University of Adelaide

Elder Conservatorium of Music

Faculty of Arts

A Creative Exploration of Organic Growth Principles:

portfolio of musical compositions and exegesis

by

Nicholas James Denison

Submitted in fulfilment of the requirements

for the degree of

Doctor of Philosophy

2018

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Track 4	*Seeking the Path that Leads Home*, for clarinet trio	6'
	Live recording of the dress rehearsal prior to the premiere (in a concert given by the Eclectica Trio), Elder Hall, Adelaide, 2011	
	Darvaza, concerto for percussion and wind orchestra	
	Live recording of the premiere (movements I and III only) given in a public concert of the Elder Conservatorium Wind Orchestra conducted by Robert Hower, with percussion soloist Andrew Wiering, in Elder Hall, Adelaide, September 2013. (The second movement was incomplete at that stage, so track 6, listed below, is a computer-generated performace.)	
Track 5	I	8'40
Track 6	II *	8'53
Track 7	III	16'25

* Computer generated recording.

ABSTRACT

This submission for the degree of Doctor of Philosophy at the Elder Conservatorium of Music, University of Adelaide, consists of a portfolio of original compositions supported by an explanatory exegesis. The submission is structured in three parts. Part A contains the exegesis and includes commentaries on the submitted works. Part B contains the scores of four new works with an overall performance time of approximately 75 minutes: ***Tidal Lock***, for symphonic orchestra; ***Sleeping Under Mariana***, for wind orchestra; ***Seeking the Path***…, for clarinet trio; and ***Darvaza***, concerto for percussion and wind orchestra. Part C contains sound recordings of the submitted works.

The overarching conceptual idea for this collection of works has been to engage in a creative exploration of the principles of organic growth; namely, Fibonacci structures - as applied to pitched material, phrase/bar lengths and larger structural durations; 'autogenesis' - the concept of self generating material, originating from a single source or 'germ'; and 'self-similarity' - structures whose components mirror their own shapes and forms. These concepts are not applied to the works in a prescriptive or formulaic manner; rather, they are used to guide and influence the compositional method with varying degrees of creative freedom. Each work seeks to explore these principles (and combinations thereof) in different ways, culminating in the major work of the submission: ***Darvaza***, concerto for percussion and wind orchestra.

DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution (except where cited) and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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Signed:

Date:

31/10/2018

ACKNOWLEDGEMENTS

Firstly, I should like to express my deepest gratitude to the various performers who made the realisation of the works presented herein possible. In particular, conductor Robert Hower, whose enthusiasm, tireless efforts in rehearsal, and belief in my work inspired me to continue down the rabbit hole. The players of the Elder Conservatorium Wind and Symphony Orchestras, whose positivity and openness made the realisation of my new works a pleasure. Percussionist Andrew Wiering, who performed my percussion concerto and spent many late nights workshopping various ideas and providing invaluable feedback; and finally, the players of the Eclectica Trio: Anna Coleman, Amanda Home and Charise Penrose.

This project would not have been possible if not for the support, encouragement and kindness of my principle supervisor, Professor Charles Bodman Rae. I would also like to thank my co-supervisor Professor Graeme Koehne, and Associate Professor Kimi Coaldrake for their feedback along the way.

There are many people in my personal life that helped in some way to bring this work to life. Firstly my friends, many of whom grew tired of hearing "it's nearly done" - well, it is now done, and I thank you for your support, and or harassment. I would especially like to thank Dr Crystal Sweetman for her feedback and support, stretching back to my Honours year. My parents Rob and Therese, who have supported my musical aspirations from the earliest steps, and of course extended family. My dear pet cat "Buddy", for keeping me company during the long nights of writing (R.I.P.), and finally my partner Emily, whose unwavering encouragement kept me chomping at the bit!

Thank you all.

LIST OF MUSIC EXAMPLES

A.3 Commentary on *Sleeping Under Mariana*

A.4 Commentary on *Seeking the Path that Leads Home*

A.5.1 Commentary on *Darvaza Mvt I*

A.5.2 Commentary on *Darvaza Mvt II*

A.5.2 Commentary on *Darvaza Mvt II*

PART A

EXEGESIS

A Creative Exploration of Organic Growth Principles

A.1 INTRODUCTION

1.1 Introduction to submission and general overview of organic concepts.

Through the application of organic growth principles, this creative compositional submission aims to produce major original works which display high levels of 'organic unity'. The submission takes the principles of organic growth applied by Bartók and other composers as its departure point, aims to build upon them, and take the concepts forward with the composition of these new works.

The application of the organic growth principle in musical composition is not a new concept. In fact, one can find examples of the principle at work not only in music, but also in other disciplines such as architecture[1] and the visual arts.[2] It is not surprising that nature's forms have been sought out as an alternative to the established forms in music (e.g. sonata form). The forms found in nature are symmetrical and balanced, yet each example displays a degree of uniqueness. In addition to this property, organic forms often display inseparable and fundamental relationships between materials making an organism, and the structures containing them (the concept of the micro - macro relationship).[3]

These properties lend themselves to the ideal of achieving organic unity within a musical composition. Stephen Pepper explains 'organic unity':

> There are two qualitative dimensions that yield organistic standards of beauty - the degree of integration and the amount of the material integrated. The maximum of integration is a condition where every detail of the object calls for every other. Or negatively, it is a condition where no detail can be removed or altered without marring or even destroying the value of the whole. Such a whole is called an organic unity.[4]

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[1] The Golden Section has been a defining principle of design ratios as seen in the time of the ancient Greeks. For further reading on organicism in architecture see: Richard A. Dunlap: *The Golden Ratio and Fibonacci Numbers* (Singapore: World Scientific Publishing, 1997), and also: Le Corbusier: *The Modulor* (London: Faber and Faber, 1951)

[2] An example of organicism in the visual arts would be that of 'Cubism', where in many examples ratios appear to be intentionally selected to conform to those of the Golden Section. For further reading see: Dunlap, *op. cit*.

[3] Peter Pearce: *Structure in Nature is a Strategy for Design.* (Cambridge, MASS: MIT Press, 1980), p.iv.

[4] Stephen Pepper: *The Basis of Criticism in the Arts.* (Cambridge, MASS, 1946), p. 79.

Ruth Soli describes the concept of organic unity as a network of related ideas, saying "The characteristic of biological systems most commonly invoked in aesthetic evaluation is their "organic unity," a notion which lies at the centre of a whole network of related ideas".[5]

The concept of organic growth in this submission is made necessarily objective and measurable by identifying and discussing the following three aspects:

1. The Fibonacci numbers and the Golden Section.[6]
2. The concept of Autogenesis
3. The concept of 'self-similarity' and the Mandelbrot set.

The research is therefore tripartite in its methodology and approach. This submission discusses each aspect in relation to its function in nature, followed by appropriate musical examples from the existing repertoire.
These three components are briefly discussed below:

Fibonacci, Lucas and the Golden Section

The Fibonacci and Lucas numbers are additive numerical sequences, whereas the Golden Section is defined as a ratio (known as Phi, and defined as the number 1.618...[7]). Both Phi, and the aforementioned numerical sequences are commonly found in nature, both being linked in that by dividing the upper digit of two neighbouring Fibonacci or Lucas numbers by the lower, the resulting number is an approximation of the Golden Section (becoming increasingly more accurate the higher one goes up in either sequence).

Autogenesis - growth of all compositional materials from a single 'germ'

[5] Ruth A. Solie: 'The Living Work: Organicism and Musical Analysis'. *19th-Century Music* (1980) Vol. 4, No. 2, p. 148.
[6] Strictly speaking, only the Fibonacci series is used as a compositional tool in the submission - in conjunction with the other two concepts. However, due to the inseparable nature of the Fibonacci series and the Golden Section, this discussion would be incomplete without its inclusion. A rationalisation for the omission of the Golden Section as a compositional tool is provided chapter 1.6.
[7] Phi (ϕ), like Pi (π, defined as the number 3.14159... etc) is an irrational number, with an infinite number of decimal places.

Autogenesis: self-generation; origination within the organism,[8] the concept of all materials originating from a single source, evolving and expanding.

The concept of 'self- similarity' and the Mandelbrot set (fractals)

Anthony Barcellos defines 'self-similarity' as "...expanded objects which can be dissected into congruent components similar to the original object".[9] That is to say, an object whose components mirror its shape and form. The Mandelbrot set deals with the analysis of shapes that Mandelbrot[10] refers to as 'fractal sets'.[11] These fractal sets display a high level of self-similarity (the micro-macro relationship).

1.2 Aims of the creative investigation

The aims of this creative research investigation have been:

1. To create a body of new works, each of which is generated by (or affected by) principles of organic growth.
2. To build upon principles of organic growth applied to composition by Bartók and others, taking the concepts forward.
3. To explore the principles of organic growth in various compositional situations, including works for large orchestral forces and multi-movement works of extended duration.
4. To apply and synthesise these principles of organic growth in orchestral and extended works that will hopefully make a significant contribution to their respective repertoires.

[8] Miller -Keane & O'Toole, Mary T: 'Autogenesis', in *Miller - Keane Encyclopaedia & Dictionary of Medicine, Nursing & Allied Health.* (New Jersey: Saunders, 2005), Vol. 7, p. 17.
[9] Anthony Barcellos: 'Fractal Geometry of Mandelbrot'. *The College Mathematics Journal,* (March, 1984), Vol. 15, No. 2, p. 100.
[10] The Mandelbrot set is named after mathematician Benoît Mandelbrot.
[11] Benoit B. Mandelbrot: 'Scalebound or Scaling Shapes: a Useful Distinction in the Visual Arts and in the Natural Sciences'. *Leonardo,* (1981), Vol. 14, No. 1, p. 45.

1.3 RESEARCH QUESTIONS

The above aims have been interrogated through a group of corresponding research questions:

1. In what ways can the concepts of organicism as used by Bartók et al be expanded upon and further developed?
2. How can these principles of organicsm be applied in different compositional situations, including application to large orchestral forces, and conversely to smaller ensemble type configurations?
3. How can the chosen aspects of organicism[12] be used both in combination, and independently in the composition of orchestral and extended works that will hopefully make significant contributions to their respective repertoires?

1.4 DETAILED DESCRIPTION OF ORGANIC CONCEPTS

1.4.1 Goethe and Robinet - early ideas of organicism from the perspective of botanists.

As one would expect, there is an extensive literature on principles of organic growth, primarily relating to growth patterns found in nature, but also covering some growth patterns in artistic creation, including music. Perhaps the most obvious sources to mention for growth patterns in nature are by the early botanists. The discussion below focuses on poet Johann Wolfgang von Goethe [1749 – 1832] and naturalist Jean Baptiste Robinet [1735 – 1820] and is sourced primarily from David Montgomery's article 'The Myth of Oragnicism: From Bad Science to Great Art'.[13]

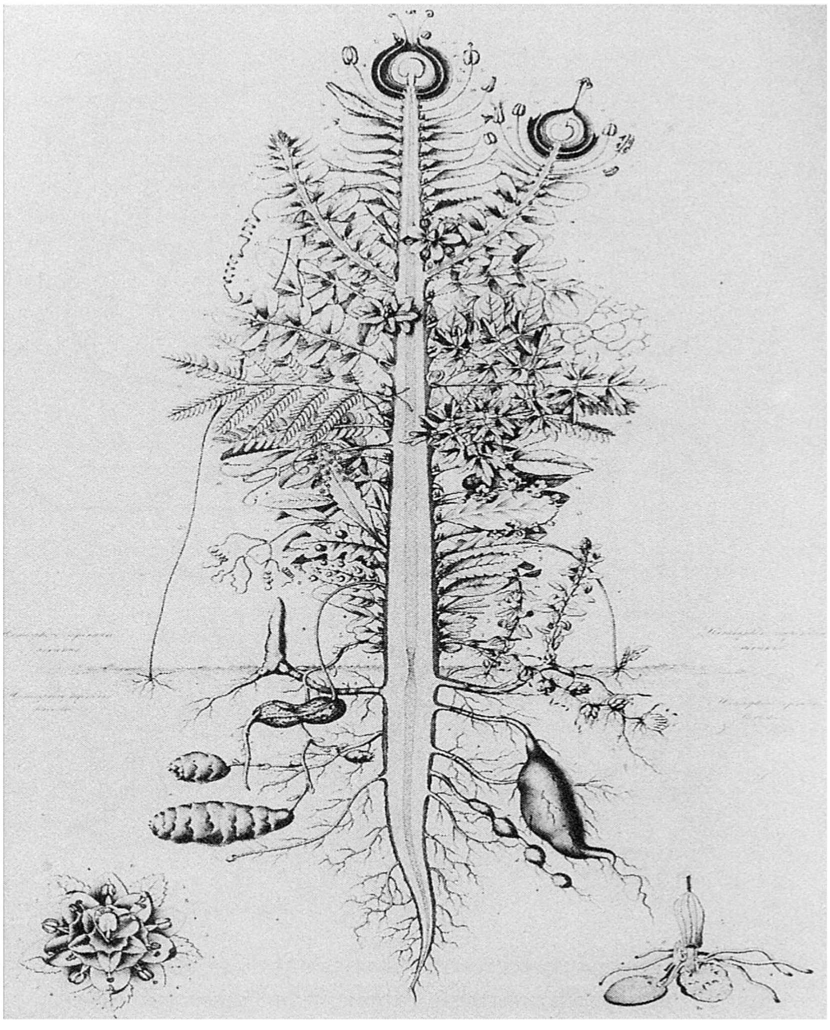
Although Goethe is perhaps best known for his poetry and other writings, he spent a considerable amount of time and energy as an amateur scientist. His fascination with the sciences led him to self-imposed studies in "everything from botany to optics"[14] Through his investigations and studies, he became convinced of the existence of various prototypical

[12] As discussed above: Fibonacci, autogenesis & self-similarity.
[13] David L. Montgomery: 'The Myth of Organicism: From Bad Science to Great Art'. *The Musical Quarterly* (Spring, 1992), Vol. 76, No. 1, pp 17-66.
[14] Ibid, pp. 17-18.

forms (*Urtypen*) for both fauna and flora. These forms he termed the *Urtier* ("generating animal") and *Urpflanz* ("generating plant").[15] The *Urpflanz* (artistic impression appearing in Fig. 1.4.1.1) “consisted...of a single giant bush, replete with the seeds of every known botanical species.".[16]

Goethe’s idea of the *Urpflanz*, if applied to musical composition, might be understood as the disorganised sketch materials of the composer, appearing on a single large canvas. Of course, the composition that followed could not include further materials not present in the original sketches – a kind of frozen state of development, with no subsequent transformations. One could of course reverse engineer a polished work to produce an *Urpartitur*[17] of sorts. A more broad interpretation might be that of the composer who writes the one masterwork - basing all future works off of its various parts. Such a concept is in fact a reality, and many composers are indeed guilty of it!

