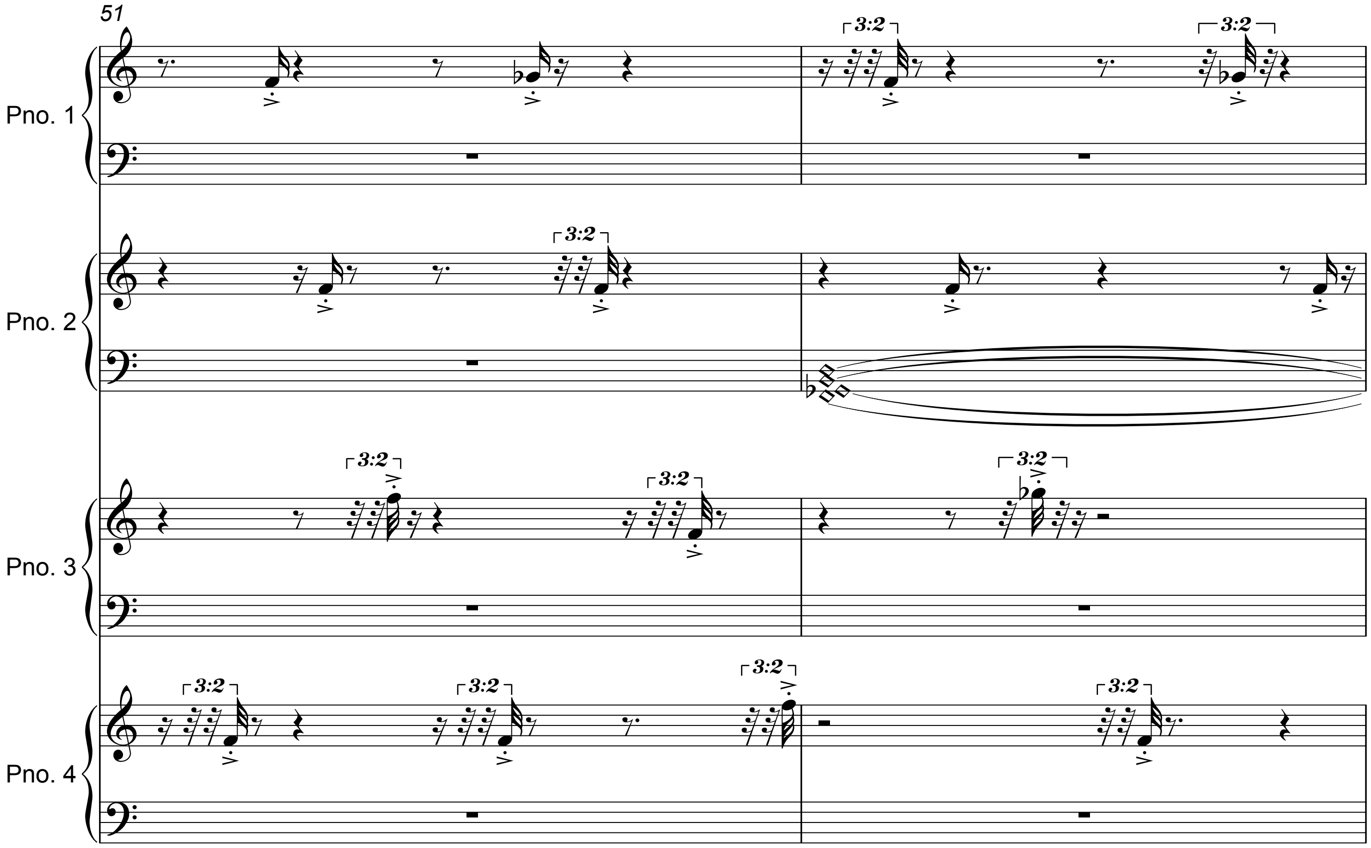

14
3:2
hold until
bar 22
Pno. 1
Pno. 2
3:2
Pno. 3
3:2
Pno. 4
21
A
3:2
Pno. 1
3:2
Pno. 2
3:2
Pno. 3
Pno. 4