Fig. 1.4.1.1 Goethe's *Urpflanz.*[18]



[15] Ibid, p. 18.
[16] *Loc. cit.*
[17] An invented word and concept.
[18] Image source: 'Urpflanze.'Wikipedia. https://de.wikipedia.org/wiki/Urpflanze (accessed July, 2018).

Goethe's idea of the "original life form" was in fact preceded by French naturalist Jean Baptiste Robinet some twenty years prior. Whilst Goethe's prototype was "all-inclusive", containing all possible future iterations – Robinet's took the form of a "small primal element, a cell possessed of a will to develop into higher forms"[19] Such an idea bears a more immediate relationship with the compositional process in comparison to Goethe's. This mechanism often presents itself the works themselves, as themes and motives are spawned of from a central point.

Robinet came to realise his conception of the prototype was perhaps best imagined a romantic idea, as opposed to a valid scientific phenomenon. Geothe, however, clung to his convictions, going so far as to search for its very existence. He searched for his "botanical "Noah's ark" in Italy and Sicily, where, presumably, he felt that life had begun...".[20] Goethe's unwavering enthusiasm and belief in his model are highlighted by his diary entries below, made whilst searching for his mythical *Urpflanz.*

> Palmero. Tuesday, April 17, 1787
>
> Early this morning, with the calm, firm intention of realizing (sic) my poetic dreams, I went outside into the garden. But before I knew it there arose another vision that has occupied me these days. Myriad plants that during the year I am used to seeing only in tubs and pots—in fact most of the time only behind glass—here they grow happy and hearty under untroubled skies. And as they attain the fullness of their potential, they become ever more clear to us. In fact so many new and renewed impressions I began again to wonder if I might discover among this array the Generating Plant itself. Such a thing must exist![21]

> Naples. May 17, 1787
>
> The Generating Plant will turn out to be the most fascinating creation in the world, for which [discovery] Nature herself should envy me. With this model, and the key to it, once can invent plants ad infinitum that will eventually come to be—this means even those that do not exist but could exist (and not just in the poetic or painterly imagination, but also in the sense of inner truth and necessity). The same principle will apply to all other living things.[22]

[19] Montgomery, *op. cit.,*p. 18.
[20] *Op. cit.,* p. 20
[21] *Loc. cit.*
[22] Ibid, p. 21.

One can only imagine Goethe's disappointment when such a plant never revealed itself to him.

Of the two prototypical ideas, "It was Robinet's model that actually dominated the nineteenth-century concept of organic development—particularly as it extended to artistic creation".[23] Sadly for Robinet, Goethe has come to inherit the credit for both ideas and their respective influences on artistic creation.[24] Despite the early popularity of both ideas, neither was found to be rooted in fact, and "...by the mid-nineteenth century scientists rightly regarded them as crack-pot."[25]

Despite the above dismissal, we can say that at least Robinet's prototypical cell concept bears some passing resemblance to the standard model of evolution on a broader scale – the idea of a simple cell developing into a more complex one, and so on.

In the context of this compositional project, Robinet's prototypical cell and subsequent growth concept is the most useful and usable - although there will perhaps be instances where Geothe's model bears fruit in its own way.

1.4.2 Fibonacci/Lucas numbers and the Golden Section

The focus of this background introduction is to explain the relationship between the Fibonacci series and the Golden Section, and its appearance as a defining proportion of Nature, Architecture and of Art (including Music).[26]

Leonardo of Pisa, perhaps the greatest mathematician of the Middle Ages (ca. 1170-1250) is today known as "Fibonacci".[27] According to Richard Dunlap, Leonardo received a formal education North Africa, becoming acquainted with the Arabic system of numbers and the advanced system of Arabic mathematics.[28] Returning to Italy in the early part of the thirteenth century,[29] he published his mathematical treatise *Liber Abaci* (1202), advocating the implementation of the Arabic Numerals in present day mathematics.[30]

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[23] *Op. cit.,* p. 20.
[24] *Loc. cit.*
[25] *Op. cit.,* p. 23.
[26] Steven Vadja: *Fibonacci & Lucas Numbers, And The Golden Section - Theory and Applications* (Chichester: Ellis Horwood Limited, 1989), p. 7.
[27] Ibid, p. 17.
[28] Richard A. Dunlap: *The Golden Ratio and Fibonacci Numbers* (Singapore: World Scientific Publishing, 1997), p. 35.
[29] *Loc. cit.*
[30] Vadja, *loc. cit.*

In his book, Leonardo posed the "problem involving the progeny of a single pair of rabbits which is the basis of the Fibonacci sequence (or Fibonacci series)".[31] Dunlap describes the rabbit problem as follows:

> A pair of adult rabbits produces a pair of baby rabbits once every month. Each pair of baby rabbits requires one month to grow to be adults and subsequently produces one pair of baby rabbits each month thereafter. Determine the number of pairs of adult and baby rabbits after some number of months. It is also assumed that rabbits are immortal.[32]

The following explanation of the Fibonacci sequence can be used in reference to Figure 1.4.2.1.[33] By the end of the first month, the first pair of rabbits has mated but not given birth. The female of the pair gives birth to a new pair towards the end of the second month, meaning there are now two pairs of rabbits in the field. The original female now produces a second pair during the 3rd month, making a total of 3 pairs now in the field. As the fourth month passes, both female rabbits (the original, and its first born female) both produce pairs, making a total of 5 pairs. Looking at the number of pairs in the field on a monthly basis, we see the following figures (with a continuation of the same sequence beyond 5 pairs): 1, 1, 2, 3, 5, 8, 13, 21, 34 etc.[34] This sequence is known as the Fibonacci sequence. In order to calculate each subsequent number, one simply adds the previous digit with the current digit (e.g. 0+1 = 1, 1+0 = 1, 1+1=2, 2+1=3, 3+2=5, 5+3=8, 8+5=13). The sequence officially begins on the number zero (although it is occasionally shown as being: 1, 1, 2 etc).

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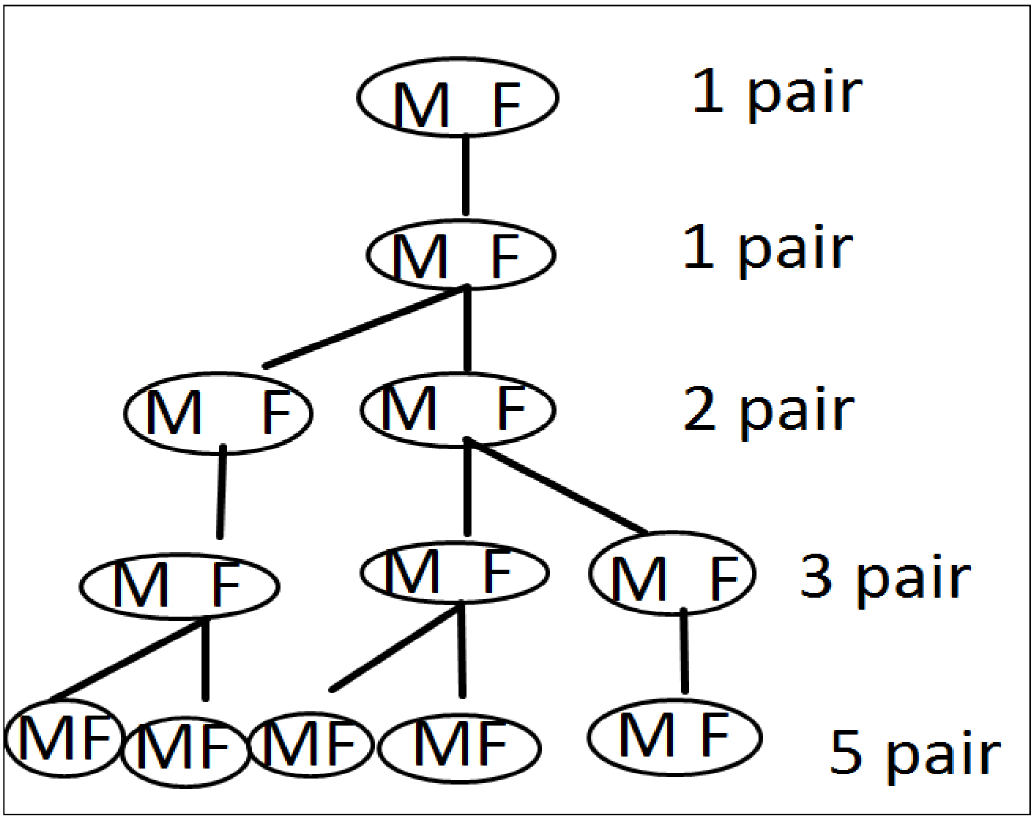
[31] Dunlap, *loc. cit.*

[32] Ibid, p. 35.

[33] Pages 20-27 and portions of pages 37-39 and their associated images are directly derived from a chapter of the author's own honours submission: Nicholas J. Denison: Honours submission (University of Adelaide, 2009), pp. 140-148.

[34] Ron Knott: 'Fibonacci Numbers and Nature.' Fibonacci Numbers and the Golden Section. http://www.maths.surrey.ac.uk/hostedsites/R.Knott/Fibonacci/fib.html (Accessed November 13, 2009)

Fig 1.4.2.1 Fibonacci, as demonstrated by the breeding of rabbits.

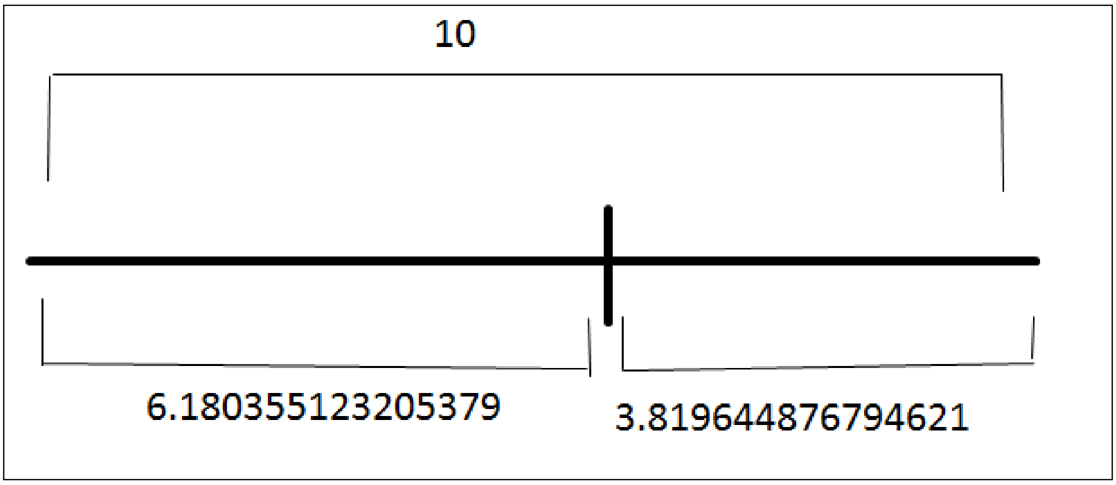


Whilst the Fibonacci sequence is less than 800 years old (and serious study dates back only 150 years), the Golden Section has been studied since antiquity (Vadja, p. 17). The Golden Section (often referred to as "Phi", or "ϕ") is an irrational number which is defined as $(1+\sqrt{5})/2$ and is considered to be the most irrational of the so-called irrational numbers.[35] "It has been called the *golden mean,* the *Golden Section,* the *golden cut,* the *divine proportion,* the *Fibonacci number* and the *mean of Phidias* and has a value of 1.61803...".[36 37]

The basic concept of the Golden Section can be described as follows. A line of length 'x' is divided into two sections of differing lengths, 'a' and 'b', where 'a' is longer than 'b'. In this case, the ratio of the total length of the line (x) to the length of the longer segment (a), is the same as the ratio of the length of the longer segment (a) to the length of the shorter segment (b). That is, x/a = a/b. This ratio is the Golden Section.[38]

[35] Dunlap, *op. cit.,* p. 1.
[36] *Loc. cit.*
[37] "1.61803..." is an expression of the expanding Golden Section. The corresponding expression of contraction is "0.61803...".
[38] *Loc. cit.*

Fig 1.4.2.2   A line divided into two sections by way of the Golden Section.



The first book exclusively to cover the topic of the Golden Section was *De Divina Proportione*, written in 1509 by Luca Pacioli [1445-1519]. Pacioli's book was illustrated by Leonardo da Vinci [1452-1519].[39] The ratio can also be found at the heart of many geometric shapes of both two and three dimensions (for example, in architecture). Whilst a reference to the Renaissance and da Vinci is made above, the Golden Section can in fact be traced back much further, as far back as the ancient Egyptians. Regarding the great Pyramid of Cheops (also known as the great pyramid of Giza), Dunlap notes:

> The great Pyramid of Cheops...has a base length of about 230 meters, a height of about 147 meters (although about 9 meters of this has weathered away) and an apex angle of approximately α = 63.43 degrees....This apex angle is very close to the angle of the golden rhombus (63.435 degrees) which has dimensions derived from the golden ratio.[40]

The above examples can be considered as visual manifestations of the Fibonacci numbers and the Golden Section. The rabbit problem, a consequence of the Fibonacci sequence operating through time, leaves a concrete result that is observable. The Pyramid of Cheops is interesting in that it is a 3 dimensional object. It has elements of the Golden Section running through all three dimensions, yet one can only observe a certain portion at any one time.

[39] Ibid, p. 2.
[40] Ibid, p. 3.

Lucas Numbers

Little needs to be said regarding the Lucas numbers, as much of the above regarding the Fibonacci numbers is applicable to both sets. The Lucas numbers follow the same additive formula as the Fibonacci numbers, but start on the values 2 and 1, instead of 0 and 1 (or 1 and 1 if the zero is discounted). Regarding the differing 'seed values' of the two series, Dunlap states:

> Certain choices of seed values will... yield additive sequences which are distinctively different from the Fibonacci sequence. One such possibility was studied extensively in the late nineteenth century by French mathematician Édouard Lucas who published the results of these investigations in 1877. He considered the next smallest seed values L0= 2 and L1= 1.[41] These values will generate the additive sequence
>
> 2, 1, 3, 4, 7, 11, 18, 29, 47, 76, 123 ...etc.[42]

As the additive formula is common to both sets of numbers, derivation of an approximation of the golden section is also possible with the Lucas numbers; for example, 123 divided by 76 produces 1.6184...

It is clear that the Lucas numbers are equally as useful compositionally - if by no other device than by alternation with Fibonacci values. Two independent lines/materials could operate on each, or material previously treated with Fibonacci values could be later treated with Lucas values as a means of variation. Many other possibilities of combination and alternation are feasible.

1.4.3 Examples of Fibonacci and Golden Section in nature

Flowers

The Golden Section manifests itself within biological systems in numerous ways, with its properties being evident on many different levels of an organism's structure. The characteristics of symmetry, of optimal spacing and the phenomenon of the Fibonacci growth spirals are all related to the mathematical properties of the Golden Section.[43] According to Dunlap, for instance we find that "Among the higher plants, the flowering

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[41] Where the Fibonacci sequence's seeding values are F0= 0 and F1= 1.
[42] Ibid, p. 51.
[43] Ibid, p. 122.

plants are those which display the most obvious fivefold symmetry".[44] We find the Fibonacci number in the number of petals in the following flowers: Iris have 3, Corn Marigolds have 13, Daisies can be found to have 24, 55 or even up to 89 and buttercups have 5 petals.[45]

Flowering plants can be divided into the two distinct subclasses of *Monocotyledonae* and *Dicotyledonae,* more commonly known as "Monocots" and "Dicots" respectively. In the subclass Monocots, petal arrangements of three-fold symmetry (eg. 3, 6, or 12 petals are present), whilst Dicots display four- or five-fold symmetry. This five-fold symmetry is either rotational (i.e. the flower may be rotated five times and preserve its original shape in each rotation), or both rotational and inverted (mirrored) symmetry, depending on the shape of the petals.[46] In regard to this symmetry and its connection to the Golden Section, Dunlap remarks, "It is shown that the Golden Section plays a prominent role in the dimensions of all objects which exhibit fivefold symmetry".[47] The occurrence of Fibonacci numbers in flower petals is a static, two dimensional example. These visually orientated examples can be viewed and at once comprehended.

The Human Body

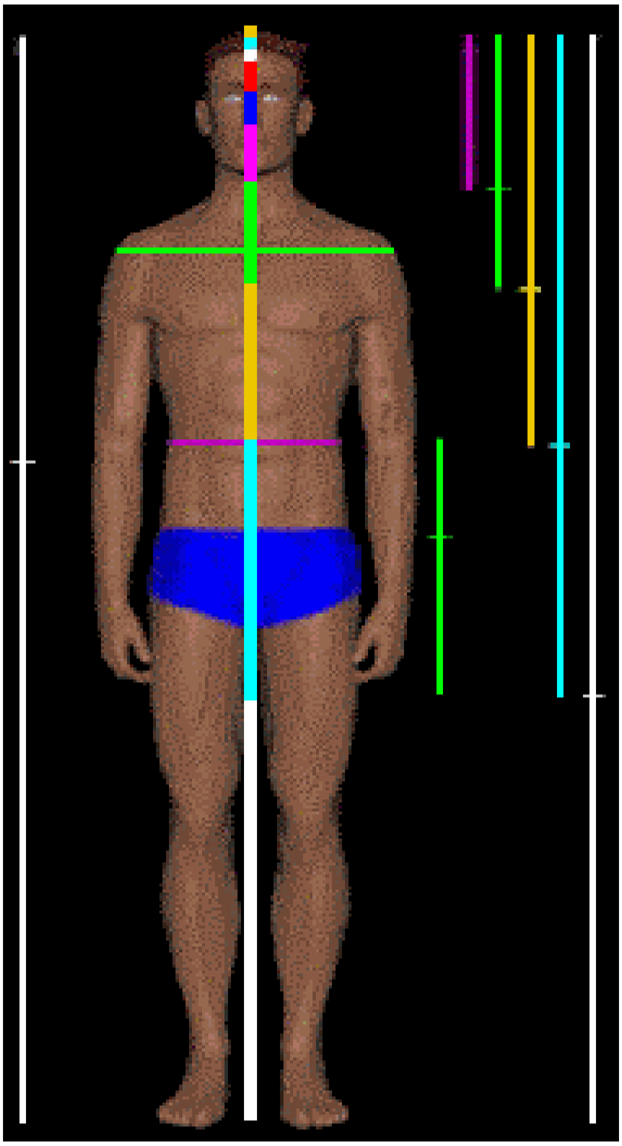
The human body displays the Golden Section in many of its proportions (Fig 1.4.3.1), both on the macro and micro levels. For example, the point at which the elbow joint occurs (with arms loose at the sides) is the point at which the height of the human body is divided by the Golden Section. When turning this division upside down, we find the point of the golden section aligns with the outstretched fingertips. Progressively focussing in, we find the Golden Section division of the distance from the top of the head to the fingertips at the elbow joint. Dividing the distance from the top of the head to the elbow joint yields the position of the shoulder joint; turned upside down this division runs approximately through the bottom of the chin.[48]

The human body also displays multiple symmetries, the most obvious of which is the symmetry based around the central axis through the middle of the body. This can be related to the symmetry found in the music of Béla Bartók for example, where the formal structure

[44] Ibid, p. 123.
[45] Knott, *loc. cit.*
[46] Dunlap, *op. cit.,* p. 5.
[47] *Loc. cit.*
[48] Gary Meisner: 'The Human Body.' GoldenNumber.net. http://goldennumber.net/body.htm (Accessed November 16, 2009) (now located at http://www.goldennumber.net/human-body)

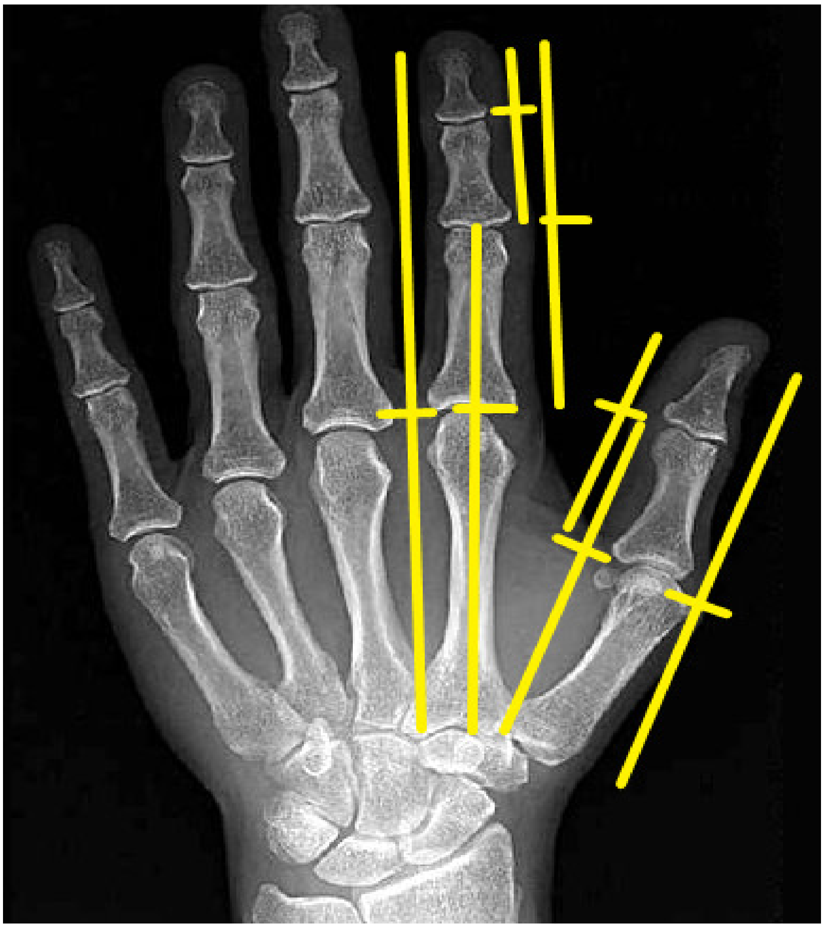
often involves symmetry, and the scalic material is often found constructed around a central axis, creating pitch symmetries.

Fig 1.4.3.1 Divisions of the Golden Section in the human body.[49]



[49] Image source: Meisner, *loc. cit.*

Fig 1.4.3.2 An X-ray of the human hand demonstrating the Golden Section divisions.[50]



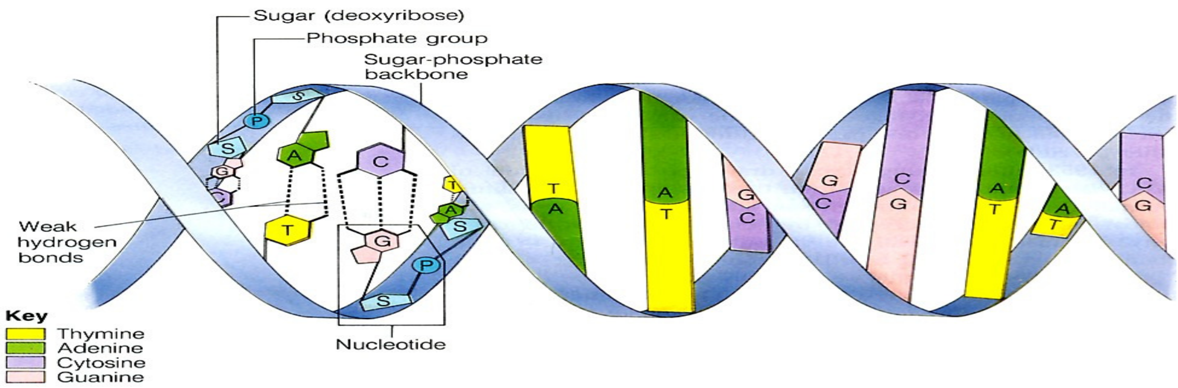
On a much smaller scale, we discover that the human hand harbours multiple divisions of the Golden Section (Figure 1.4.3.2). Dividing the distance from the first knuckle to the end of the finger reveals the Golden Section at the second knuckle. Dividing the distance of the second knuckle to the end of the finger reveals the golden section at the last joint. If we divide the entire length of the hand (to the end of a particular digit) we arrive at the Golden Section at the first knuckle.

The Golden Section can be found in the most intricate building blocks of humankind, in the material that defines each one of us as who we are; our DNA (Figure 1.4.3.3). Regarding the Golden Sections manifestation in the human and all other biological organisms, Radoslav Jovanovic remarks:

[50] Image source: ' Medical Physics Teaching Materials for Schools'. http://schools.medphys.ucl.ac.uk/images/images.html (accessed September 2009) (yellow lines denoting Golden Section divisions added by author of the submission)

> The DNA molecule, the program for all life, is based on the Golden Section. It measures 34 angstroms long by 21 angstroms wide for each full cycle of its double helix spiral. 34 and 21, of course, are numbers in the Fibonacci series and their ratio, 1.6190476 very closely approximates Phi, 1.6180339...[51]

Fig 1.4.3.3. A strand of DNA.[52]



Fibonacci Spirals

The occurrence of Fibonacci spirals in growth patterns is directly related to nature's requirement for 'optimal spacing' and is encountered in many plants and organisms. These growth spirals can be differentiated into two categories: those that are visually obvious (e.g. snails and spiral shells) and those that are less obvious (e.g. the scales on a pinecone, or the surface of a pineapple).[53]

In the example of the typical pinecone, we see spiral growth patterns in both clockwise (Figure 1.4.3.4, left) and counter clockwise (Figure 6, right) directions. It is clear from the images below that the clockwise spiral is the tighter of the two, indicating an outward spiral growth.[54] The number of clockwise and counter clockwise spirals are almost always successive numbers from the Fibonacci series. In this instance, the clockwise spiral series has eight, and the counter clockwise series has 13. The growth angle of the scales is therefore related to the golden ratio (i.e. 13/8 which is equal to 1.625, a rough approximation of the Golden Section of 1.618).[55]

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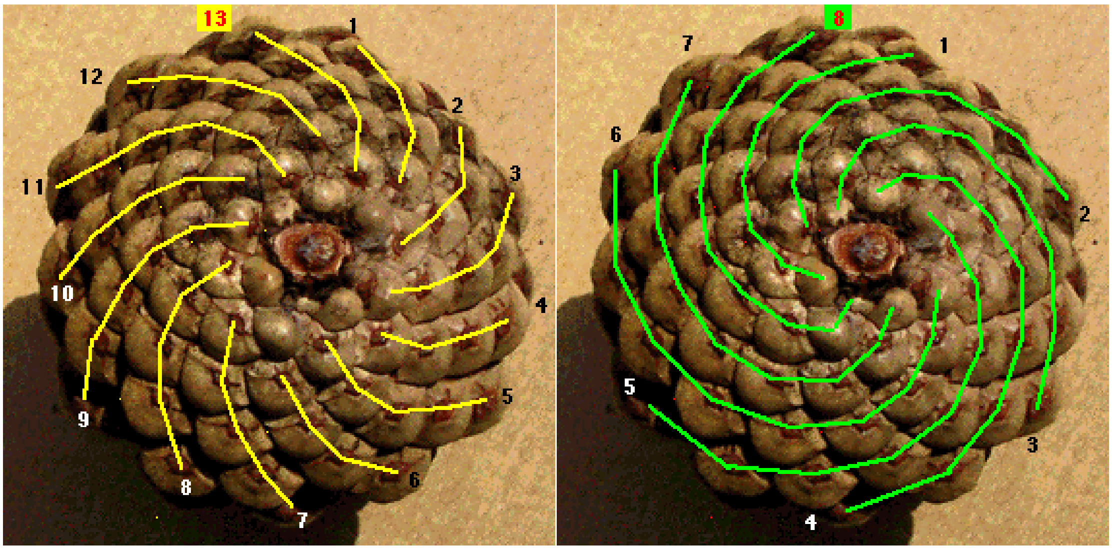
[51] R. Jovanovic: *The Golden Section and the Human Body*. Fibonacci Numbers and the Pascal Triangle. http://milan.milanovic.org/math/english/golden/golden2.html (accessed November 16, 2009)
[52] Image source: 'DNA, RNA and Chromosomes.' http://blog.nus.edu.sg/yiuyan/2009/08/26/dna-rna-and-chromosomes/ (Accessed September, 2009)
[53] Dunlap, *op. cit.,* p. 123.
[54] *Loc. cit.*
[55] Knott, *loc. cit.*

The pinecone comes closer to the concept of Fibonacci numbers and the Golden Section as a measurement of time than the previous examples, showing its growth history through time. Here we have a snap shot of the pinecone at different stages in its development, much like the rings of a tree.