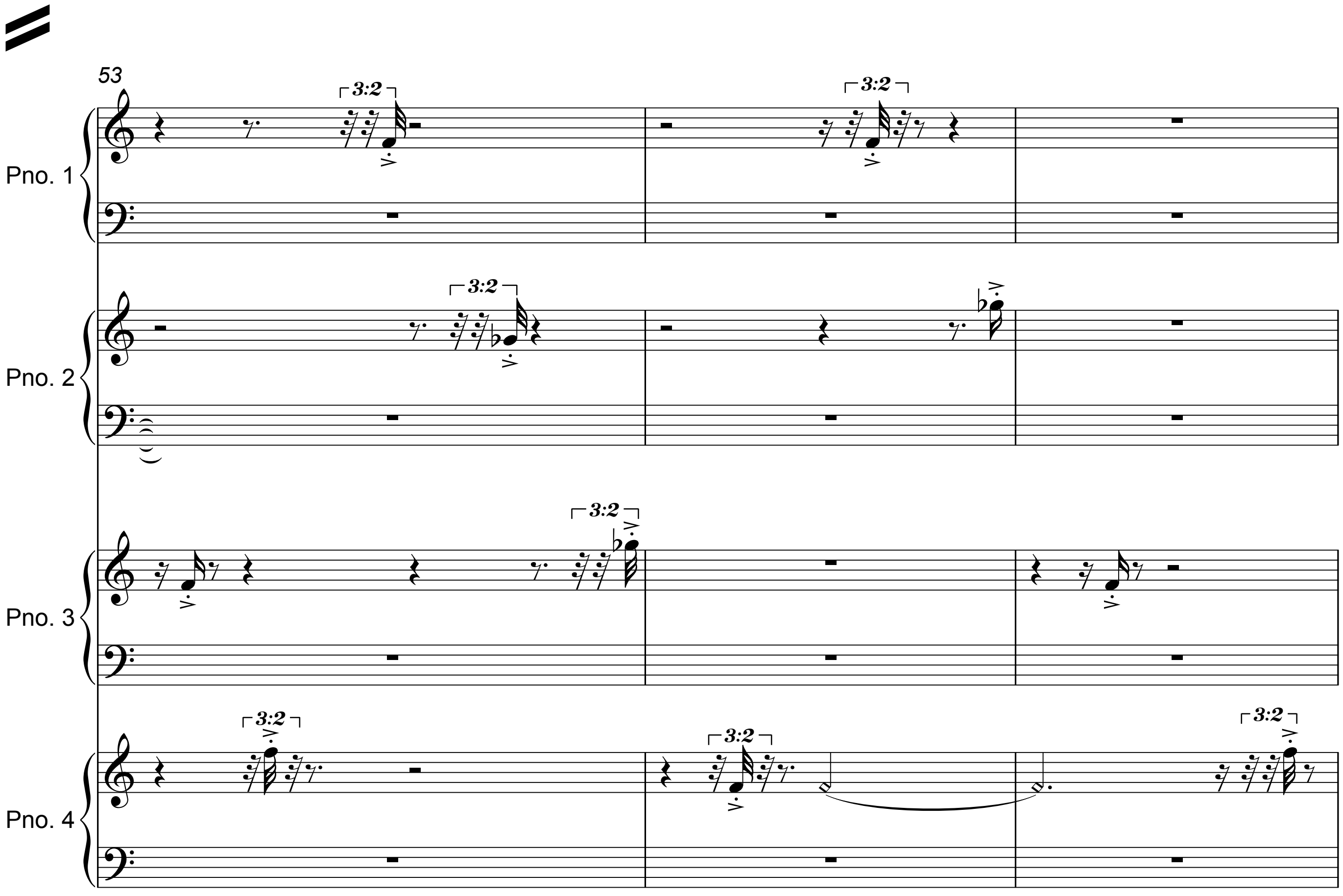

27
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4

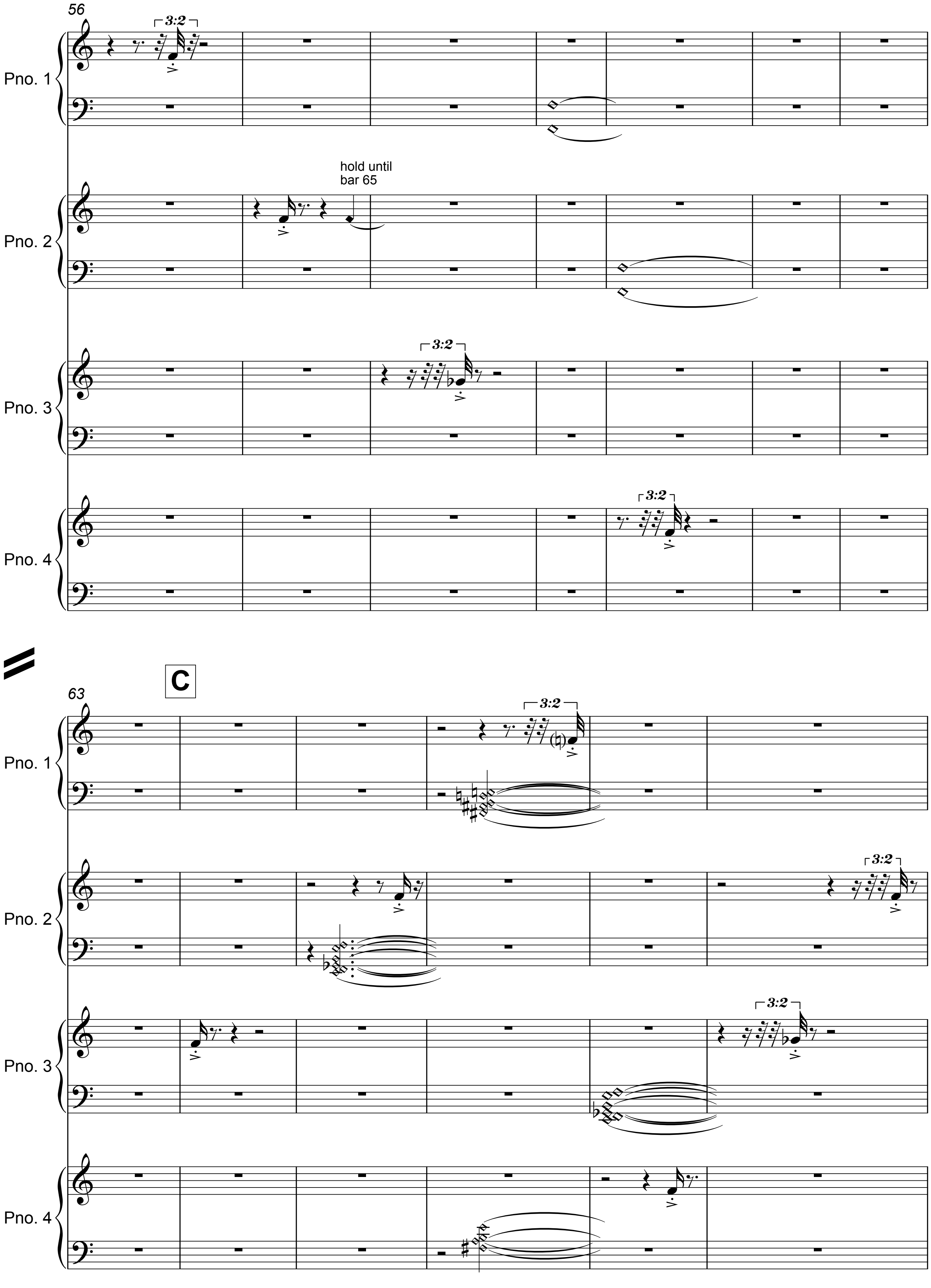

30
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4

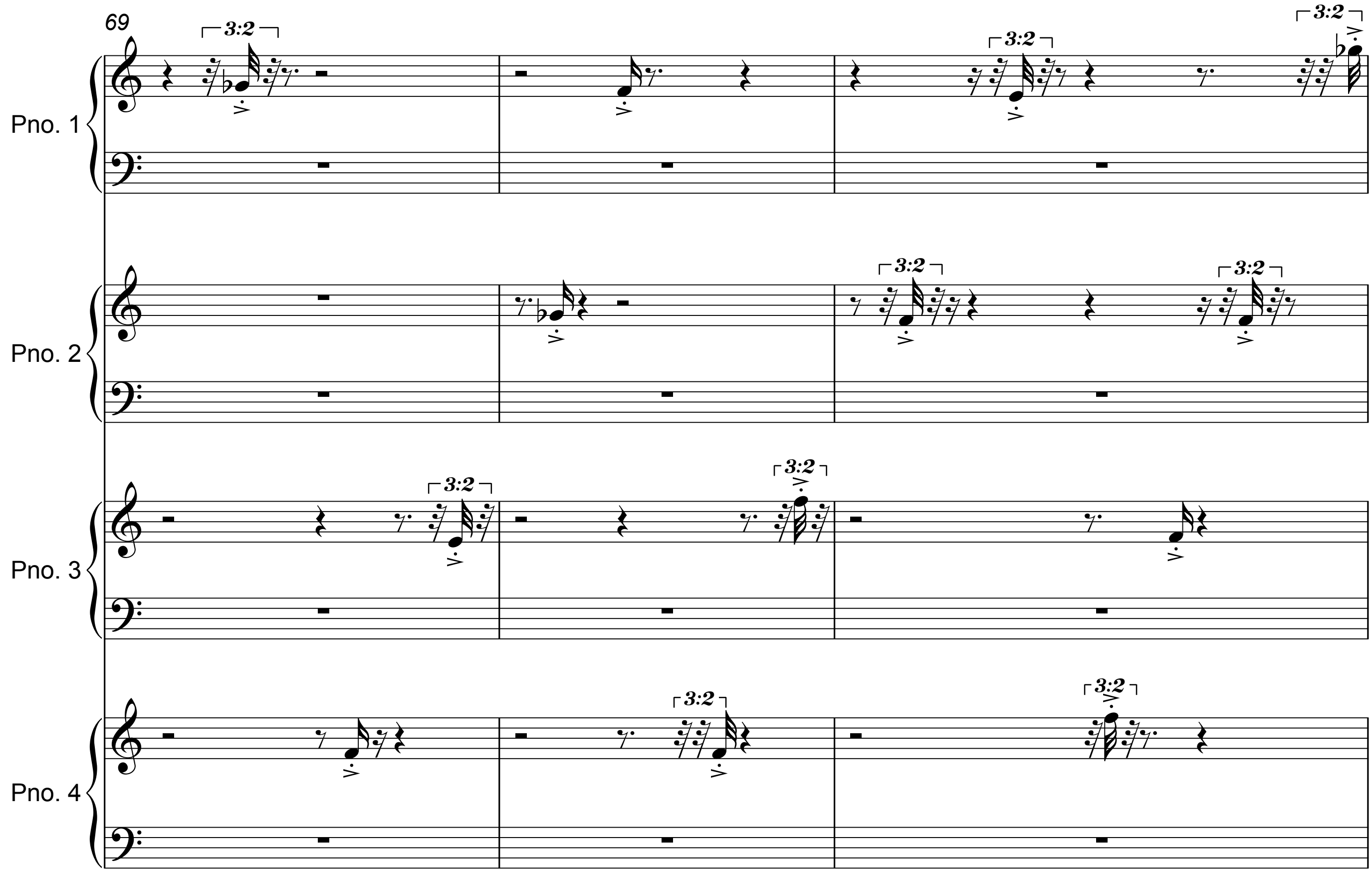

32
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2
8vb
35
hold until bar 43

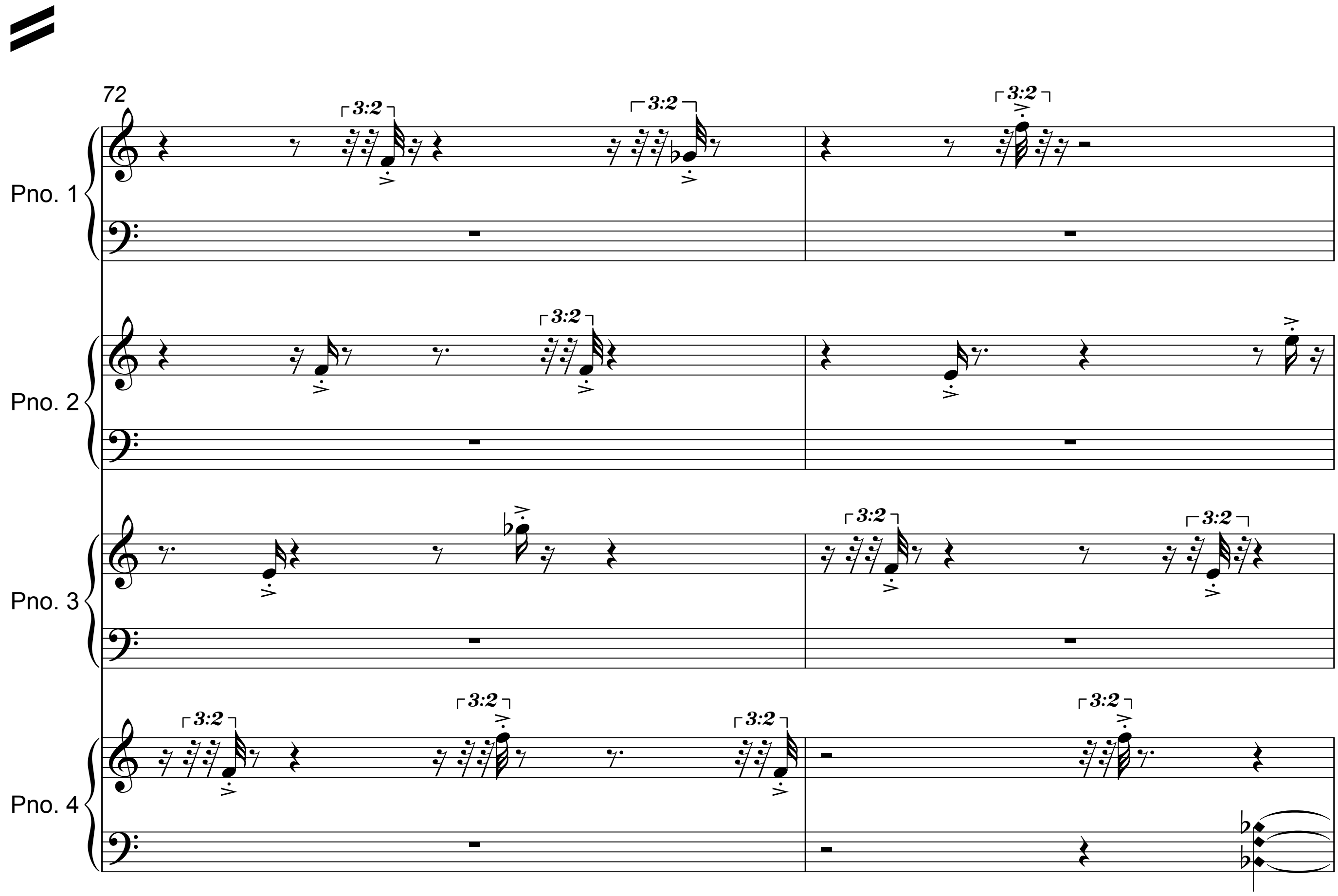

B
42
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2
48
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2