Fig 1.4.3.4 Identification of two different spiral arrangements on the same pinecone.[56]



1.4.4 Autogenesis

According to Vilmos Csányi and György Kampis, "one of the still unresolved problems of evolution is the formation of the very first replicative entities, self-replicating molecules or molecule-systems or, possibly, cells during the initial phase of biological evolution".[57] The theory of autogenesis attempts to resolve these questions surrounding the emergence of replicative entities. To this end, Csányi and Kampis describe "autogenesis" as "a theoretical evolutionary model -concerning the theory of the emergence of replicative unities".[58] They suggest that "replicative unities--such as living organisms--evolve via autogenesis".[59]

Some additional descriptions of "autogenesis" from other authors will help in rounding out the concept. Maryam Moshaver describes it as "…the image of the unfolding

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[56] Image source: http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fibnat.html#pinecones
[57] Vilmos Csányi & György Kampis: 'Autogenesis: The Evolution of Replicative Systems', *Journal of Theoretical Biology* (1985), Vol. 114, No. 2, p. 305.
[58] Ibid, p. 311.
[59] Ibid, p. 303.

germ and the autogenesis of living organisms…"[60] and "The idea of autonomous self-generation of organisms".[61] Terrence Deacon refers to the process of autogenesis as a complex that "becomes self-maintaining of its own self-maintenance capacity" noting that "such a system tends to reconstitute itself if disrupted, and can even reconstitute multiple replicas of the original if broken up".[62] In the early 20th century, the morphologist Alexei Nikolaevich Severtsov (1866 - 1936) referred to autogenesis as an evolutionary theory based on internal causes, strongly distinguishing it from those based on external causes, which he called "ectogenesis".[63]

Autogenesis commences from a beginning point known as a "zero-system/0-system". In reference to the processes surrounding the beginnings of evolution, Csányi describes the zero-system as "the "ground state" of the molecular system immediately preceding the start of evolution on Earth".[64] A zero-system has no organisiation, and requires a minimal set of appropriate components to initiate the self-oragnising, self-building process of autogenesis. These sets of minimal components are termed *autogenetic system precursors* (AGSP).[65] Autogenesis of a system proceeds until it reaches its end state, where its replication is perfect, and it produces its own boundaries. This is considered to be the state of "*evolutional equilibrium*".[66]

The explanations above are rather biologically-centric in their nature. It is important to point out that the theory of autogenesis can be studied in many different contexts – not only in the biological sciences. Csányi extends the application of the concept to include other levels of evolution on Earth, including: cultural, ecological and technical. He gives a description for the way in which each process may have led to the emergence of the 'zero-system' conditions required for the initiation of the next.[67] Moshaver suggests that the genesis of "history, language, philosophy, art—in short all aspects of human endeavour"

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[60] Maryam A. Moshaver: *The Motivation of Form: The Poetics of Music Theory and the Writings of Moritz Hauptmann* (PhD diss., Columbia University, 2006), p. abstract.
[61] Ibid, p. 169.
[62] Terrence W. Deacon: 'The Importance of What's Missing', *NewScientist* (2011), Vol. 212, No. 2840, p. 36.
[63] As cited in: Sander J. Gliboff: The Pebble and the Planet: *Paul Kammerer. Em st Haeckel, and the Meaning of Darwinism*. (PhD diss., Johns Hopkins University, 2001), pp. 267-268.
[64] Vilmos Csányi: *Evolutionary Systems and Society: A General Theory of Life, Mind, and Culture*. (Durham: Duke University Press, 1989), p. 44.
[65] Vilmos Csányi: 'Evolution: Model or Metaphor?', In *Evolutionary Systems: Biological and Epistemological Perspectives on Selection and Self-Organization* (1st ed., pp. 1-11), ed. G. Vijver, S. Salthe & M. Delpos (Dordrecht: Springer Netherlands, 1998), pp. 6-7.
[66] Csányi & Kampis, *op. cit.,* p. 314.
[67] As cited in: Csányi & Kampis, *op. cit.,* p. 316.

may be ascribed to the concept of autogenetic growth.[68] Terrence Deacon tentatively speculates that the emergence of consciousness itself may lie in the autogenetic process, remarking that “the origins of life and the origins of consciousness both depend on the emergence of self: the organisational core of both is a form of self-creating, self-sustaining, constraint-generating process”.[69]

In summary, autogenesis is a process in which replicative growth arises from a conducive set of pre-existing conditions and materials (the zero-system and AGSP). Or put more simply, autogenesis is a process that commences in an environment containing components capable of spontaneous self-organisation and replication. The growth and organisation of the system is informed by the information contained within its starting components, without significant exterior influence. Growth and replication of the system proceeds until it has reached its final end state – a stable state in which it is replicatively perfect, and has exhausted the potential for further growth/change. The ultimate potential for replicative growth is effectively predetermined by the information contained within the system’s originating components (AGSP), and thus we have, as Moshaver put it, “…the image of the unfolding germ…”.

As the concept is complex and theoretical in nature, it will not be appropriate to give detailed examples of its occurrence in nature, as with the discussions on Fibonacci/Golden Section and ‘self-similarity’. The enthusiastic reader is of course encouraged to delve into the sources provided. We can consider, however, a simplistic example. The seed that grows into the plant. The seed contains the information that will unfold and grow into the final form. A tomato seed is destined to become a tomato plant. No amount of exterior influence (e.g. environmental) can cause it to become a carrot, or a pine tree. Such an example is admittedly imperfect (and likely at odds with the strictest scientific definition of the concept), but will satisfy our needs here.

In the compositional context of this submission, the concept of *autogenesis* is granted a broad and flexible interpretation. That is, the general idea of extracting all (or a large percentage) of the compositional materials from a single 'germ' of information. This germ (which will be referred to as the 'primordial material'[70] within the commentaries) could be a horizontal line such as a melody, a rhythmic pattern, or a vertical arrangement of notes.

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[68] Moshaver, *op. cit.,* p. 176.

[69] Terrence W. Deacon: ‘The Importance of What’s Missing’, *NewScientist* (2011), Vol. 212, No. 2840, p. 36.

[70] Interchangeably and as a synonym to "*autogenetic system precursors*” (AGSP).

The process may be generational, in the sense that an extracted material may itself serve as a node from which to generate new materials, without direct reference to the original germ.

Compositionally, the 'zero-system' will be considered here to be the point at which there are rough, disorganised sketches – but without known/decided form or function. These loose sketch materials will be the AGSP - capable of growth and replication. The system of autogenetic growth will then commence unlike in nature (spontaneously), but by the conscious hand of the composer. The 'end state' of the process is reached when the compositional process has exhausted the potential inherent in the original idea/s, as is appropriate to the creative narrative of the work. It could also be more pessimistically considered as when the composer has exhausted their talent for creatively manipulating the material.

In the course of the commentaries, the discussion and analysis regarding autogenesis will be weighted towards the autogenetic growth of the germ materials, with an introductory discussion alluding to the sketching process that created them, dependent on the piece in question.

1.4.5 'Self-similarity' (the micro – macro relationship)

Whereas autogenesis describes a process of growth, 'self-similarity' describes a state of being – an end point. Simply put, if an object or phenomenon reproduces itself on different scales of space or time, it is said to be self-similar.[71] In other words, an object that is similar to each part of itself.[72] A familiar example of this would be the Russian Matryoshka dolls (Fig. 1.4.5.1). The larger doll is made up of smaller copies of itself. A geometrical example is shown in Fig. 1.4.5.2. Here there are two distinct levels of self-similarity; the large upper triangle - made from smaller triangles, and the lower square - made from smaller squares. This phenomenon is found abundantly in nature, but is also a feature of fractal mathematics.

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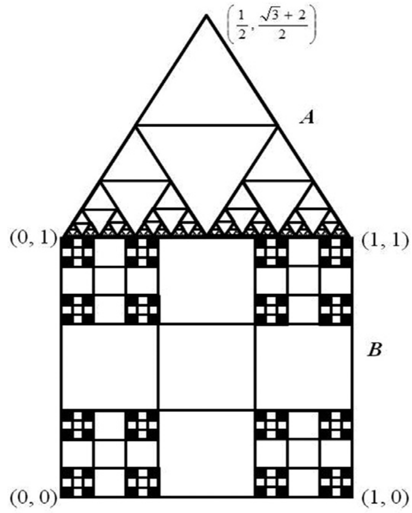
[71] Bahman Zohuri: *Dimensional Analysis and Self-Similarity Methods for Engineers and Scientists.* (Cham: Springer International Publishing, 2015), p. 9.

[72] Serge Cohen & Jacques Istas: *Fractional Fields and Applications* (Berlin: Springer Berlin Heidelberg, 2013), p. 1.

Fig. 1.4.5.1 Russian Matryoshka dolls as an illustration of self-similarity.[73]

Fig. 1.4.5.2 Basic geometric shape displaying self-similarity.[74]



The concept of self-similarity, is, in a sense, a unifying concept out of the three included in the submission. It has a potential relationship with both the Fibonacci sequence, and the process of autogenesis. The application of either growth process (Fibonacci sequence derived or autogenesis) has the potential to produce an end state with levels of self-similarity present, and the same is likely true of these phenomena in the natural world.

Any discussion regarding the macro - micro relationship would not be complete without acknowledging the realm of fractals. Broadly speaking, fractal theory is both the study of the shapes of natural objects, and the mathematical creation and study of artificial/theoretical fractals, as pioneered by mathematician Benoit Mandelbrot (1924 - 2010).[75] Mandelbrot coined the term 'fractal' in the late 1970s, though he acknowledged the

[73] Image source: Zohuri, o*p. cit.*, Fig. 1.3

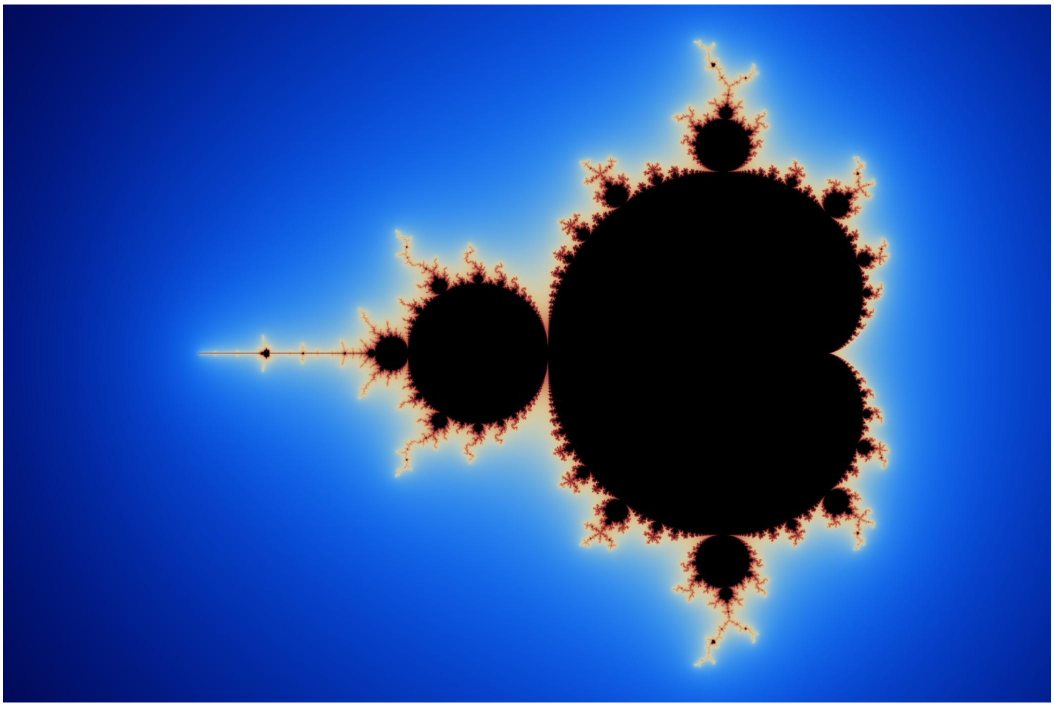
[74] image source: R.K. Aswathy & Sunil Mathew: 'On Different Forms of Self Similarity'. *Chaos, Solitons and Fractals: the interdisciplinary journal of Nonlinear Science, and Nonequilibrium and Complex Phenomena* (June, 2016), Vol. 87, p. 104, Fig. 1

[75] Ibid, p. 102.

existence of objects now considered as 'fractal' as having existed long before this.[76] Theoretical fractals display an exact level of self-similarity where the "fractal objects are infinitesimally subdivisible...containing no less detail than the complete set".[77] This exact form of scalability is known as *Scale Invariance*.[78] A more detailed survey of fractal theory (e.g. digressing into complicated equations) would not be appropriate here. The sources on the subject provided in the reference list will give direction to the avid reader, particularly those by Mandelbrot himself.[79]

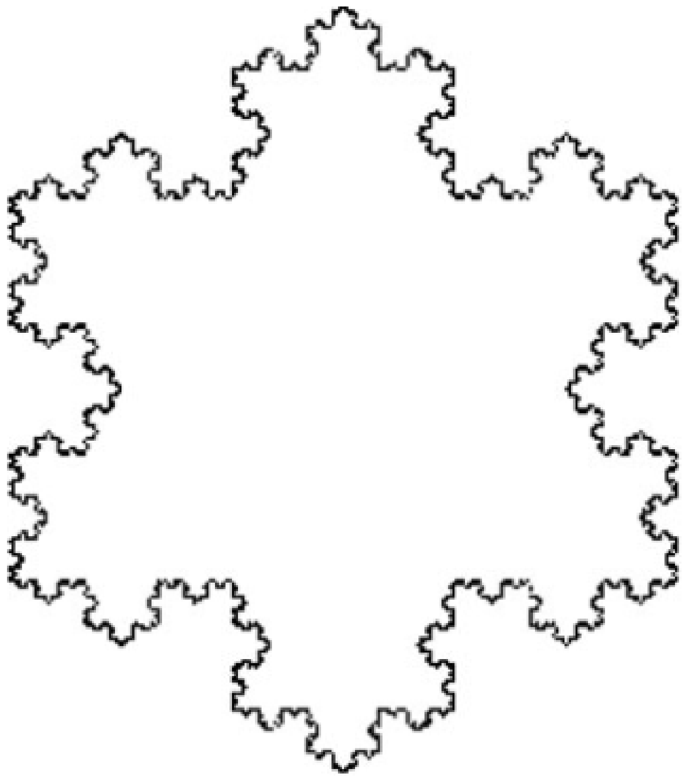
Figures 1.4.5.3 and 1.4.5.4 depict fractals with the above described qualities of scale invariance (there are many other fractal sets, such as the Julia set).[80] The Mandelbrot set's (Fig. 1.4.5.3) boundary features smaller exact copies of itself, which in turn have copies along their boundaries, and so on. The Koch snowflake's (Fig. 1.4.5.3) boundary consists of unclosed partial copies of itself, which, like those of the Mandelbrot set, repeat to infinity.

Fig. 1.4.5.3 The Mandelbrot set.[81]



[76]As cited in: Huw Jones: 'Fractals Before Mandelbrot - A Selective History' In *Fractals and Chaos*, ed. A. J. Crilly, R. A. Earnshaw, & H. Jones (New York: Springer New York, 1991), p. 7.
[77] *Loc. cit.*
[78] Zohuri, *op. cit.,* p. 75.
[79] Mandelbrot, 1981, 1983 & 2002
[80] Zohuri, *op. cit.,* p. viii
[81] Image source: Dan Scott: 'Mandelbrot Set in Excel.' The Drafting Table, http://danbscott.ghost.io/mandelbrot-set-in-excel/ (accessed August 11, 2017).

Fig. 1.4.5.4 A Koch snowflake.[82]



1.4.6 Examples of self-similarity in nature

The following examples ought to be rather self-explanatory. Fig. 1.4.6.1 demonstrates the aforementioned example of zooming in on a coastline from space. Though the self-similarity at each magnification is not exact, the features are distinctly 'similar'. Fig. 1.4.6.2 reveals a universal fractal relationship between objects from the micro (spiral organism), to the truly macro (galaxy). The branch systems (tree and river system) of Fig. 1.4.6.3 are similar to both themselves, and to one another. The branches fork out into smaller branch systems that resemble the whole. Finally, the fern's (Fig. 1.4.6.4) parts are near exact copies of its whole.

[82] Image source: Zohuri, *op. cit.*, p. 14.

Fig. 1.4.6.1 Coastline of England at increasing levels of magnification, showing self-similarity.

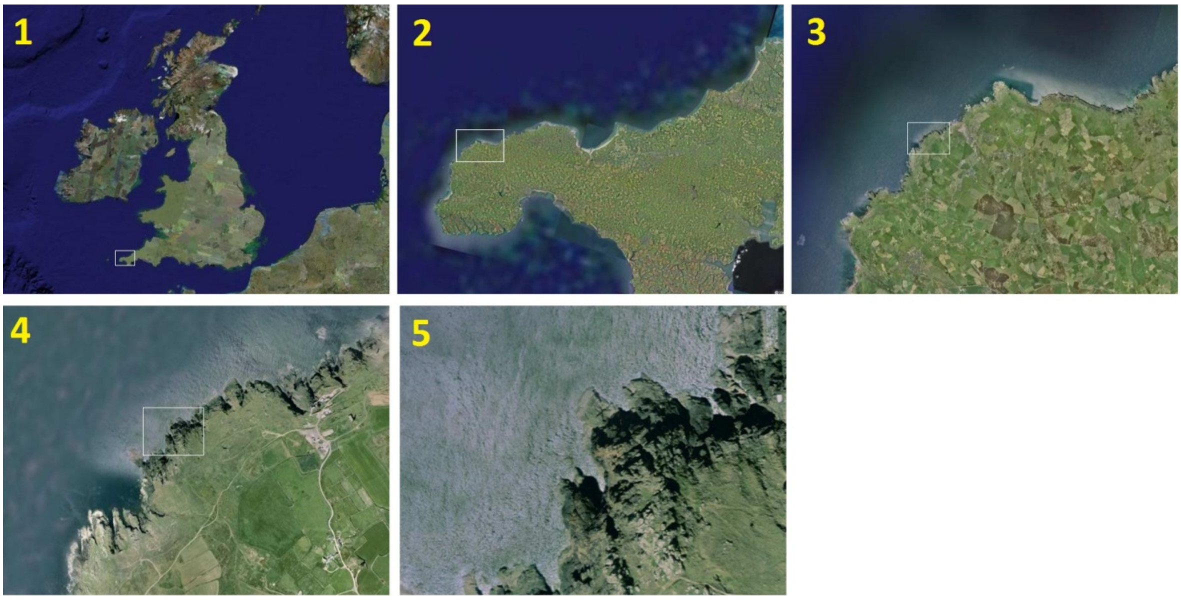


Fig. 1.4.6.2 Micro – macro relationship in spirals. A 300 million year old fossilised ammonite, hurricane and a galaxy.

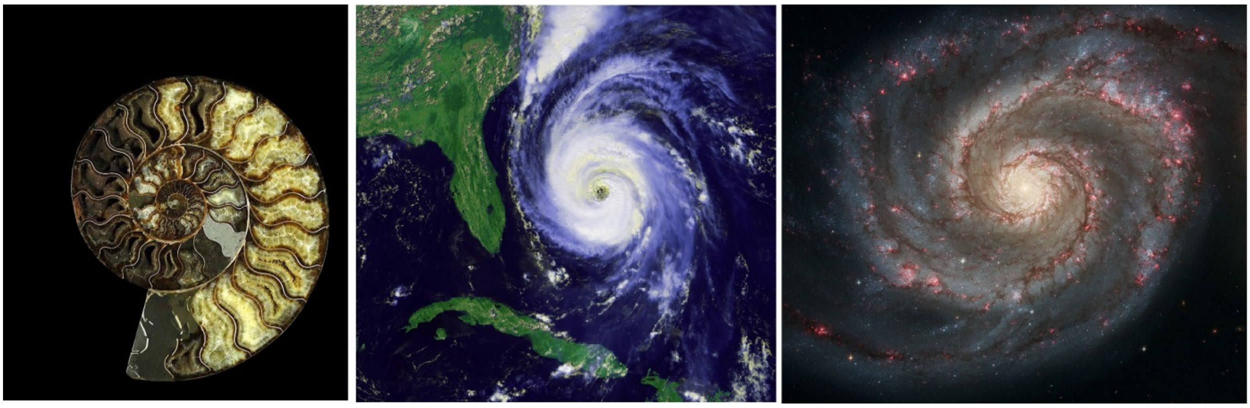


Fig. 1.4.6.3 Micro – macro relationship in branches. A tree and a river system.[83]

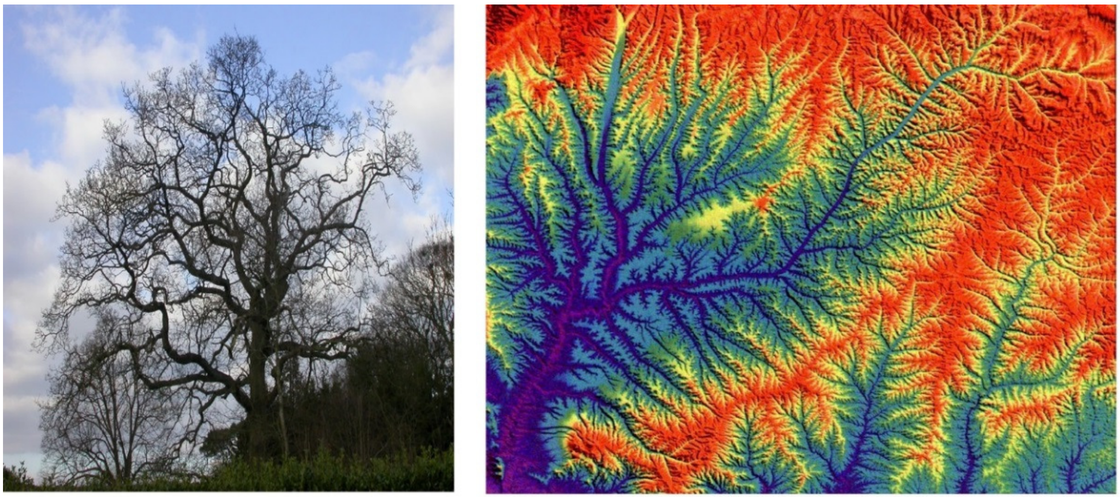
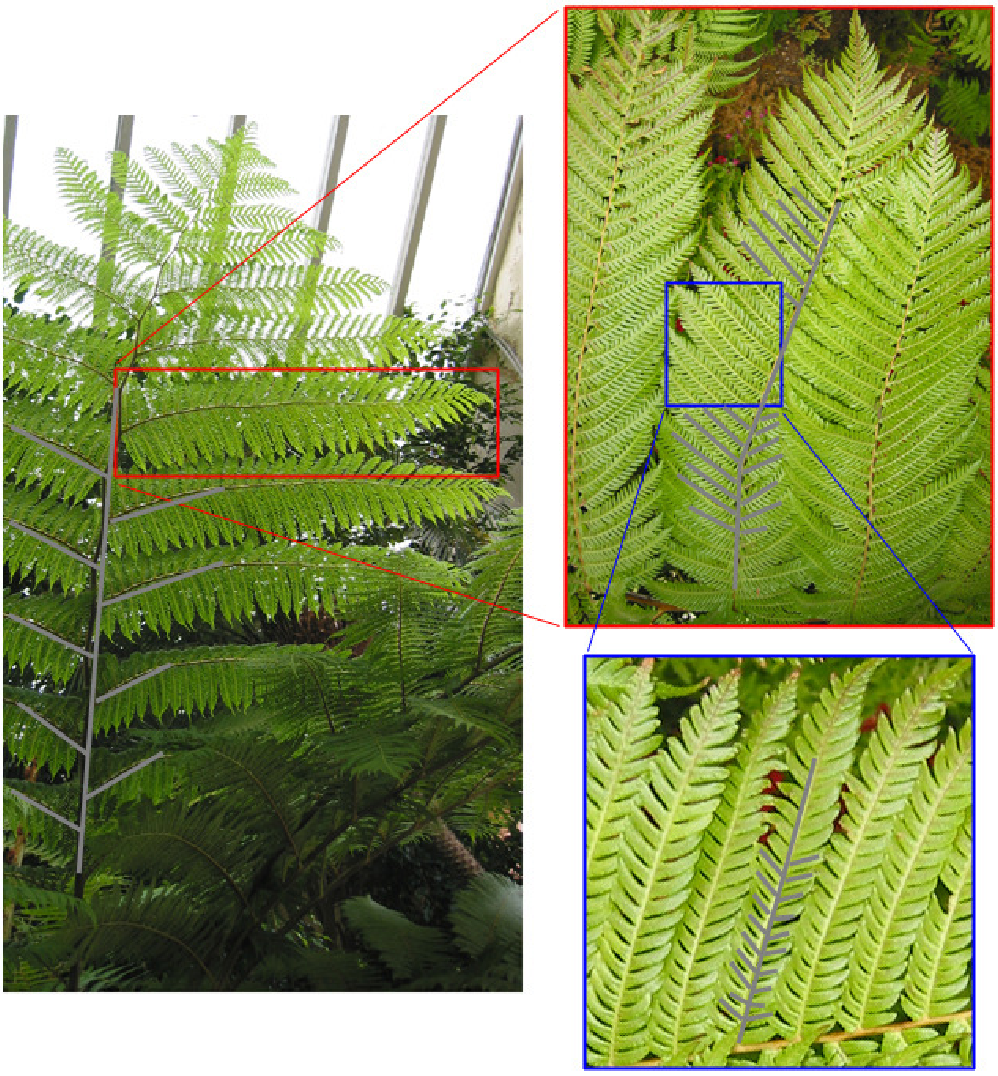


Fig. 1.4.6.4 A fern displaying self-similarity.[84]



[83] Image sources for figures 1.4.6.1 - 1.4.6.3: Jonathan Wolf: 'What are Fractals?' Fractalfoundation.org, https://fractalfoundation.org/resources/what-are-fractals/ (Accessed August 2017).

[84] Image source: Robert Lindeman: 'Fractals and Iterative Function Systems.' Semantic Scholar https://pdfs.semanticscholar.org/presentation/aa12/1b2bb40802b2235fdeb9c3cbfc0affcf8b73.pdf (p. 15). (Accessed August 2017).

1.5 ORGANIC CONCEPTS AS APPLIED TO MUSIC

1.5.1 Fibonacci numbers and the Golden Section

Belá Bartók is perhaps the most well-known composer to have made use of the Golden Section and Fibonacci numbers in his music. However, many other composers have made use of these ratios as defining proportions in their works, including Karlheinz Stockhausen, Luigi Nono and Ernst Krenek.[85]

It is necessary to acknowledge here that there are documented cases of Fibonacci and Golden Section use in the music of composers going back as far even as the Renaissance.[86] These examples, whilst they require acknowledgement, lie outside of the scope of this PhD submission, and will therefore not be discussed.[87]

Bartók

The explorations of Fibonacci sequences and Golden Section ratios in Bartók's music have largely been undertaken by Ernő Lendvai (1925 – 1993). Roy Howat states:

> Two qualities make Lendvai's analyses especially fascinating. The first is the link between his theory and the organic world: Lendvai stresses Bartók's expertise in natural history and his frequently expressed view of music as an organic phenomenon. The other quality is the cohesion of Lendvai's ideas which embrace all aspects of musical structure.[88]

Bartok's string quartets in particular display proportions derived from the Fibonacci numbers and the Golden section. Derek Locke presents the following explanation regarding the fourth string Quartet of Bartók:

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[85] Jonathan Kramer: 'The Fibonacci series in 20th-century music', *Journal of Music Theory* (1973), Vol. 17, No. 1, pp. 121, 126, 141.

[86] It is worth noting that some, or all of these early examples may in fact be cases of analyses 'after the fact', where the investigating party has found connections that exist purely by chance.

[87] For further reading on early examples of Fibonacci and Golden Section use in music, see: , M.V. Sanderesky: 'The Golden Section in Three Motets of Dufay'. *Journal of Music Theory* (1981), Vol. 25, No. 2, pp. 291-306 and also: J.D. Webster: 'Golden-Mean Form in Music', *Music and Letters* (1950), Vol. 31, No. 3, pp. 238-248.

[88] Roy Howat: *Debussy in Proportion: A Musical Analysis* (Cambridge: Cambridge University Press, 1983), p. 72.