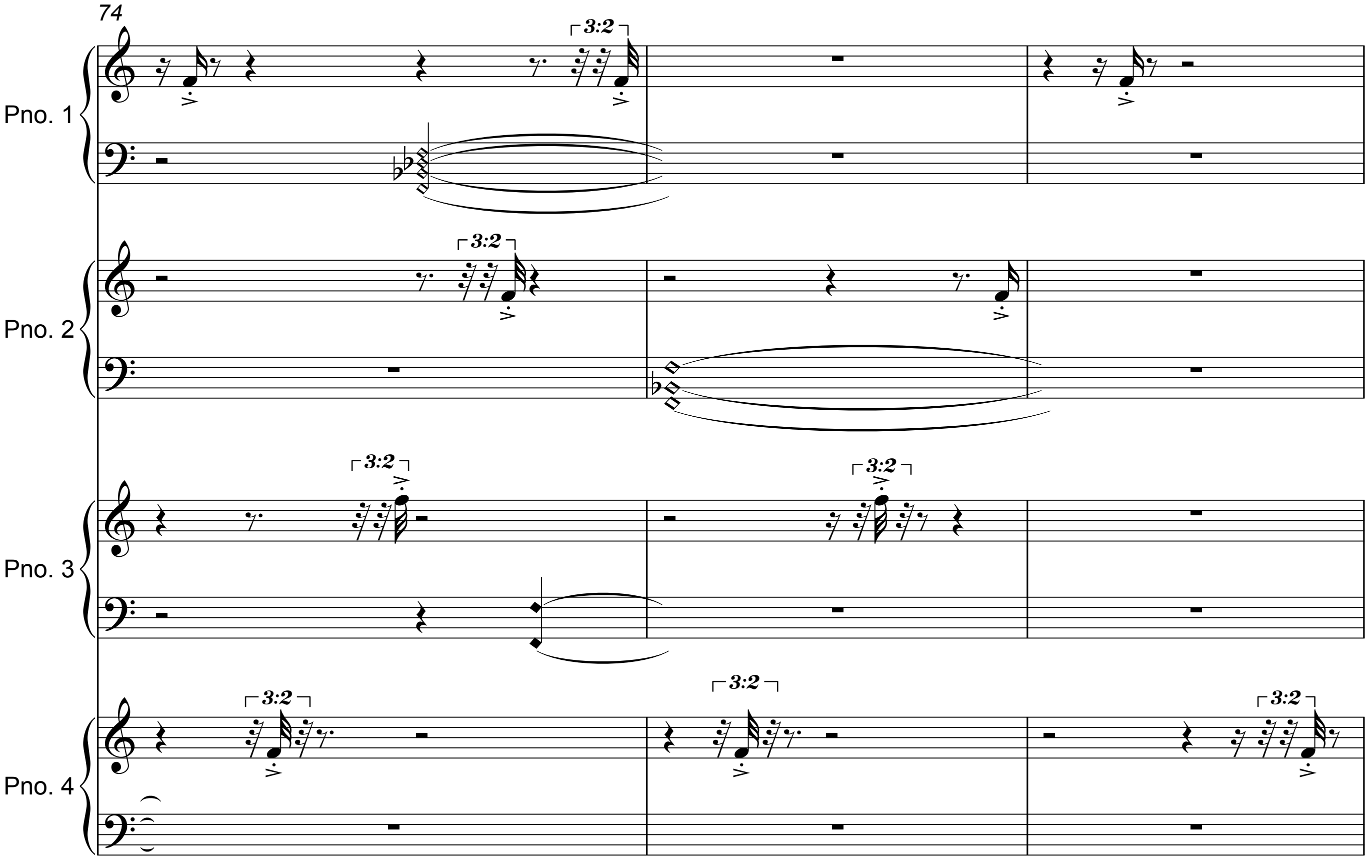

51
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4

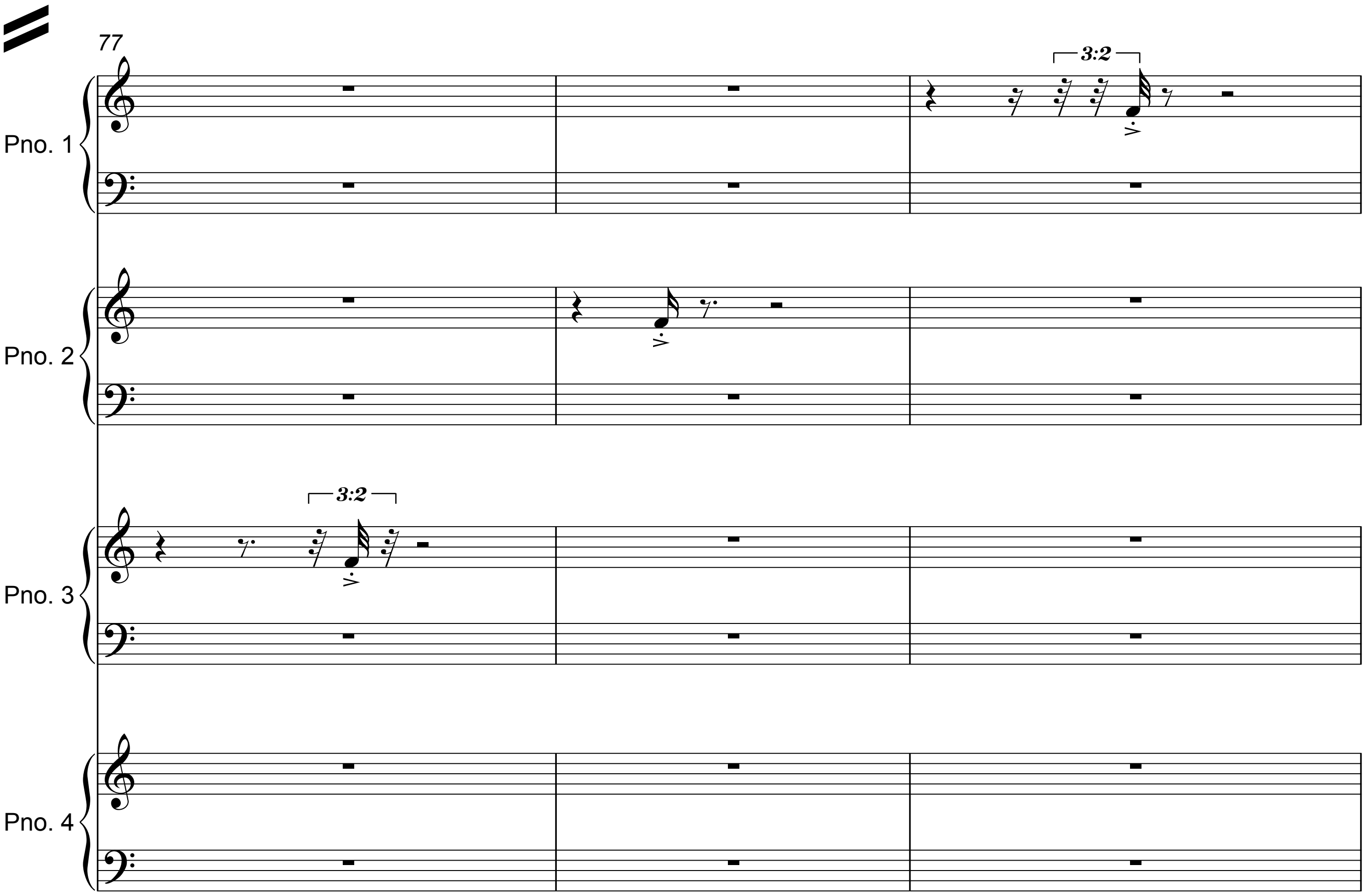

53
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4

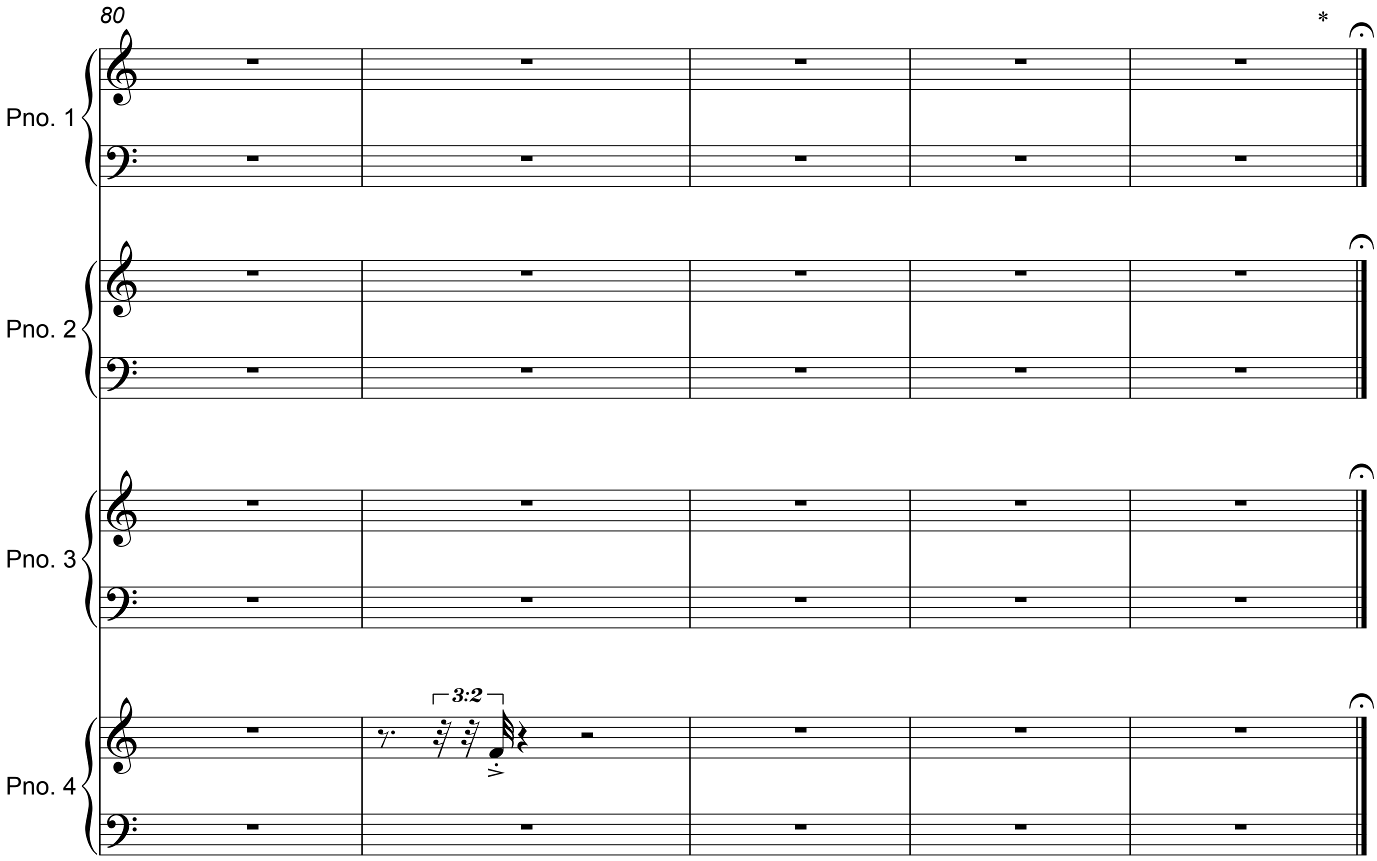

56
3:2
Pno. 1
Pno. 2
hold until
bar 65
Pno. 3
3:2
Pno. 4
3:2
C
63
Pno. 1
3:2
Pno. 2
3:2
Pno. 3
3:2
Pno. 4


69
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4


72
3:2
Pno. 1
Pno. 2
Pno. 3
Pno. 4


74
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2


77
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2


80
*
Pno. 1
Pno. 2
Pno. 3
Pno. 4
3:2

* all players release held notes
in the left hand simultaneously

Strength in Unity

for bass clarinet duo

Richard Glover

Strength in Unity

for bass clarinet duo

Richard Glover

Programme note

“Unity can only be manifested by the Binary. Unity itself and the idea of Unity are already two.”

Gautama Siddharta, 563-483 BC

Strength in Unity was written for Heather Roche and Sarah Watts and premiered on 23 April 2009 at The Space, London.

Duration c.6'

Strength in Unity

for two bass clarinets

Richard Glover

Players sit on opposite sides of the stage.

Play a note in the lowest register which allows for a number of microtonal variations.
Play it softly.
Hold it for as long as you comfortably can.

Repeat this five times, with comfortable pauses in between notes.
Do not synchronise note entries.
Each new note should be successively more breathy; the final note should be almost completely breath sound, with a barely perceivable pitch.
Use available alternate fingerings and embouchures to help you achieve this. Explore microtonal inflections that arise as a result of this.
Do not change timbre during a note.

Once both players have finished this, repeat the whole process in reverse up the octave.
Begin with almost breath sounds, and on successive repetitions, the sound should be more lucid, until clarity is achieved and the piece ends.

String Sextet

Richard Glover

String Sextet

for 2 vn 2 vla 2 vc

Richard Glover

Programme note

A series of gradually transforming patterns are overlaid in various densities; each pattern iteration is linked with the others by sustained tones. The piece exists mostly within a whole tone, to reduce distinct characteristics between patterns and to induce beating patterns from the overall sound.

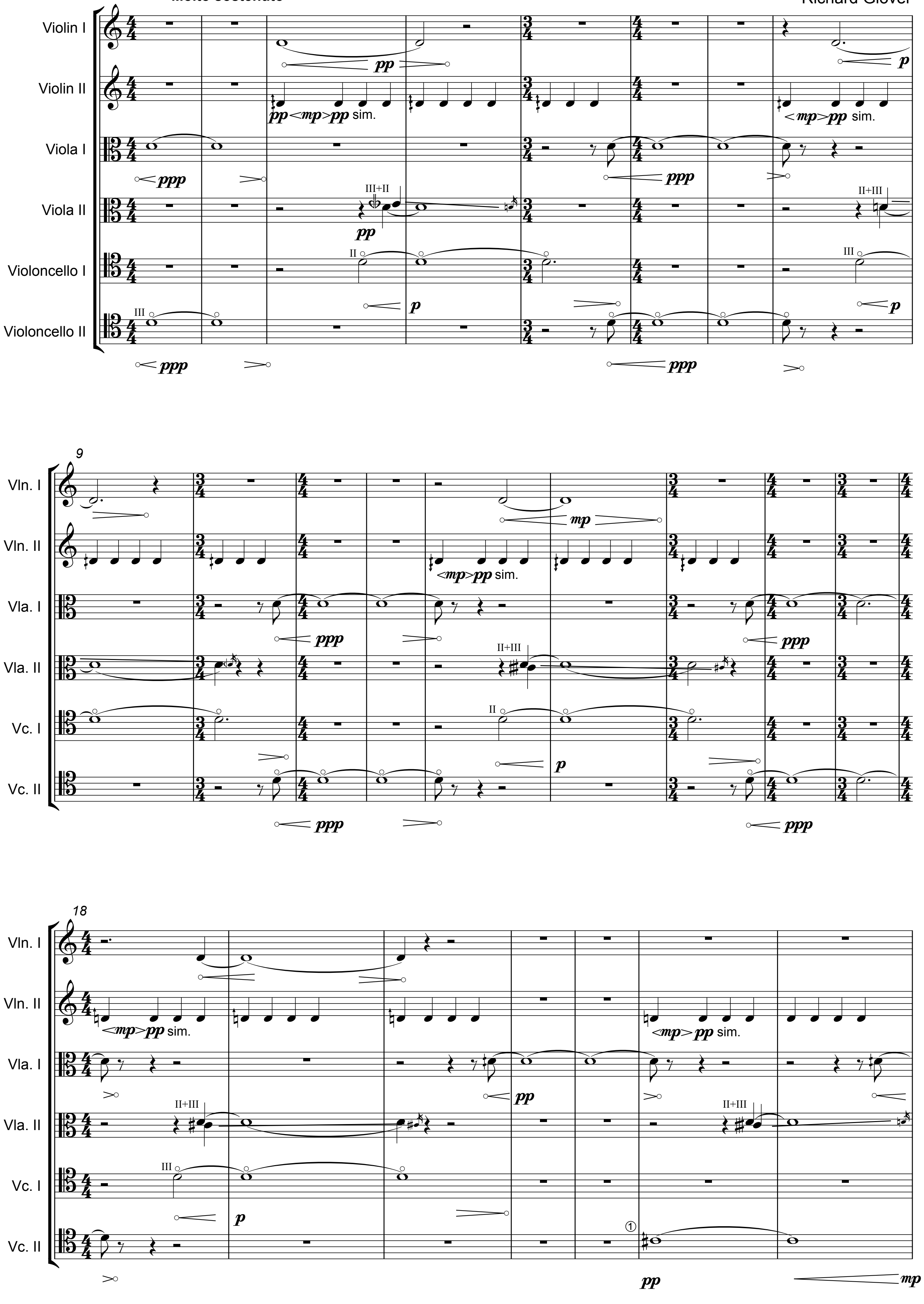
String Sextet was premiered by University of Huddersfield music students on 4 June 2008 in St. Paul's Hall, Huddersfield