> The work has five movements...., the total number of beats in these movements are as follows.
>
> | | | | | | | |
> |---|---|---|---|---|---|---|
> | movement: | 1 | 2 | 3 | 4 | 5 | total |
> | beats: | 644 | 500 | 284 | 372 | 784 | 2584 |
>
> The total, 2584, is the 18th Fibonacci number, while 1156 is the sum of the three inner movements, and also of the last three, is the square of 34, the 9th Fibonacci number.[89]

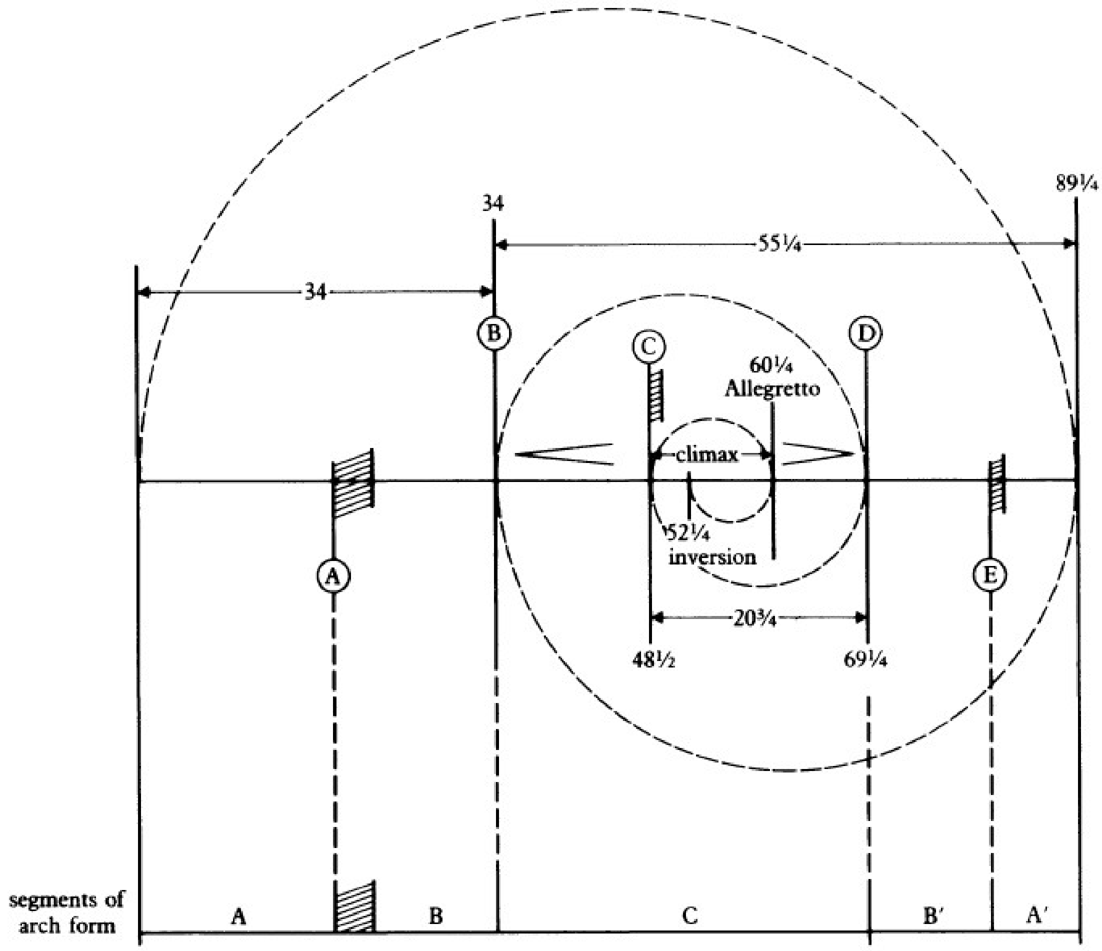
In this instance, the Fibonacci sequence has been applied to the macro aspect of the work. Each of the five movements bears a relationship to the other by way of the Fibonacci sequence.

The next example is a structural analysis of Bartók's *Music for Strings Percussion and Celeste.* Here we see a logarithmic spiral, the shape of which underlies constructions ranging from snail shells to galaxies.[90] Lendvai suggests that the cross-section of this spiral closely corresponds to the form and dynamic shape of the third movement of Bartók's *Music for Strings Percussion and Celesta*, as shown in Fig. 1.5.1.1.[91] This spiral analysis shows the Golden Section occurring numerous times, with multiple occurrences of the Golden Section occurring within itself. The climax of the movement occurs at the major Golden Section of the piece.

As opposed to the 4th string quartet, where the Fibonacci sequence is manifested as a ratio between the individual movements, the example from the 3rd movement of Bartók's *Music for Strings Percussion and Celesta* shows a 'focussing in' of the concept, where the Golden Section ratio is applied throughout a single movement.

[89] Derek Locke: 'Numerical Aspects of Bartók's String Quartets', *Musical Times* (1987), Vol. 128, No. 1732, p. 322.
[90] Howat, *op. cit.,* p. 83.
[91] Ernö Lendvai: *Béla Bartók: an analysis of his music* (London: Kahn & Averill, 1971), p. 31.

Fig. 1.5.1.1 Third movement of Bartók's *Music for Strings Percussion and Celesta.*[92]



The above examples of Bartók should be tempered by mentioning that Kramer is not in complete agreeance with the findings of Lendvai, suggesting that Lendvai's measured proportions of the *Music for Strings, Percussion, and Celeste* "are not quite as elegant or significant as they might first appear".[93] Kramer holds that Lendvai is perhaps guilty of omitting certain details (e.g. major textural changes) that do not suit the narrative of his examination:

> For example, the climax occurs after 55 bars (i.e., in bar 56) while the mutes are removed and the timpani enter in bar 34 (i.e., after 33 bars). For another example, a major textural change (underlined by the celeste entrance) occurs at bar 78, but it is omitted from Lendvai's schematic, perhaps because it does not fit his analysis.[94]

[92] Image source: Howat, op. cit., p. 83.
[93] Kramer, *op. cit.,* p. 120
[94] *Loc. cit.*

Both Howat and Lendvai give examples of Bartók's application of the Fibonacci sequence in determining pitched material.[95] Howat gives a pentatonic scale frequently found in his works, as illustrated by figure 1.5.1.2. This pentatonic scale proceeds by the distinctive intervals of tone, minor third, fourth and minor sixth - which as Howat identifies, is equal to 2, 3, 5 and 8 semitones, all Fibonacci numbers.[96] Similar scales as used by Bartók are shown in figures 1.5.1.3 - 1.5.1.4, with a detailed visual analysis in the latter example.

Fig. 1.5.1.2 Pentatonic scale commonly found in Bartók's work showing possible Fibonacci derived pitches.

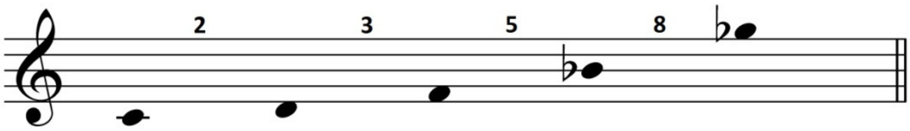


Fig. 1.5.1.3 Bartók pentatonic scale as given by Bachmann and Bachmann.[97]

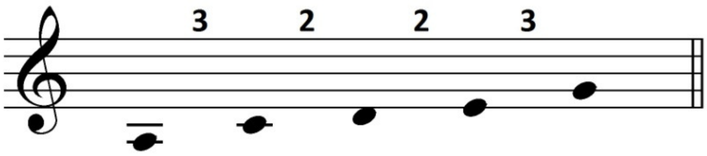
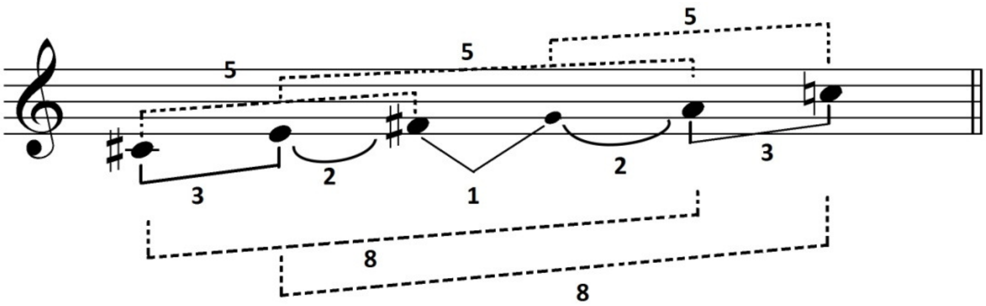


Fig. 1.5.1.4 Bartók hexatonic scale with possible Fibonacci relationships identified.[98]



Remarking on the additive qualities of the Fibonacci series as a compositional device, Kramer states:

> For the additive property of the Fibonacci series to have any meaning, there must be at least four consecutive terms present... To hear a duration of 8 as the sum of other durations of 5 and 3 is not special: the smaller durations could just as well have been, say, 6 and 2.

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[95] Lendvai's examples are cited in Kramer, *op. cit.,* p. 133.
[96] Howat, *op. cit.,* p. 72.
[97] Tibor Bachmann & Peter J. Bachmann: 'An Analysis of Béla Bartók's Music Through Fibonaccian Numbers and The Golden Mean', *The Musical Quarterly* (1979), Vol. 65, No. 1, p. 74.
[98] *Op. cit.,* p. 75.

Whilst Kramer's above remark is likely directed at the durational use of Fibonacci, one can see that the latter two examples (Fig. 1.5.1.3 & 1.5.1.4) fall short of this criteria. Speaking directly to Bartók's use of the Fibonacci series in the derivation of pitches, Kramer seems largely unconvinced by many of Lendvai's observations, stating that "these claims are not as universal or significant as Lendvai seems to imply".[99] Kramer suggests that although Lendvai's examples are numerous enough to "convince us he is basically correct", they are removed from their contexts in such a way as to distort their importance.[100] Kramer notes that it is largely irrelevant whether or not Bartók derived such pitch structures from the Fibonacci series, as "it cannot be perceived nor can any consequences of it be perceived...".[101] He goes on to give the reasoning that the examples given by Lendvai only use the values 1, 2, 3, 5 (occasionally 8),[102] and that a better explanation would be "a stylistic predilection for avoiding interval 4 (major 3rd)...".[103] Although Kramer only directly mentions Lendvai, his criticisms may applied equally to the other examples.

Kramer's objections are presented here in the role of the *advocatus diaboli* (devil's advocate) - balancing the enthusiasm of the above authors (Lendvai, Howat and the Bachmans), but not as an attack on their wonderful work. In order to not misrepresent Kramer as a 'Bartókian pessimist', is should be noted that he presents a detailed analysis of Bartók's work *Allegro Barbaro* relating to its use of Fibonacci durations.[104]

Stockhausen

In contrast to the above examples by Bartók, Stockhausen's use of the Fibonacci series is more prominent and systematic, contributing more significantly to the total form of his works.[105] *Klavierstück IX* sees the extensive use of Fibonacci derived time signatures. For example, the opening thirteen measures are each a Fibonacci duration, proceeding:

$$\begin{matrix} 13 & 2 & 21 & 8 & 1 & 3 & 8 & 1 & 5 & 13 & 2 & 5 & 3 \\ 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 \end{matrix}$$

[99] Kramer, *op. cit.,* p. 132.
[100] *Loc. cit.*
[101] *Op. cit.*, p. 134.
[102] As is the case with Howat's example (Fig. 1.5.1.2)
[103] *Loc. cit.*
[104] Kramer, *op. cit.,* pp. 118-119.
[105] *Op. cit.,* p. 121.
[106] *Loc. cit.*

With the exception of the lone 21/8 bar, each other time signature occurs twice (1/8, 2/8, 3/8, 5/8, 8/8 and 13/8 respectively). The measures containing repeated time signatures are not identical. In each instance, one contains attacks, and one contains sustained pedals. This passage is expositional in nature, with the work's following Fibonacci values being derived from it, and the passage that follows.[107]

As another example, Stockhausen's work *Adieu* features Fibonacci proportions used on a larger scale. The durational properties of all measures, except nine (five of which contain tonal references, the four others containing silence) are assigned by Fibonacci numbers from 1 - 144.[108] The use of Fibonacci by Stockhausen here is deliberate, and clearly perceptible; each Fibonacci duration is marked by a relatively static sonority, changing only when the next measure begins. This pairing of mechanisms draws the attention of the ear, fortifying and highlighting the unfolding of the Fibonacci durations.[109]

These are but brief glimpses into both works by Stockhausen, each of which contain many more instances of Fibonacci durations in a similar nature to those discussed above. Stockhausen's other notable Fibonacci related works include *Zyklus* (1959)[110] and *Telemusik* (1966).

Ferneyough

Brian Ferneyough's Second String Quartet is an interesting instance in which the composer forgot the compositional processes of his own work. Giacomo Albert recounts a lecture given by Ferneyough in Darmstadt (1982), wherein Ferneyough was unable to precisely analyse his use of the Fibonacci series in the work.[111] Albert uncovers numerous inconsistencies and alterations of the Fibonacci series' application in the work; some of these seem accidental as a result of reworking the piece, some are perhaps intentional deviations. Albert's examination of Ferneyough's sketches at the Paul Sacher Foundation reveal the following numerical sequence: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 311 (377), 550 (610), 861 (987), 1411 (1597) etc.[112] Numbers 1 - 233 follow the Fibonacci series, whereas numbers 311 - 1411 deviate (bracketed numbers showing the correct Fibonacci

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[107] *Op. cit.,* p. 123.
[108] *Op. cit.,* p. 125.
[109] *Loc. cit.*
[110] *Zyklus* is particularly interesting, as the composer presents an analysis of his own work in: Karheinz Stockhausen: *Texte Band 2* (Cologne: M. Dumont Schauberg, 1964).
[111] As cited in: Giacomo Albert: 'Weakening Structures or Structuring Mistakes? Brian Ferneyhough's Manipulation of the Fibonacci Sequence in his Second String Quartet', *Mitteilungen der Paul Sacher Stiftung* (2015), No. 28, p. 55.
[112] *Loc. cit.*

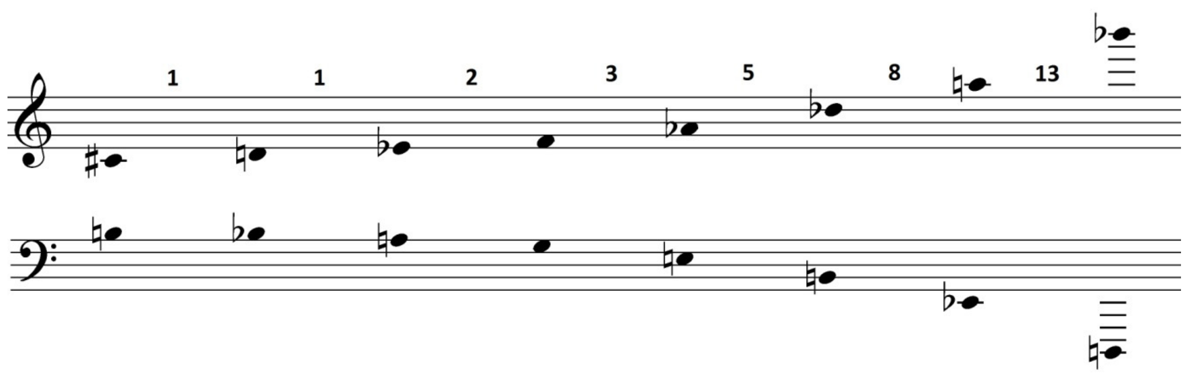
values). These alternate numbers then proceed in a Fibonaccian manner - adding each previous value to the current one to determine the following number. Such a deviation could actually be thought of as an organic process of mutation.