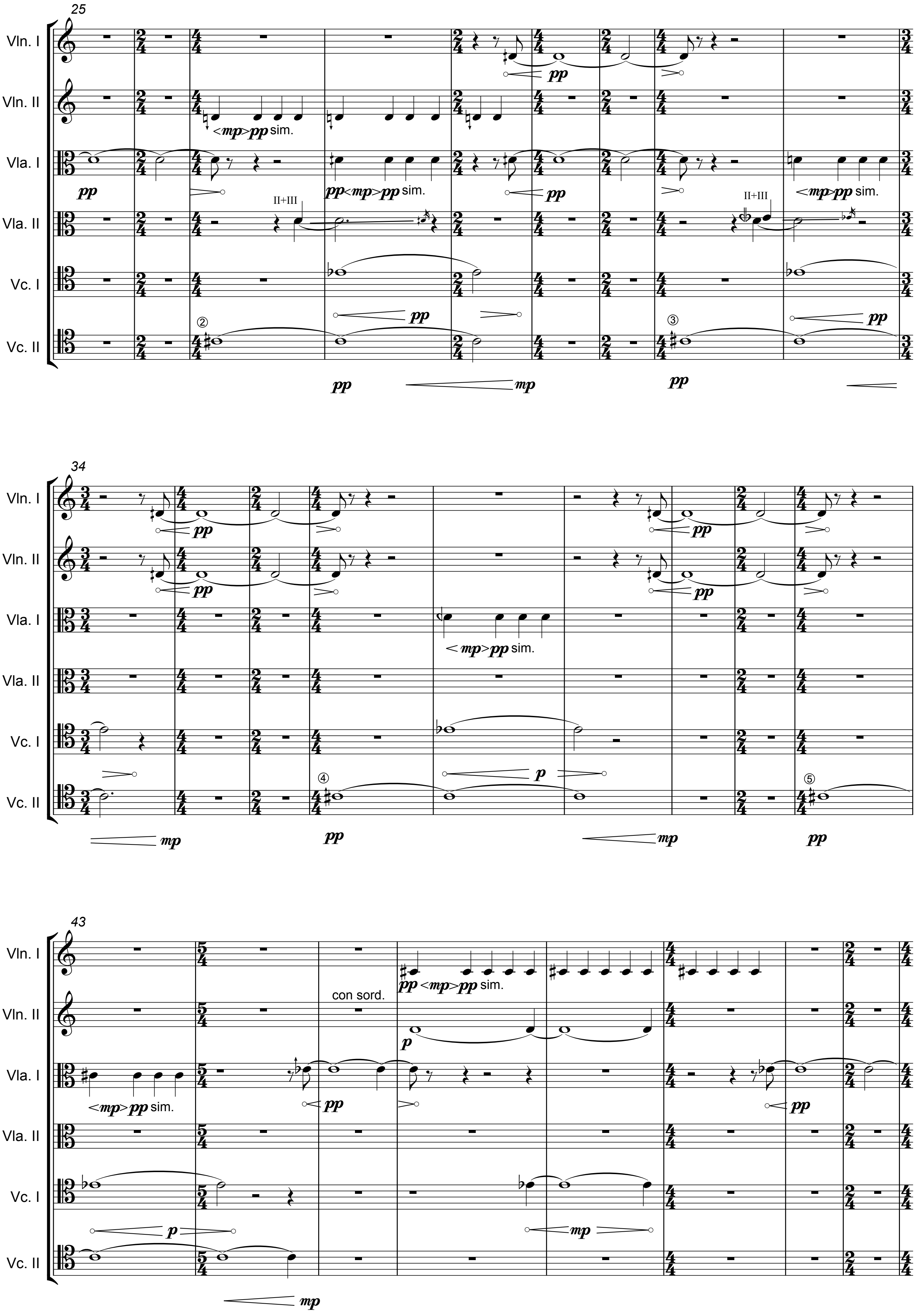
Duration c. 15'

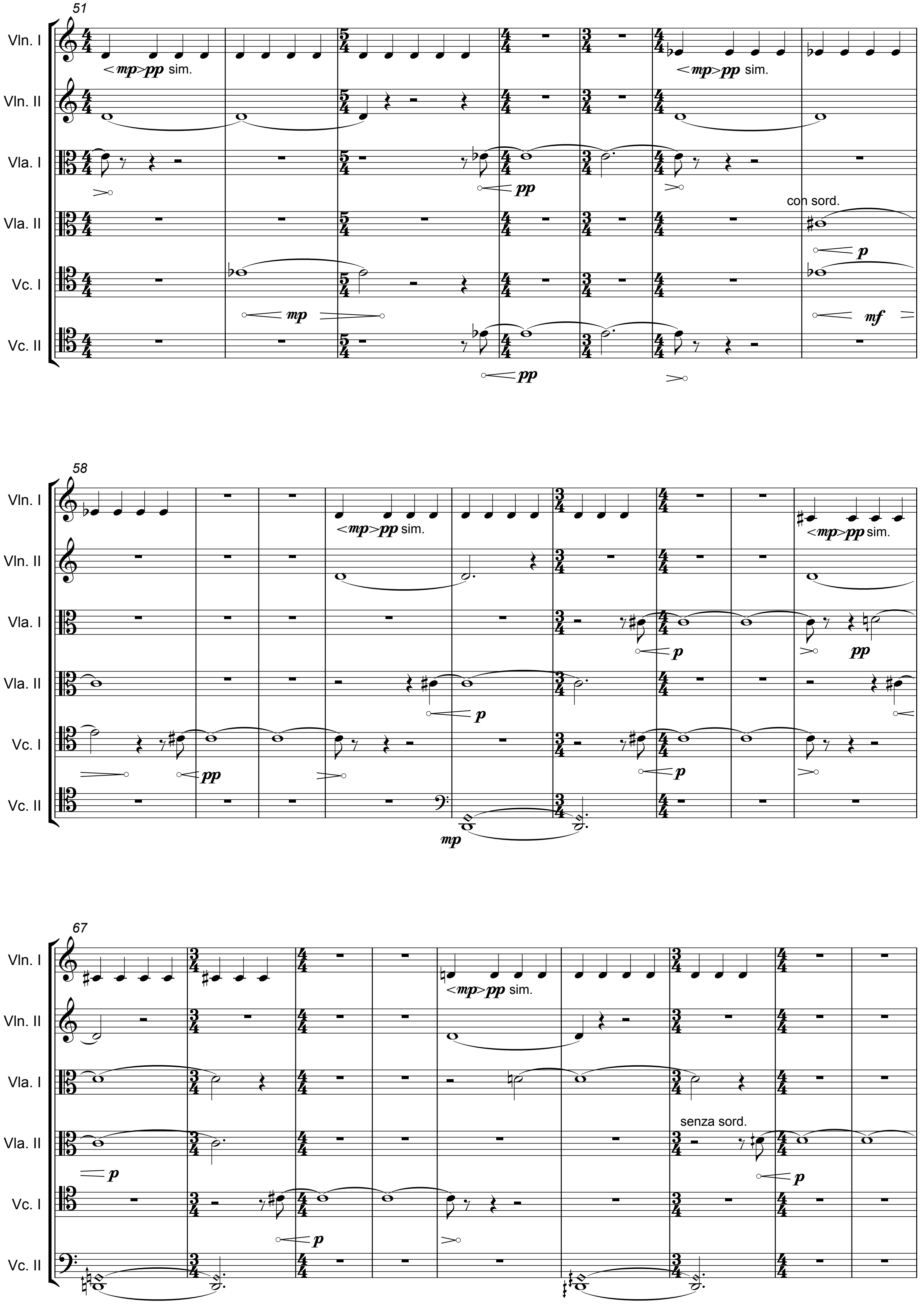
String Sextet

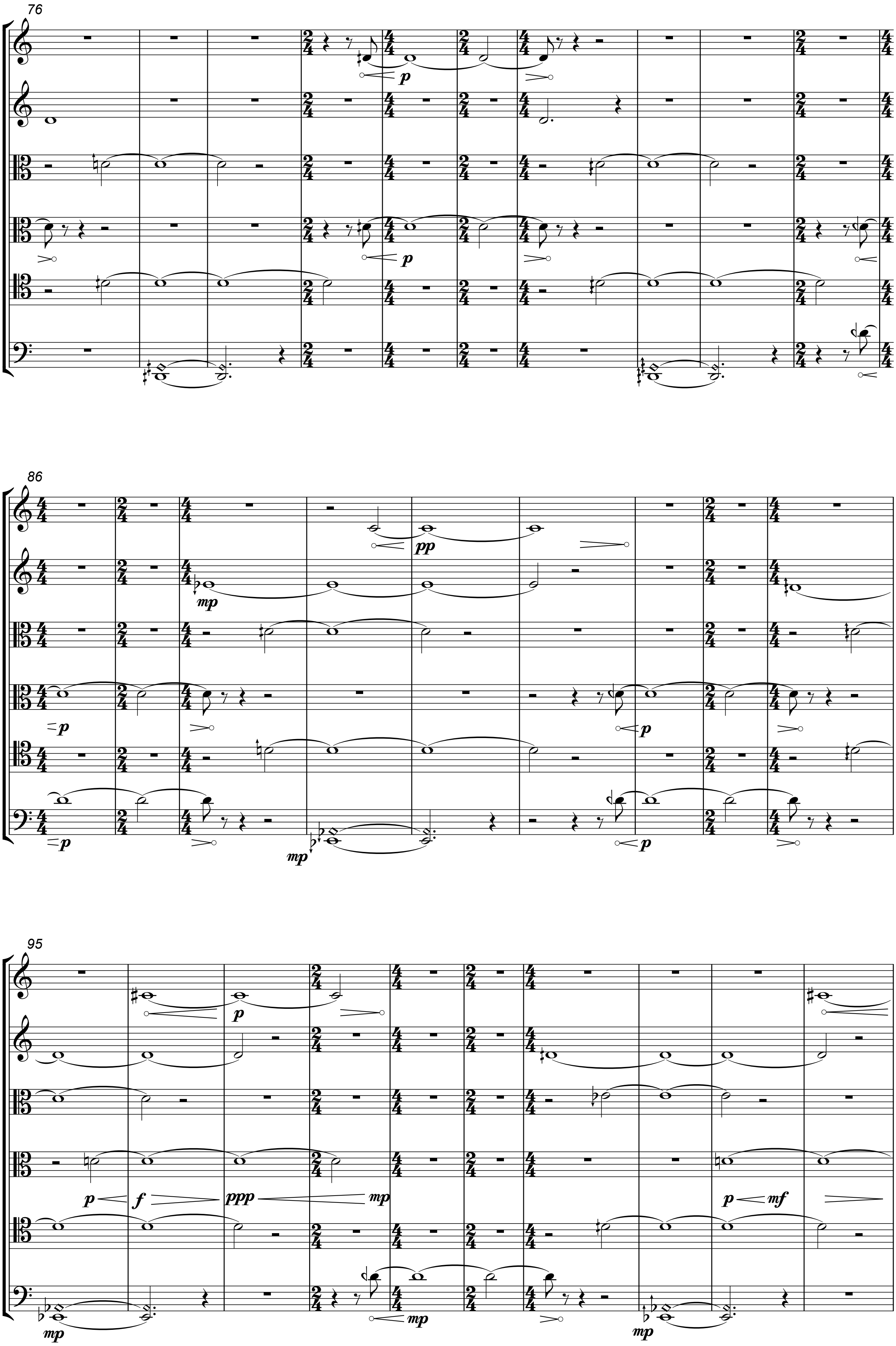
♩=60 **Molto sostenuto**

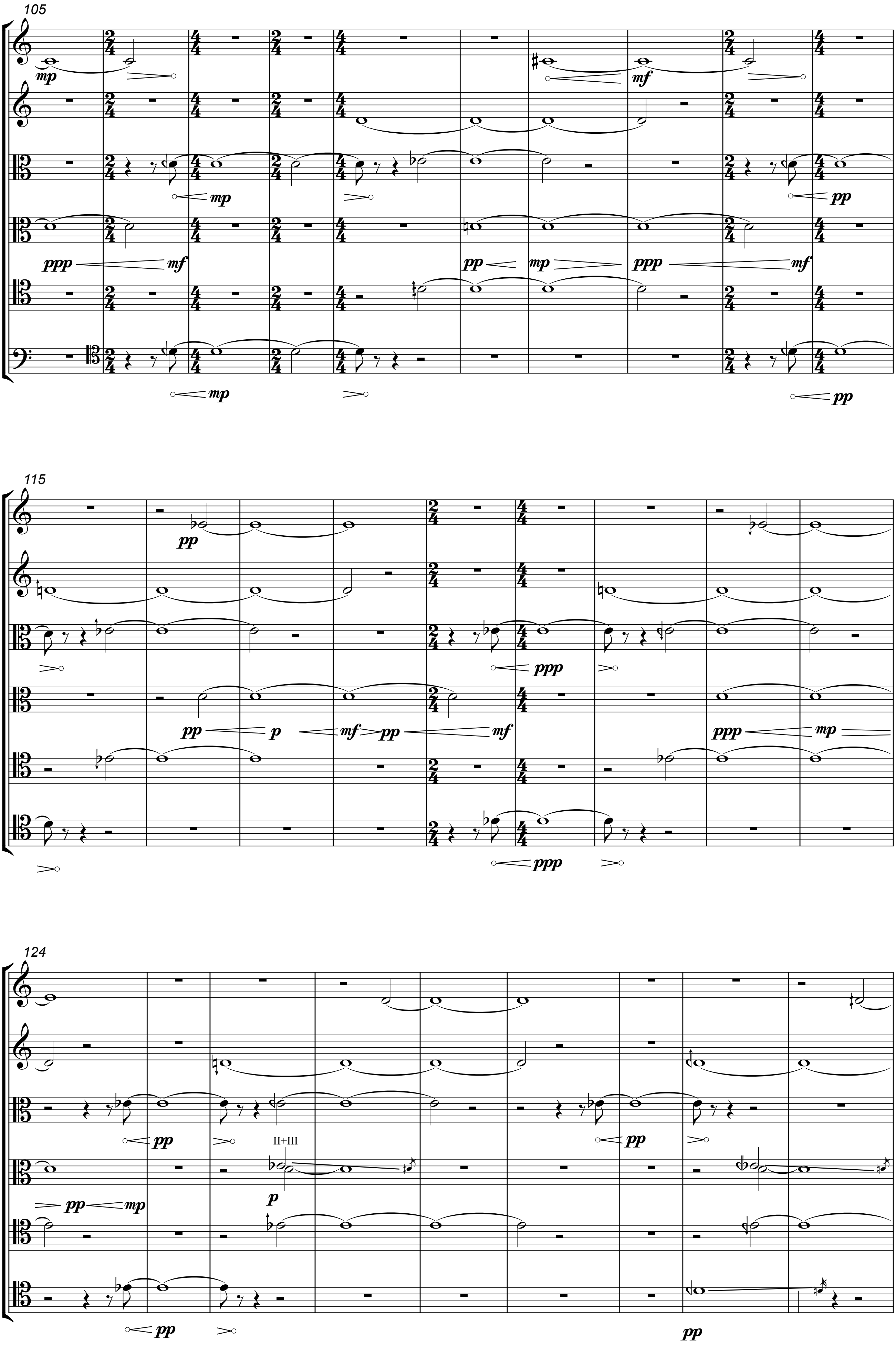
Richard Glover

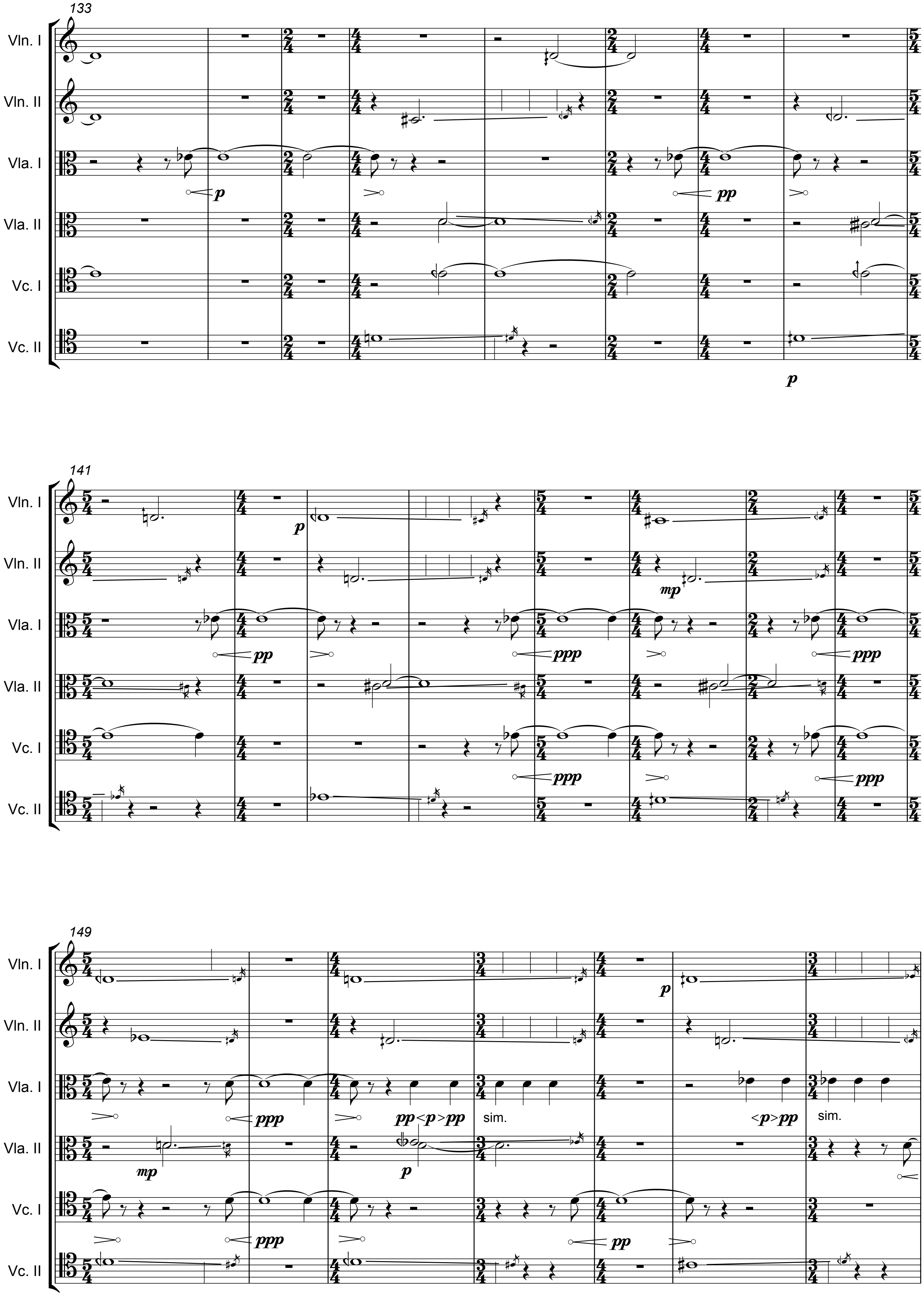

Violin I
Violin II
Viola I
Viola II
Violoncello I
Violoncello II
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
9
18
III+II
II+III
II
III
①
pp
pp<mp>pp sim.
<mp>pp sim.
ppp
p
mp
sim.

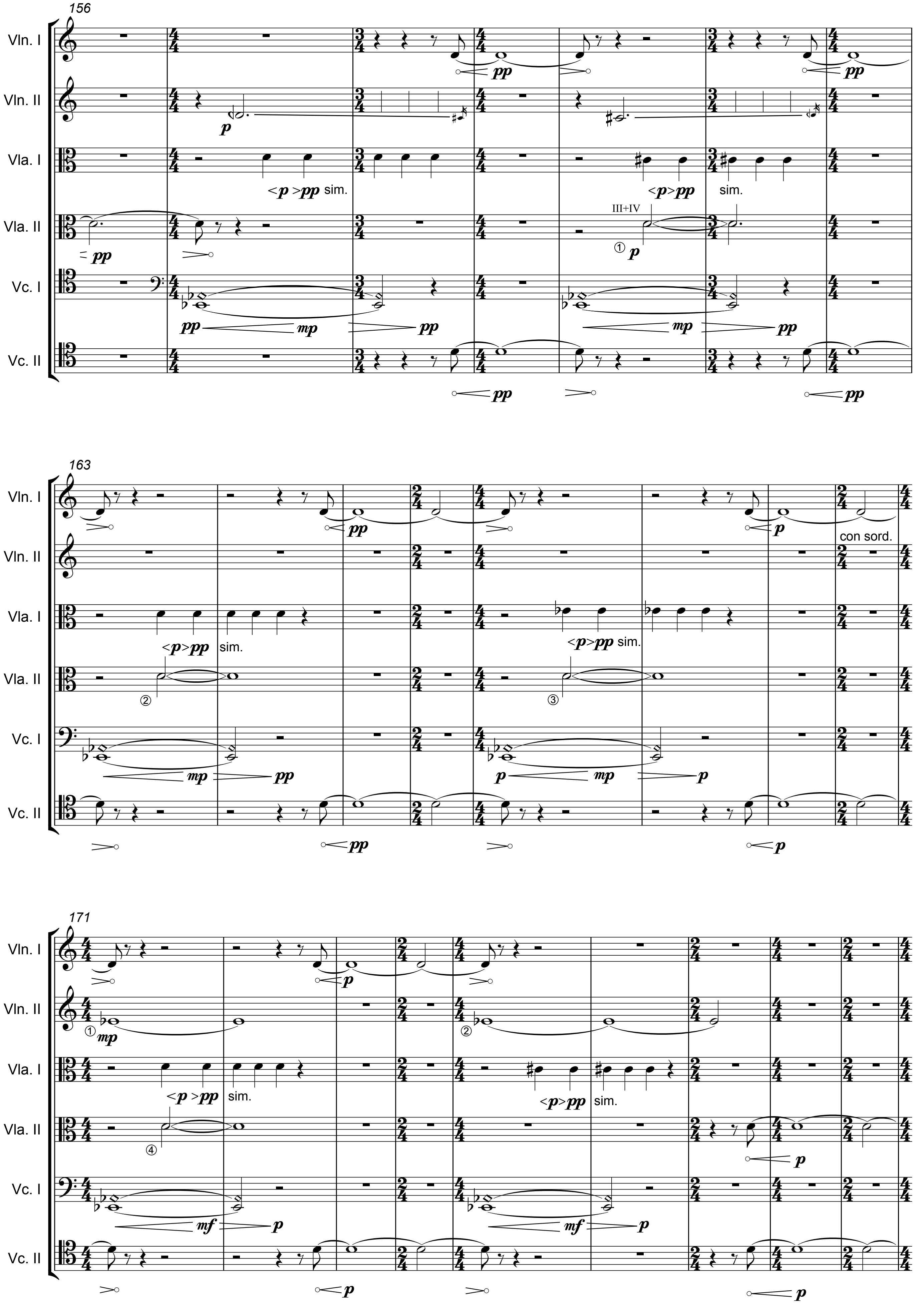

25
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
<mp>pp sim.
pp
pp<mp>pp sim.
II+III
<mp>pp sim.
②
③
mp
34
④
⑤
p
43
con sord.
pp <mp>pp sim.
p
mp