Albert does not come to a concrete answer as to whether the deviations are intentional or accidental. Such an explicit decree would of course be impossible without the composer's direct input. That the work has claimed its secrets for itself is an interesting phenomenon, like the overgrown ruins of an ancient structure - claimed by nature, claimed by time.

Walker

Figure 1.5.1.5 comes from a work titled *Business Music* by little known American composer Don Walker (1907 - 1989).[113] This scale is derived in the same way Bartók allegedly derived his Fibonacci based pitched materials, with the application of the Fibonacci numbers to successive intervallic relationships. Unlike the examples by Bartók however, Walker extends his scale well beyond the minimum "four consecutive terms" described by Kramer.

Fig. 1.5.1.5 Fibonacci derived scale from Don Walker's *Business Music.*



The examples presented above are by no means all inclusive - many other Fibonacci based/influenced works exist that have been well documented (e.g. those by Iannis Xenakis), and no doubt many exist that are yet to come to light. Those presented above are at least sufficient to give one a sense of what has been done in the area already.

[113] Kramer, *op. cit.,* p.

1.5.1.1 Two examples from the submission

The composition of *Sleeping Under Mariana* (2010) was preceded by an extensive exploration of the Fibonacci sequence. Building upon Bartók and Walker's use of the Fibonacci sequence to derive scalic materials, the eight tone scale below (Fig. 1.5.1.6) was created. Like Walker's scale, this scale uses the Fibonacci sequence to determine pitches by its application to the intervallic succession. Unlike Walker's scale, the scale below uses the Fibonacci sequence in reverse, starting on the number 21. The pitches are then assembled into a scale, by placing the tones in their ascending order (e.g. the sixth tone, D, becomes the second tone after C, the seventh tone E, follows and so on). The resulting scale was experimented with, but did not form a part of the compositional materials used in the piece.

Fig. 1.5.1.6 Reverse ordered Fibonacci series derived scalic material.

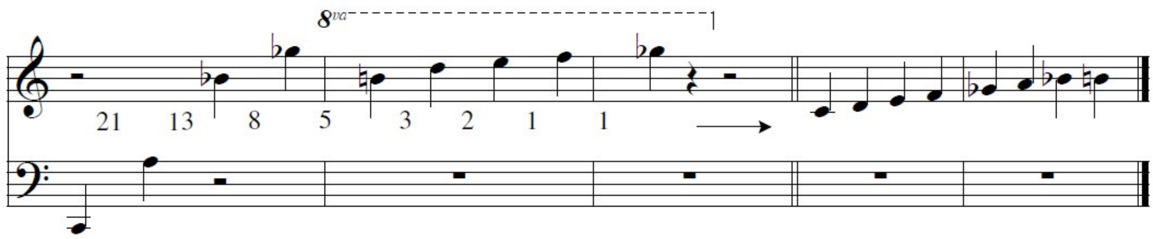


Fig. 1.5.1.7 is an early sketch relating to the submitted work *Darvaza*[114] (percussion concerto). Here the Fibonacci sequence is applied to bar lengths, not unlike the examples presented above by Stockhausen.

There are two components at work in this example, the bars of 8/8, and the sixteenth note bars. The three bars of 7/16 starting from bar 3 add up to 21, the 8th Fibonacci number. Bars 6 and 7 (7/16 + 6/16) add up to 13, the 7th Fibonacci number. Bars 9 and 11 are metered in 5/16, which is the 5th Fibonacci number.

The 8/8 bars are deceptive. They appear to conform to the sequence (the number 8 being the 6th Fibonacci number), but are in fact equal to 32 semiquavers, two short of the nearest Fibonacci number - 34. The 8/8 bars are operating independently of the semiquaver bars, and were intended to share similar sequential relationships with other quaver metred bars later in the work (e.g. 5/8, 3/8, 13/8).

[114] This sketch material did not 'make the cut' so to speak, and does not contribute to the construction of the final work.

Fig. 1.5.1.7 *Percussion Concerto* - Preliminary sketch utilising Fibonacci concepts.

1.5.2 Autogenesis

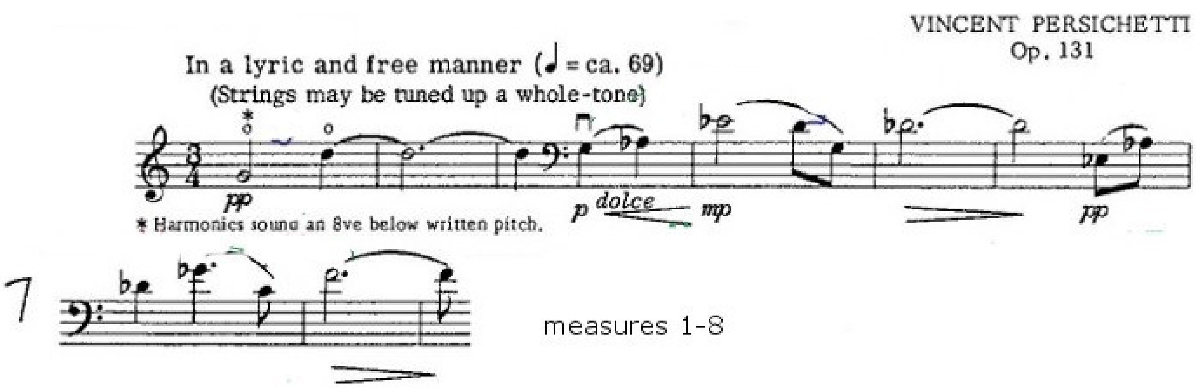
Vincent Persichetti

Mark Huff's doctoral dissertation examines Vincent Persichetti's *Parable for Solo Double Bass.* Huff discusses Persichetti's work from several angles, including defining the concept of a 'musical parable', a general analysis (including an investigation of Persichetti's use of autogenesis in his compositional method), and finally a discussion of the performance aspects for the work.[115] It is not possible here to expound upon Huff's dissertation or assertions in great detail, however the examples discussed below will be sufficient in demonstrating Persichetti's contribution to the repertoire with regards to the concept of autogenesis as a compositional tool.

Mark Nelson quotes Persichetti as having defined autogenesis as: "Relationships among hidden motivic materials, the discovery of similarities where differences predominate, the ability to retain specific detail without losing the overarching concept...".[116] Though Persichetti regularly used the term "autogenesis" when making reference to his compositions, Huff suggests its use is most thoroughly applied in his *Parables*.[117]

Huff defines the introduction's opening 5ths of G -D, followed by Ab - Eb a semitone higher as "bases for a paradigm for understanding many of the pitch relationships in this piece".[118]

Fig. 1.5.2.1 Persichetti, *Parable for Solo Double Bass,* 'germ' material, bars 1 - 8.[119]



[115] Mark Huff: *Vincent Persichetti's Parable for Solo Double Bass: Its Place in his Catalog of Parables and Complete Works* (PhD diss., The University of Alabama, 2011), p. ii & iv.
[116] as cited in Huff, *op. cit.,* p. 6.
[117] Ibid, p. 9.
[118] Ibid, p. 17.
[119] Image source: Vincent Persichetti: *Parable for Solo Double Bass* (Bryn Mawr, PA: Elkan Vogel, 1975) (as cited in Huff, *op. cit.*, p.17).

Huff presents his 'paradigms' of Example 1a (Fig. 1.5.2.2) and the hexachords of Example 1b (Fig. 1.5.2.3). The examples identify their vertical, diagonal and linear intervallic relationships, with intervals classed by their number of half steps and their respective inversions identified in brackets. Huff makes repeated reference to Example 1b in particular when explaining the origin of the various materials that occur throughout the work.

Fig. 1.5.2.2 Example 1a - paradigm 1.[120]

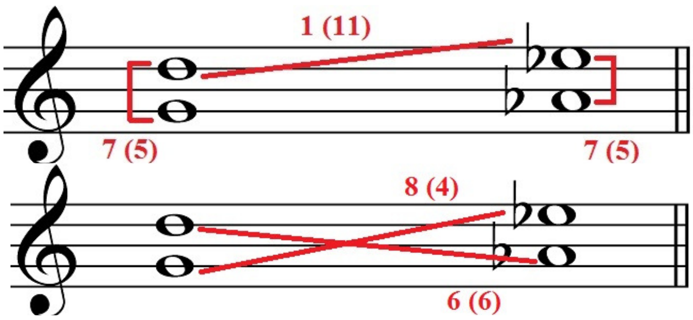
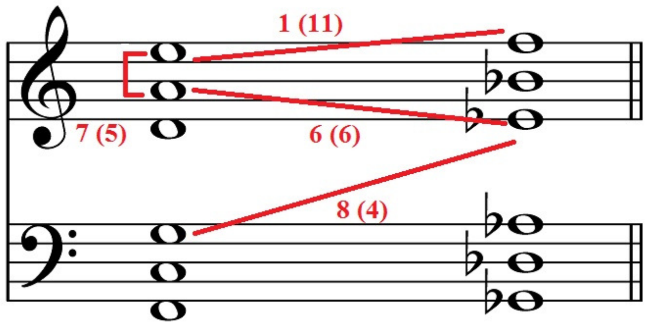


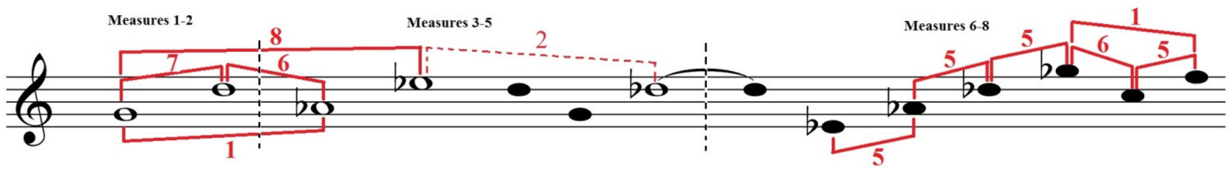
Fig. 1.5.2.3 Example 1b - paradigm 1 expanded.



In Example 1c (Fig. 1.5.2.4) Huff gives a detailed linear representation of the intervallic relationships contained within the work's opening. Here he demonstrates "one possible way of understanding what Persichetti meant by the term “autogenesis”" in highlighting the relationship between the G - D and Ab - Eb fifths of bars 1 - 4, with the fourths of bars 5 - 8; namely Eb - Ab, Db - Gb and C - F.[121] Huff draws special attention to the relationship between the semitone rise of the opening pair of fifths: G - D, Ab - Eb, with the semitone fall of the final pair of fourths: Db - Gb, C - F. He suggests that the fourths of bars 5 - 8, are a direct derivation of the opening fifths.

Fig. 1.5.2.4 Example 1c - intervallic analysis of bars 1 - 8.[122]

[120] Figures 1.5.2.2 - 1.5.2.5 are reproductions of Huff's original diagrams found at: Huff, *op. cit.,* p. 18.
[121] Huff, *op.cit.,* p. 19.
[122] Image source: *loc. cit.*



There is at least one example of Persichetti transforming linear material into a vertical arrangement. Huff gives his Example 11a, in which he plots the intervallic progression of bars 57 - 58, identifying in solid note heads the notes of interest. In example 11c, we see a chord built from these tones. This chord is labelled by Huff as the "recurring unifying chord".[123]

Why Huff decides the intervening tones of Bb and D are discardable is not made clear. If either the chord contained these tones, or there was a discernible reason for their apparent unimportance, the example of chord construction would make a far better case for itself.

Fig. 1.5.2.5 Example 11a - Bars 57 - 58 intervals.[124]

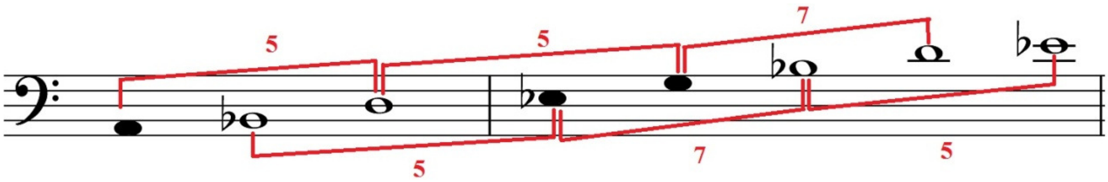


Fig. 1.5.2.6 Example 11c - Persichetti, *Parable for Solo Double Bass* - harmonies derived from linear progression, bars 111 - 112.[125]

In summary Huff concludes "Virtually all ideas in the work derive directly or indirectly from the opening four measures, the basis for Paradigm I. Those materials then are expanded immediately and developed (as fourths instead of fifths)... I find this compositional technique to be fundamentally different from more traditional approaches in that no new thematic ideas are introduced. There is no “second theme” for example, as might be

[123] Ibid, p. 38.
[124] Image source: *loc. cit.*
[125] Image source: Persichetti, Vincent, op, cit. (as cited in Huff, op. cit., p.39).

expected in a sonata. Instead, everything derives from the opening material, even though relationship of succeeding sections may become less and less direct".[126] Persichetti's method of transformation/growth is therefore somewhat indirect, focussing on intervallic relationships rather than the expansion of linear materials.

Huff states that "As far as I have been able to determine, Persichetti is the only person to have used the term autogenesis in relation to music. Nonetheless with "autogenesis," Persichetti seems to have discovered an organic procedure for composing".[127] This is a curious statement, given that the discussions on composer Roy Harris below show he both made reference to the concept, and used it extensively as a compositional tool.