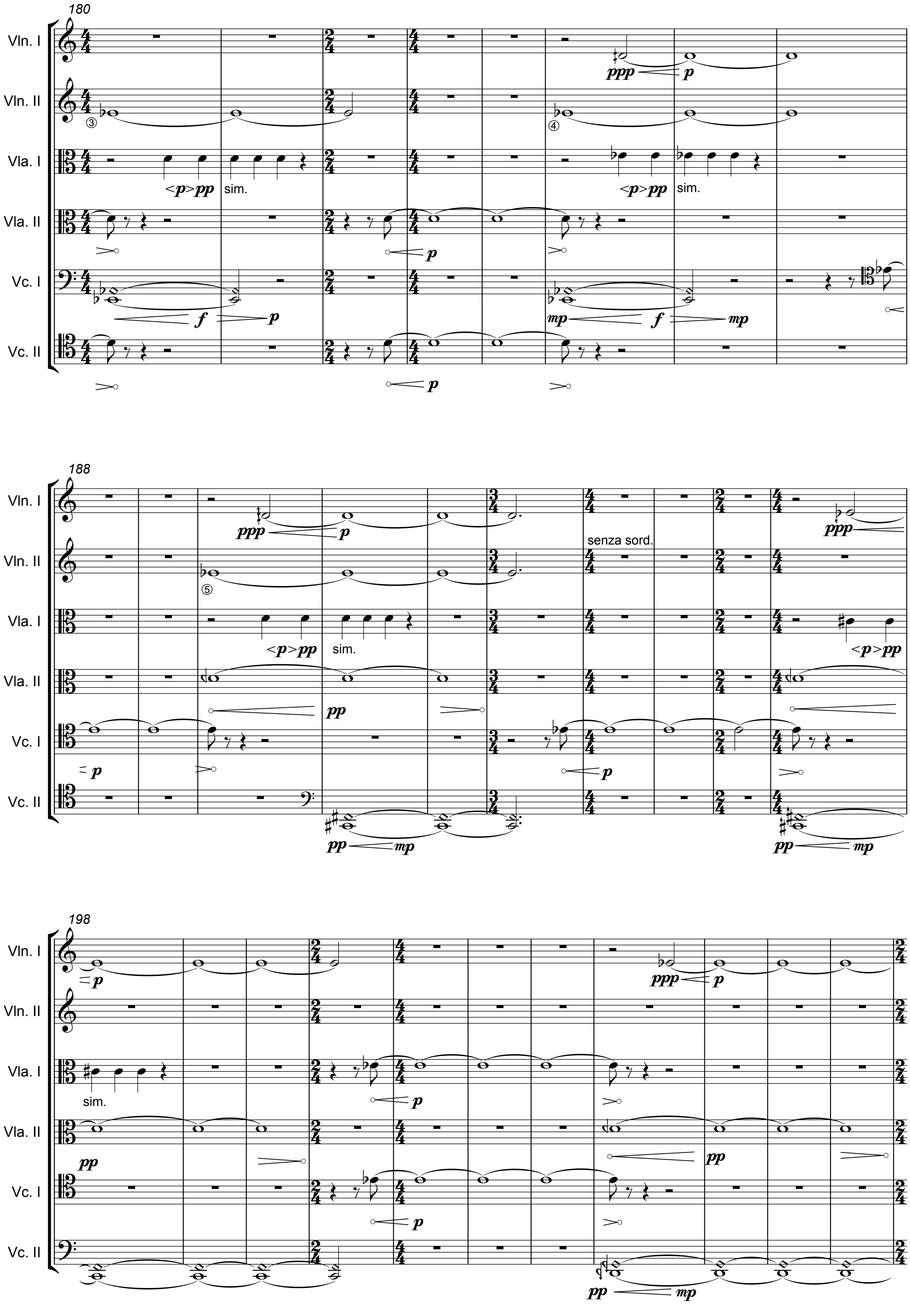

51
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
mp pp sim.
pp
con sord.
p
mp
mf
58
mp pp sim.
p
pp
mp
67
mp pp sim.
senza sord.
p

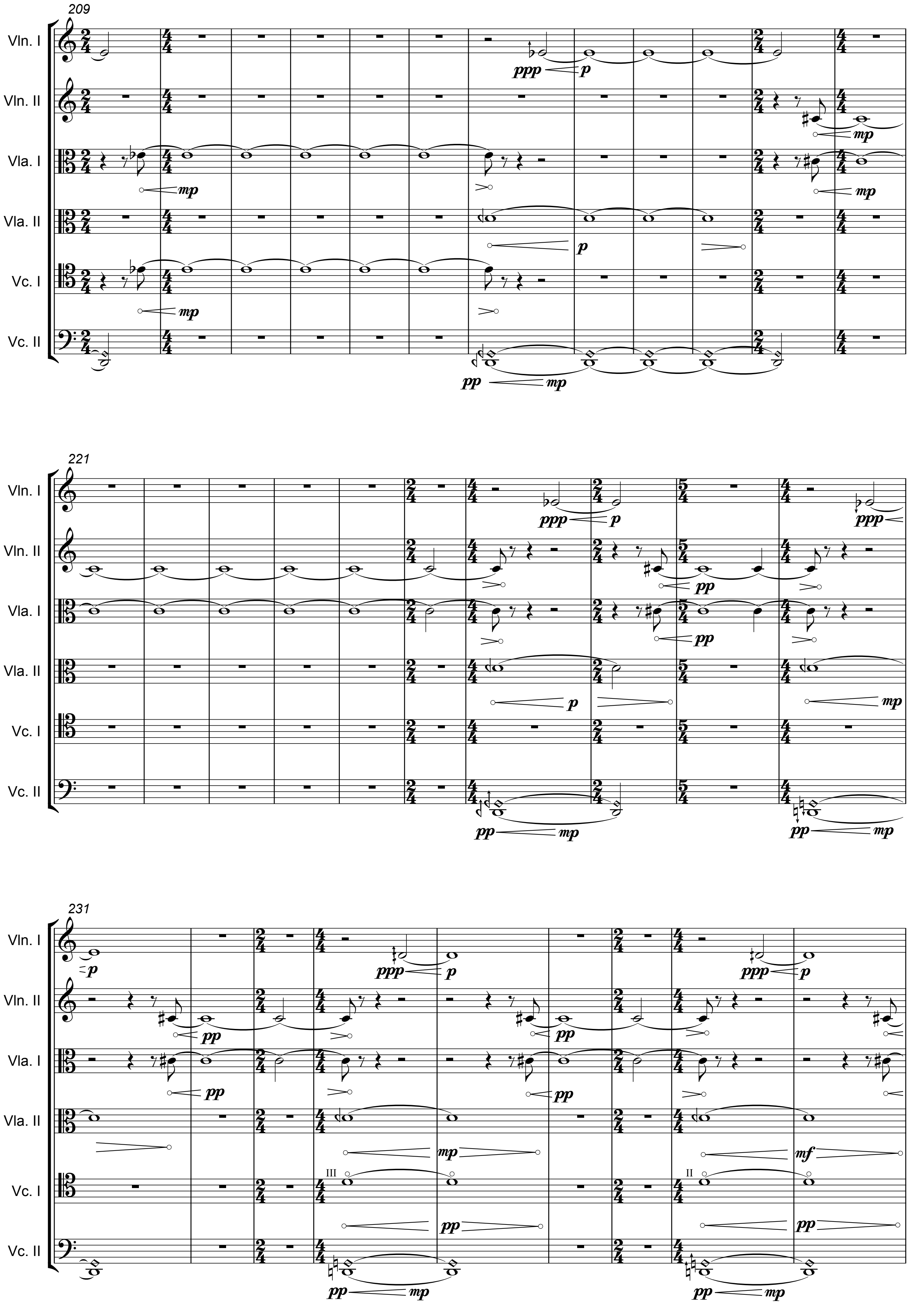

76
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
p
86
pp
mp
p
95
f
ppp
mp
mf

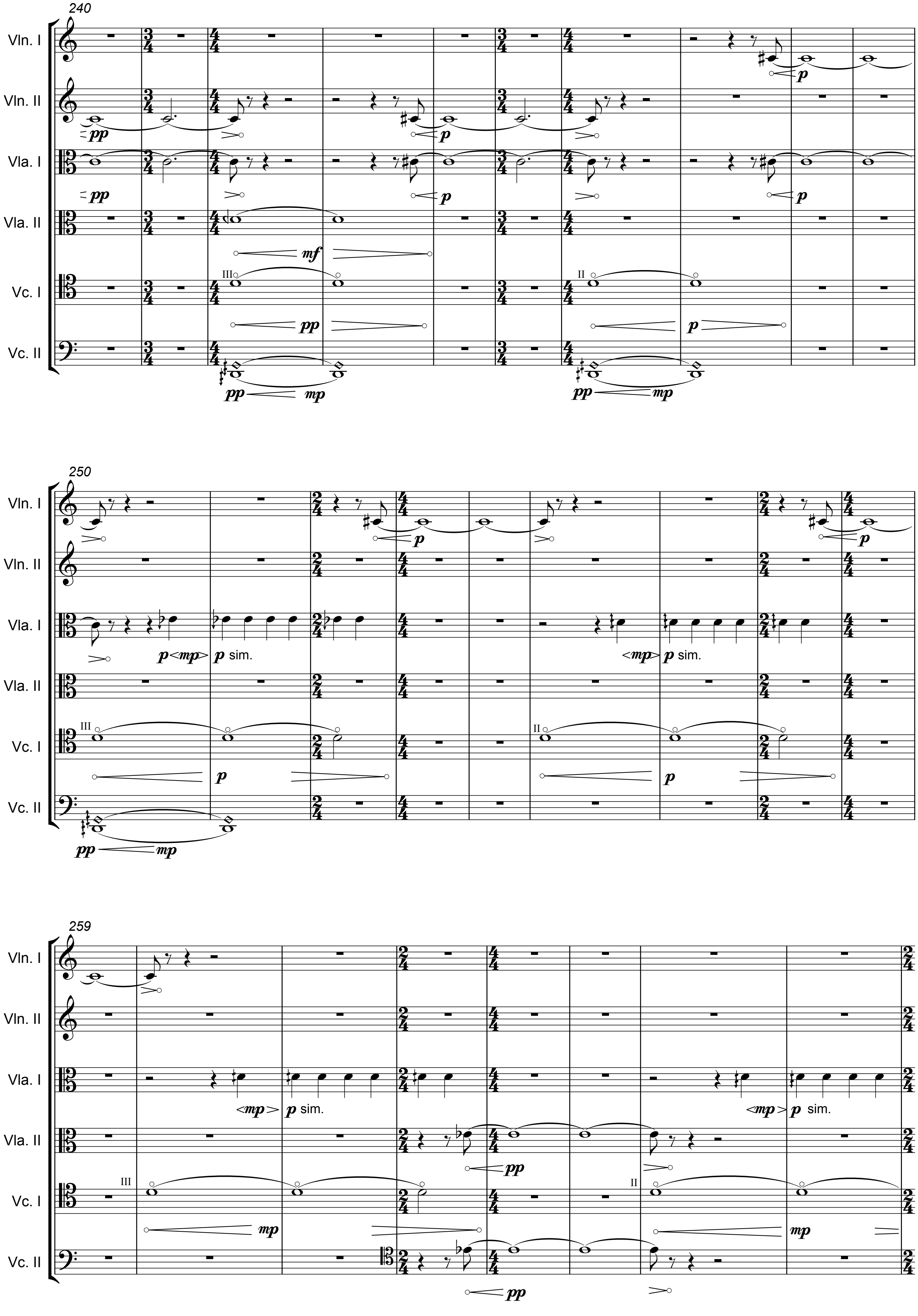

105
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
mp
mf
ppp
pp
115
124
II+III
p

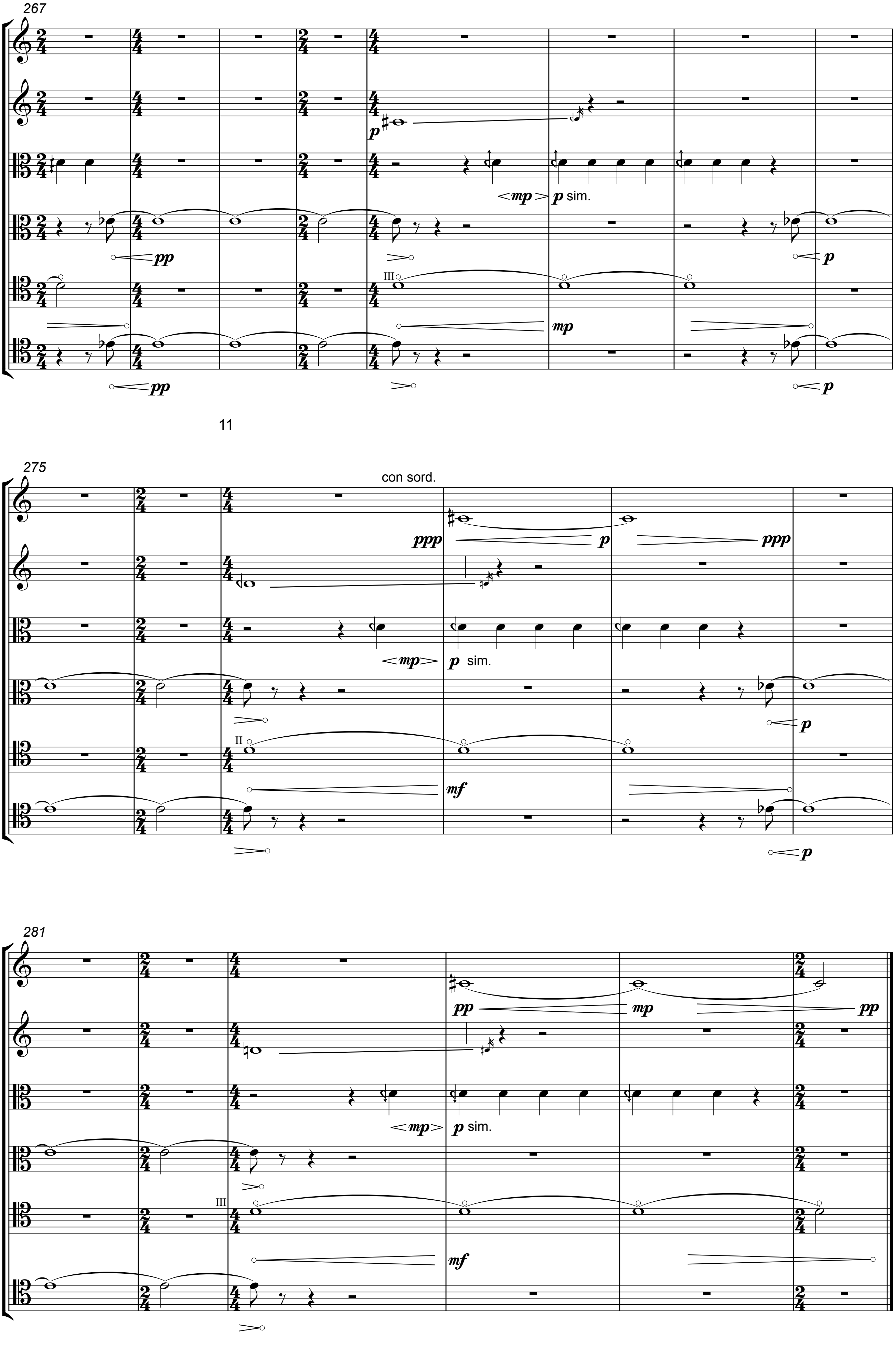

133
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
p
pp
p
141
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
p
mp
pp
ppp
ppp
ppp
ppp
149
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
p
ppp
pp<p>pp
sim.
<p>pp
sim.
mp
p
ppp
pp


156
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
pp
p
<p >pp sim.
sim.
III+IV
① p
mp
163
② ③
<p>pp sim.
con sord.
171
① mp
④
mf


180
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
③
④
ppp
p
<p>pp
sim.
f
mp
188
⑤
pp
senza sord.
198


209
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
ppp
p
mp
pp
221
231
III
II
mf


240
250
259
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
pp
p
mf
mp
III
II
p<mp>
<mp>
p sim.


267
Vln. I
Vln. II
Vla. I
Vla. II
Vc. I
Vc. II
p
<mp> p sim.
pp
p
III
mp
pp
p
11
275
con sord.
ppp
p
ppp
<mp> p sim.
p
II
mf
p
281
pp
mp
pp
<mp> p sim.
III
mf

Violin with Clarinet and Piano

Richard Glover

Violin with Clarinet and Piano

Richard Glover

Programme note

This piece has a reduced range of material, focussing on the relationship between sounds in close proximity to each other, and the acoustic phenomena which arise from this environment. The clarinet plays microtonal variants of the piano's tempered notes, and the violin very slowly glissandos between the two.

Violin with Clarinet and Piano was written for the Gemini Ensemble and premiered on 5 January 2008 at the RMA Research Students' conference at the University of Surrey.

Duration c. 5'

Violin with Clarinet and Piano

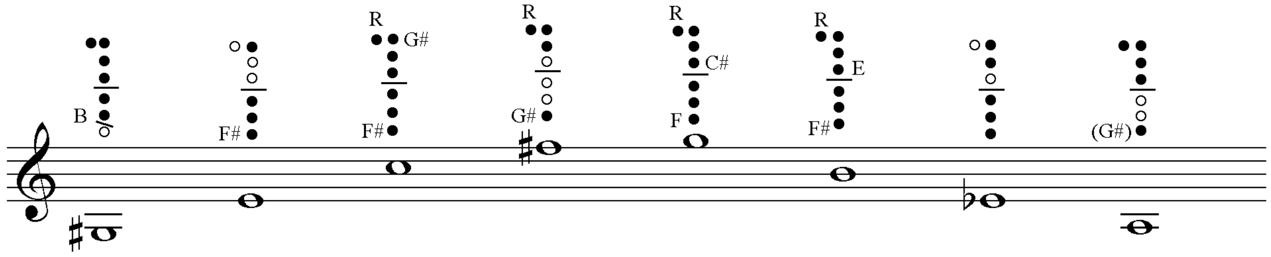
Richard Glover

Instructions for performance:

The violin and piano enter simultaneously on the same note. Once the clarinet has faded in on a microtonal variant of that pitch after roughly 3-5 seconds, the violin player should **very slowly** glissando to where they deem the clarinet note to be. For example, if the violinist hears the clarinet note as just slightly above the violin and piano note, they should slowly glissando up to it. Once this new note is reached, hold for a few seconds before all instruments end the note together (the piano note will have faded away by this point).

Read the score from left to right in the usual fashion. While each note will take a slightly different length of time due to the varying proximity of each clarinet note to the violin and piano original note, each cluster should last somewhere in the area of 20-30 seconds with a pause of 5-10 seconds in between each note.

The piano notes will need to be played loudly with sustain pedal held down, while the violin and clarinet (after fade in) should play quieter, always without vibrato.



Virtual Fusion

for clarinet in Bb, cello, piano and live electronics

Richard Glover

Virtual Fusion

for Clarinet in Bb, cello, piano and live electronics

Richard Glover

Programme note

Explores spectral relationships between pitches lying within a reduced cluster, and allows the resultant acoustic phenomena to weave in between the sounding notes of the instruments. The electronics provide accompanying spectra which shift between altering levels of harmonicity, and point towards an eventual outcome for the process. The piece is divided into two sections – the first sustained, an the second detached.

Virtual Fusion was a joint commission between Shadow Play and spnm and was premiered on 6 November 2008 at Brunel University.

Duration c. 11'

Transposed score

Virtual Fusion

Performance instructions

Clarinet

Each pitch should be held as steady as possible throughout the full duration of the note.
Avoid accents on note entries; all note should enter begin smoothly as possible.

Movement I: Each crescendo should not sound louder tha *mezzoforte*. When playing the more unstable fingerings, crescendi should not result in a split note; players should ensure the pitch of each note is not compromised by a louder dynamic.

Cello

Aim to keep the pitch and dynamic of each note as stable as possible.

Movement II: Circled numerals indicate eight evenly-spaced microtonal pitches in between D and Eb – the player should work these out beforehand.

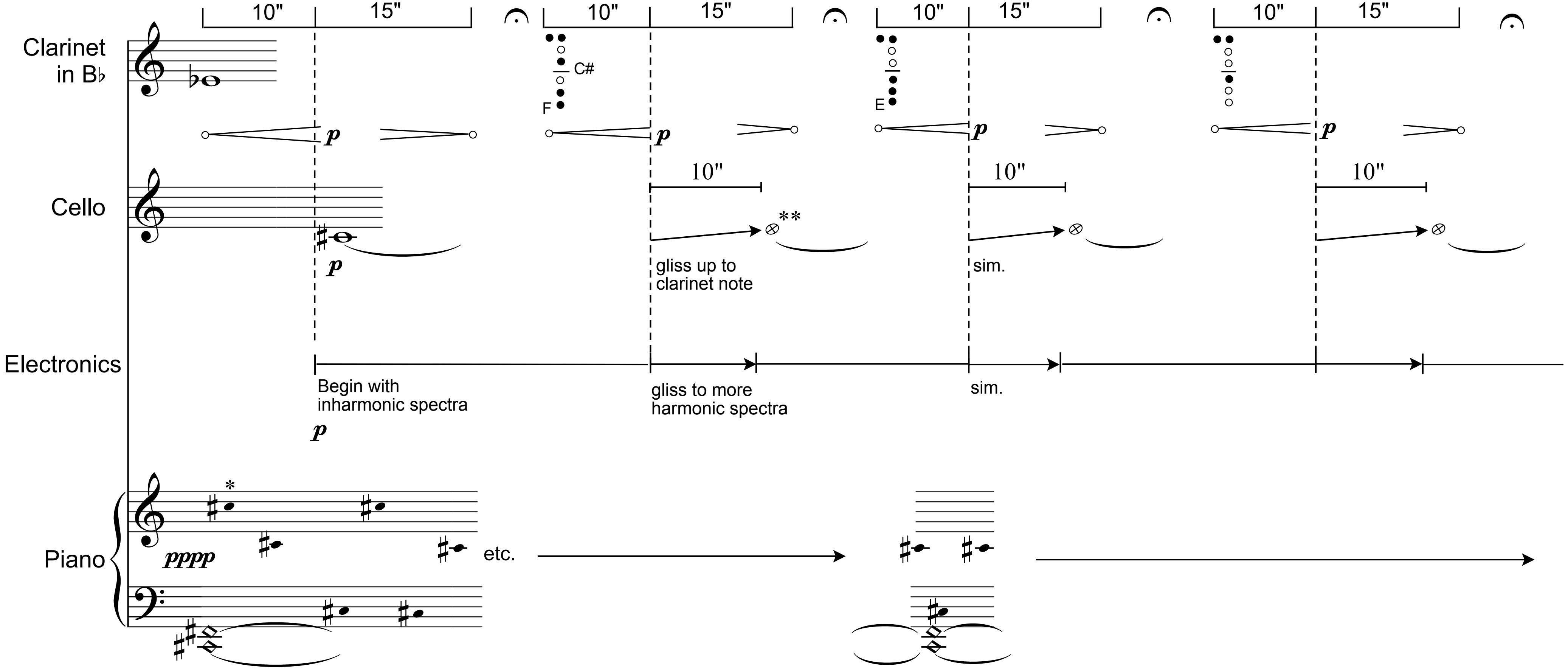
Piano

All diamond noteheads indicate notes should be depressed silently and sustained.
No pedal should be used throughout.

I

Virtual Fusion

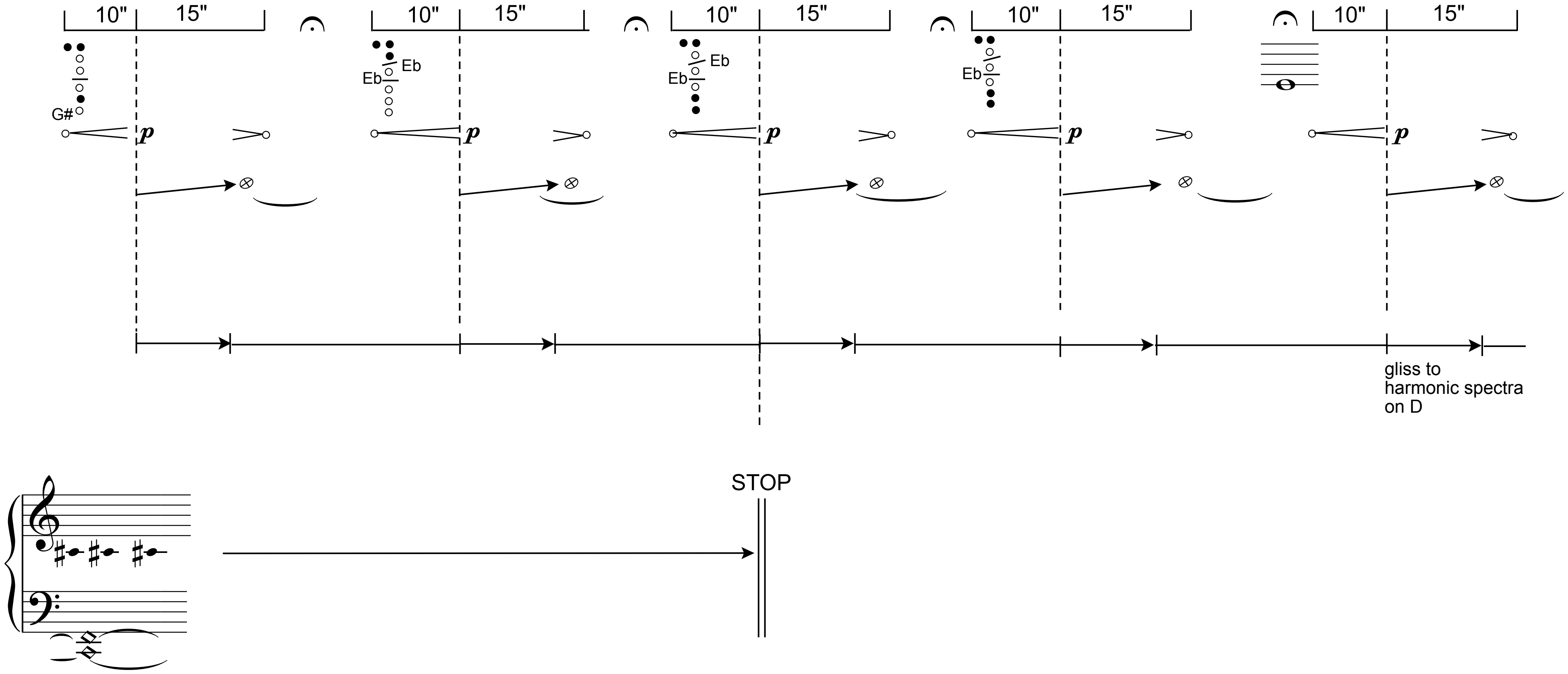
Richard Glover



10"
15"
10"
15"
10"
15"
10"
15"
Clarinet in B♭
C#
F
E
p
p
p
p
Cello
10"
10"
10"
p
**
gliss up to clarinet note
sim.
Electronics
Begin with inharmonic spectra
gliss to more harmonic spectra
sim.
p
Piano
*
pppp
etc.

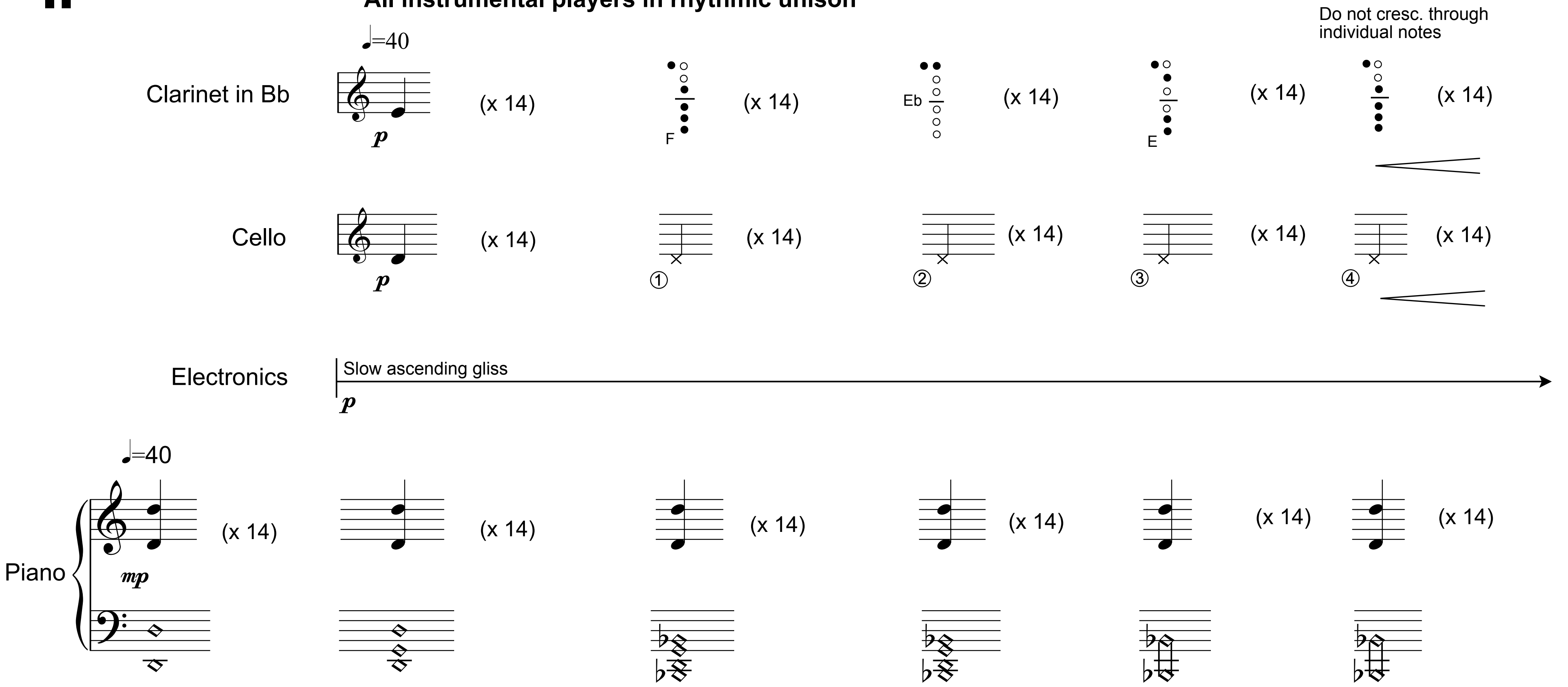
* ad libitum using only these pitches. Not all notes must sound.

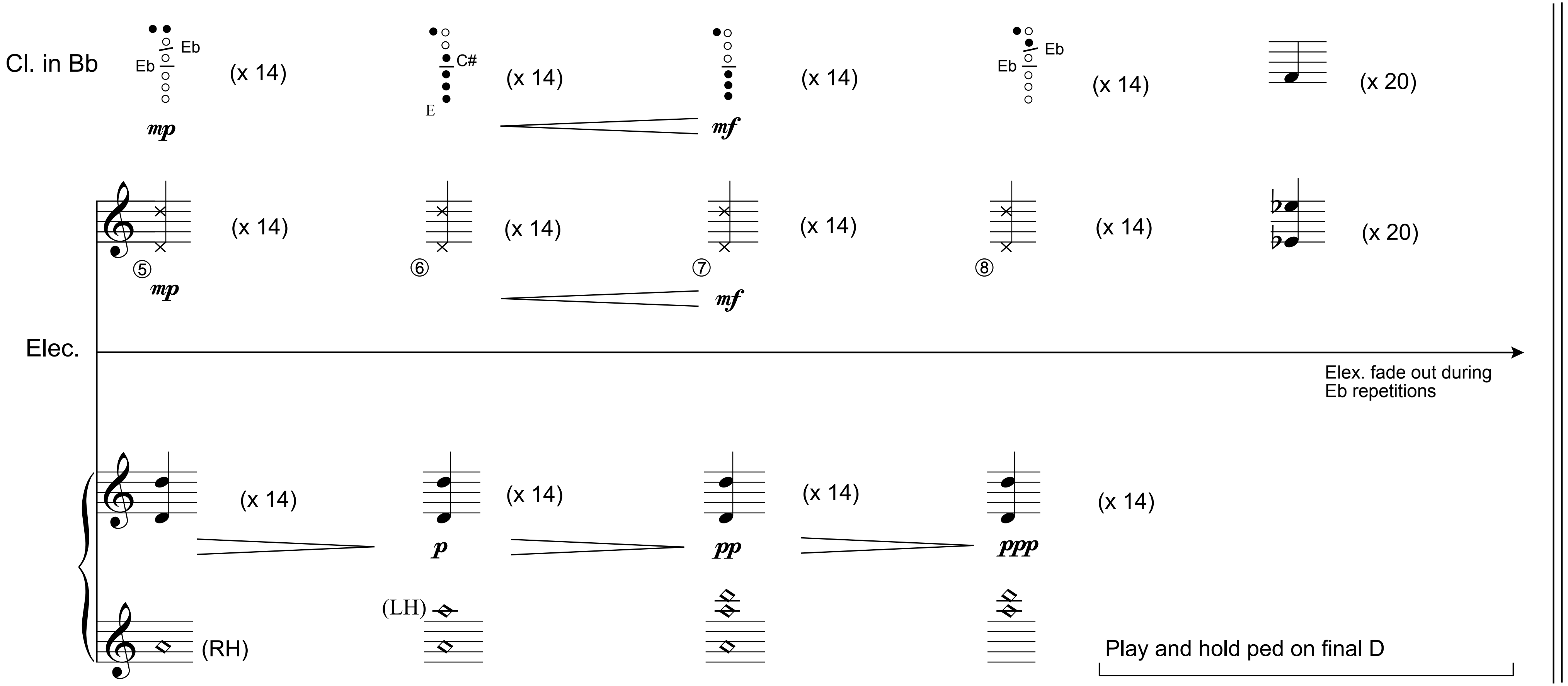
** sustain unison with clarinet


10"
15"
G#
Eb
Eb
p
gliss to
harmonic spectra
on D
STOP

II

All instrumental players in rhythmic unison


♩=40
Do not cresc. through individual notes
Clarinet in Bb
p
(x 14)
F
(x 14)
Eb
(x 14)
E
(x 14)
(x 14)
Cello
p
(x 14)
①
(x 14)
②
(x 14)
③
(x 14)
④
(x 14)
Electronics
Slow ascending gliss
p
♩=40
Piano
mp
(x 14)
(x 14)
(x 14)
(x 14)
(x 14)
(x 14)


Cl. in Bb
Eb
Eb
mp
(x 14)
C#
E
(x 14)
mf
(x 14)
Eb
Eb
(x 14)
(x 20)
⑤
mp
(x 14)
⑥
(x 14)
⑦
mf
(x 14)
⑧
(x 14)
(x 20)
Elec.
Elex. fade out during
Eb repetitions
(x 14)
p
(x 14)
pp
(x 14)
ppp
(x 14)
(RH)
(LH)
Play and hold ped on final D