Roy Harris

Dan Stehman's doctoral dissertation (1973) deals with the analysis of the linear materials contained within the symphonies and related works of composer Roy Harris.[128] Stehman discusses twelve of Harris' symphonies, giving accounts of each with regards to form, harmonic events and scoring nuances, but giving the predominant focus to linear operations such as "themes, subsidiary ideas, and motives".[129] Though Stehman's dissertation contains many valuable examples of Harris' use of autogenesis, we will discuss only the introduction of the first movement from his symphony: *American Portrait* (1929).[130]

Stehamn states: "The "Initiative" movement provides what amounts to a textbook example of Harris' principle of melodic construction, a process which is often referred to as "autogenetic." Essentially this involves the evolution of a melodic line, often of considerable length, from a single initial germ motive".[131]

Stehman's method of identifying the various thematic and motivic occurrences as related to the below example (Fig. 1.5.2.7) is as follows: Roman numerals to denote principle themes, Arabic numbers for Subsidiary thematic ideas and phrase-components of principal themes and subsidiary ideas, lower-case letters for phrases of principal themes and

[126] Huff, *op. cit.,* p. 47.
[127] Ibid, p. 7.
[128] Dan Stehman: *The Symphonies of Roy Harris: An Analytical Study of the Linear Materials and of Related Works* (PhD diss., University of Southern California, 1973).
[129] Ibid, p. vi.
[130] Unpublished, to the best of my knowledge.
[131] Stehman, *op. cit.,* p. 13.

subsidiary ideas (where there are three or less in a movement, the letters x, y and z are employed).[132]

Fig. 1.5.2.7 presents the evolution of Harris' germ motif.[133] The theme I germ (bar 1) is based upon the simplest building block of the tempered scale- the semitone (D- Eb), labelled here by Stehman as "motive x". "x" is restated in the 2nd bar, expanded by a semitone to read D - E. Bars three and four see a varied restatement of the first two; the repeated D's leading to Eb as in bar one, followed D - E as in bar two. The minor 3rd progression of bars 5 - 6 (F - D - B) continues the trend of intervallic expansion.[134]

The complete statement of theme I is outlined in the systems marked Ia – Id. Ia and Ib form the first phrase of the theme. Ia is simply a transposition of bars 1 – 4 of Igerm, up a major 3rd. Ib continues the expansion of "x" upward diatonically through a 5th from A to E, finishing the phrase with a 5th drop back to A. Stehman remarks: "thus simultaneously relating the complete first phrase of his theme to Igerm as a variant and expanding the semitone of "x" to a perfect fifth by means of all the intervening diatonic intervals".[135]

The second phrase of the theme, Ic – Id, is a variation of the first phrase. Ic 1 is an inverted variation of "x". The tone (F# - E) then major 3rd (F# - D) descents are inverted variants of the expansion of "x" in Igerm. Ic 2 is a restatement of "x" off of C#, followed by an embellishment of "x" in quavers. Stehman concludes that "The final component of I, Id, springs from the melodic and rhythmic profile of Ic, and its subdivision into three, instead of two, components parallels on a slightly larger structural level the initial intervallic expansion of motive x. In addition, the melody as a whole forms a large arch, the overall ascending line of la - Ib being reversed in lc – Id".[136]

[132] Ibid, pp. xviii-xx.
[133] Notation examples reproduced from Stehman's hand draw originals, op. cit., pg. 1039.
[134] Ibid, pp. 13-14.
[135] Ibid, p. 14.
[136] Ibid, p. 15.

Fig. 1.5.2.7 Harris, *American Portrait* – Germ theme (I germ) and complete theme I.[137]

Brian Lamb's doctoral dissertation examines Harris' little known work for wind ensemble, titled: *American Symphony.* Lamb chronicles the work's history, including the issues faced during its attempted rehearsal, and the eventual abandonment of the planned performance.[138] Lamb's dissertation also "includes information on the composer's life and works, an in-depth discussion of the compositional technique that Harris called "autogenesis," and a detailed analysis of the two surviving movements of the band piece".[139]

In reference to Harris' use of autogenesis in his compositional method, Lamb comments: "Harris' compositional approach was based on an underlying principle that he called "autogenesis," meaning that a melodic design or a harmonic pattern flowers from a seed motive, with each phrase following the first and relating back in one of two ways. It could either "launch" itself from a figure in the last measure of its immediate predecessor, or it could refer back to a seed motive. Harris' aim was to produce the effect of gradual, organic growth".[140]

[137] Image source: ibid, pp. 1039-1040.
[138] Brian Lamb: *Roy Harris' American Symphony - 1938: A Perspective on its Historical Significance and Autogenetic Elements with a Performance of a Reconstructed Modern Wind Ensemble Edition* (PhD diss., University of North Texas, 2001).
[139] Ibid, [abstract].
[140] Ibid, p. 28.

Of the many excellent examples Lamb demonstrates throughout his paper, we shall consider the example shown in Fig. 1.5.2.8. This example demonstrates a simple yet effective scheme of additive growth. The crotchets represent muted brass chords, described by Lamb as "chordal punctuations".[141] As can be seen in the example, the chords begin sparsely, gradually increasing in both "frequency and activity".[142]

Fig. 1.5.2.8 Harris, *American Symphony* – Building chord punctuations, bars 74 – 117.[143]

From the above discussions, there is an apparent difference in the way Persichetti and Harris utilise the autogenetic concept - at least from the examples cited. Persichetti seems more focussed on intervallic relationships, generating new material within the intervallic 'spirit' of what preceded it. This new material in turn creates new intervallic relationships. These sets of relationships were surmised as "paradigms" by Huff - loose scaffolds which permit the creation of new materials, which may or may not be recognisable as relating to earlier materials.[144] Harris, by comparison, is rather more linear in his treatment of the autogenetic growth concept. His lines grow and transform closer to the perceivable foreground, such that the grown material has a more directly traceable association with its forebear.

[141] Ibid, p. 61.
[142] *Loc. cit.*
[143] Image source: Lamb, *op. cit.,* p. 62.
[144] Huff, *op. cit.*

As an important sidenote, it would appear neither Persichetti nor Harris followed the 'rabbit hole' so deep that they would conceive entire harmonic progressions borne of a grown linear line, or vice versa. Even form itself could be inspired by, or entirely derived by way of autogenetic materials (as opposed to a natural unfolding, sprawling structure). Here the worlds of 'self-similarity' and autogenesis marry and blur.

It is interesting that Huff, Stehman and Lamb make no attempt to explain the concept of autogenesis outside of the musical context, as if the term itself was ushered in by musicians to explain a compositional phenomenon (i.e. a musically-centric concept). This is perhaps a missed opportunity, as there are clearly striking and interesting parallels between the concept as it exists in the sciences, and its interpretation and use as a compositional tool.

1.5.3 Self-similarity and Mandelbrot

Unlike the previous discussion, where examples of autogenesis from composers Persichetti and Harris were discussed in turn, with overviews of their respective sources included along the way - this section will instead be approached inversely, with musical examples being presented and discussed during the review of the literary sources on the subject (e.g. dissertations). The reason is that there seem to be more writings on the subject than there are clear musical examples.

In an unpublished article from 1995 (self-published online[145]) Gerald Bennett delivers a rather detailed exposé on the nature of the mathematical theories of chaos, Mandelbrot and self-similarity. The later part of his article considers the presence of self-similar structures in music (with discussions on Bach, Webern and Stockhausen). Much of Bennett's article is given over to the discussion of the more mathematical aspects of the topic, which fall outside the scope of this submission[146] (apart from those explanations already given).

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[145] Gerald Bennett: *Chaos, Self-Similarity, Musical Phrase, and Form,* self-published at the following web address : http://www.gdbennett.net/texts/publications.html (accessed June 2017).

[146] A large percentage of the research into the instances of self similarity in music seems to be focussed on the concept of *noise* (specifically 1/f noise). 1/f noise is defined by Gabriel Pareyon (2011 - cited fully on page 56) as a signal with self similar and fractal properties (p.238). Analysis by Voss and Clarke (1975, 1978) revealed 1/f noise to be prevalent in both music and speech (as cited in Pareyon, p. 238). In other words, an analysis of a musical recording's signal may show self similar features in its shape. This however says nothing about the notes used in the work, the occurrence of self similar structures within the work or lack thereof (notated), or of the composer's intention. These observations of self similar 'noise', and the electronically based compositions created to simulate this phenomenon (i.e. where the qualities of self similarity are not created notationally), are outside of the interests of this submission, and will not be discussed beyond this footnote, except in summarising the contents of the reviewed literary sources.

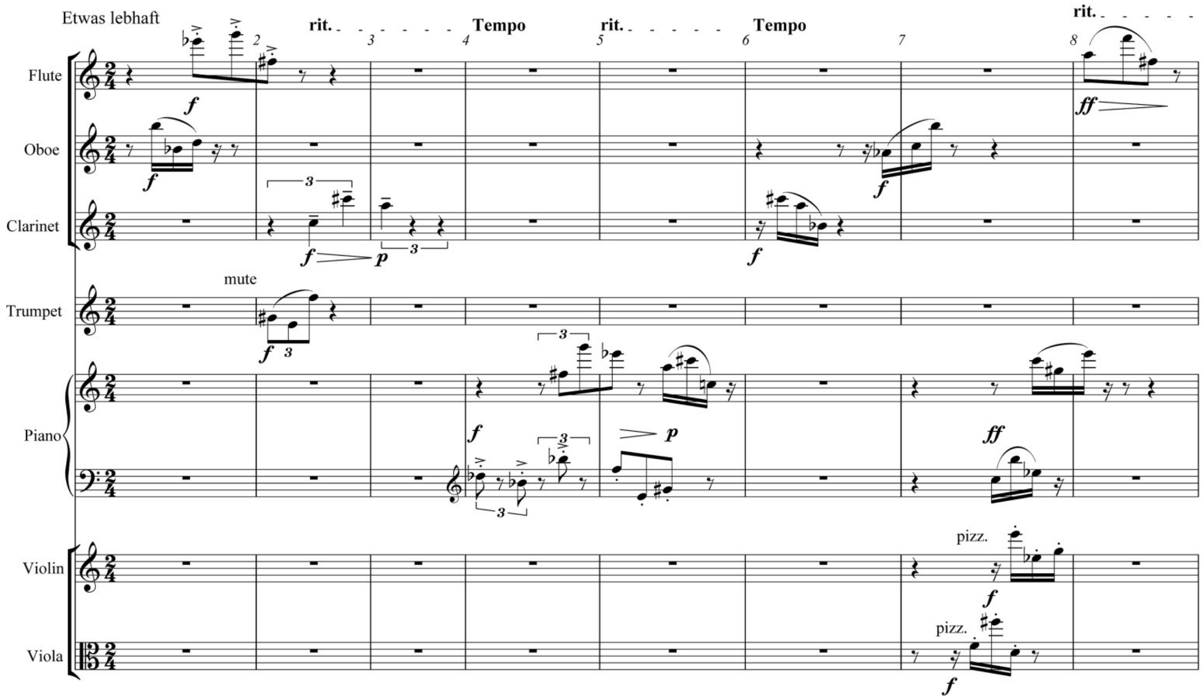
Bennett gives an example (see Fig 1.5.3.1) from Bach's chorale at the end of *Die Kunst der Fuge* (1749). Bennett observes that the ornamented chorale melody in the upper voice is imitated by the other three voices; in each case by diminution (halved note values) and the alto voice is additionally inverted. Bennett suggests this example shows both "self-similarity and scaling invariance".

Fig 1.5.3.1 Bach, *Die Kunst der Fuge* - Self-similarity between voices in chorale.[147]

The opening of Webern's *Concerto for Nine Instruments op. 24* (1934) (Fig 1.5.3.2) has a similar example of self-similarity and scaling invariance. Bennett explains the passage as follows: "In the first nine measures the instruments play only three-note figures consisting of the same two intervals, major third (or minor sixth) and minor ninth (or major seventh) in one of four different speeds". The general form of the piece is strongly symmetrical, but is not influenced by principles of scaling invariance or self-similarity.[148]

[147] Image source: Bennett, *op. cit.,* Fig. 12, p. 10.
[148] *Op. cit.,* p. 11.

Fig 1.5.3.2 Webern, *Concerto for Nine Instruments op. 24* - Self-similarity and scaling invariance, bars 1 - 8.



Let us stop to re-visit the basic definition of self-similarity before continuing on to further examples. In simple terms, a self-similar object's parts are identical or at least similar in structure to the shape of the object's whole. There seems to be some confusion by Bennett here - or at best, a liberal interpretation of the above definition. The examples by both Bach and Webern show high levels of *similarity* to be sure, but this is altogether different. Taking the example of Webern, and considering the above definition - what is to be understood as 'the whole' here? If it is the structure of the whole eight bars, then there is no real evidence of a macro structure mirroring the three note motifs. Nor is there evidence of such a structuring within the individual lines themselves. There is however, at least a hint of self-similarity between occurrences of the three note motifs. The oboe of bar 1 starting on B, then the flute immediately following on Eb - an enharmonic major 3rd. The G# of the trumpet in the 2nd bar, leading to the C of the clarinet - another major 3rd. The C of the clarinet in the 2nd bar to the Db of the piano in the 4th bar - a minor 2nd (non compound version of a minor 9th). These intervallic relationships are mirrored in the motifs themselves. These structural associations may of course be unintentional, but they are the only real instances of self-similarity. It is interesting that Bennett did not pick up on this.

It is important to discern what passes as genuinely self-similar, and what does not. If it is merely *similarity* of motifs, rhythms etc, without consideration of the macro vessel's structure and its relationship - then we might find a slippery slope leading to the inclusion of much of what has been composed in the last five hundred years. So then, we will not entirely discount examples such as Bennett's above, but will acknowledge them as being the lowest tier of musical self-similarity.

Bennett notes that the early music of Karlheinz Stockhausen (Elektronische Studie II (1954), Gesang der Jünglinge (1955 - 1956) and Kontakte (1958 - 1960)) uses the same (numerical) elements to construct the sounds themselves, build phrases and derive formal structure. He is then quick to point out that these relationships occur in the background level of building the electronic sounds (partials etc), and are not evident musically (i.e. in pitch to pitch relationships).[149]

Gabriel Pareyon's book, *On Musical Self Similarity,* covers the requisite topics of symmetry, Mandelbrot/fractal theory and self-similarity in great depth.[150] In addition, the book extends its reach to include the discussion of topics such as *gestalt,*[151] self-similarity in culture and language, biological and mechanical self-similarity, *asymmetry* and *antiproportion*, *noise* in music (and *music* in noise) and a lengthy philosophical discussion. The book's breadth of scope renders the attempt at a brief and succinct summary a virtual impossibility. For the purposes of this study, only those discussions involving direct musical examples shall be mentioned.

Paul Hudak defines a self-similar melody as follows:

> Start with a very simple melody of *n* notes. Now duplicate this melody *n* times, playing each in succession, but first performing the following transformation: the *i*th melody is transposed by an amount proportional to the pitch of the *i*th note in the original melody, and is shifted in tempo by a factor proportional to the duration of the *i*th note.[152]

In other words, taking a melody and repeating it for each note of the original melody itself, transposing each repetition in relation to the corresponding pitch of the original melody. Additionally, each repetition's duration is similarly affected by the original melody's corresponding pitch's duration. The overall line thus becomes a macrocosm of its

[149] *Op. cit.,* p. 12.
[150] Gabriel Pareyon: On Musical Self-Similarity (Helsinki: The International Semiotics Institute, 2011).
[151] Pareyon describes *gestalt* as a theory that "...provides a psychological approach to explain how the mind-brain processes self-similar relations, attributing partial qualities to the whole embracing the parts" *op. cit.*, p. 85.
[152] as cited in Pareyon, *op. cit.,* p. 70.

constituent parts. A mock example of this is shown in figure 1.5.3.3. Such a use of the self-similar concept has the potential to be applied to a work's most macro structuring.

Fig 1.5.3.3 An example of a truly self-similar melodic structure.

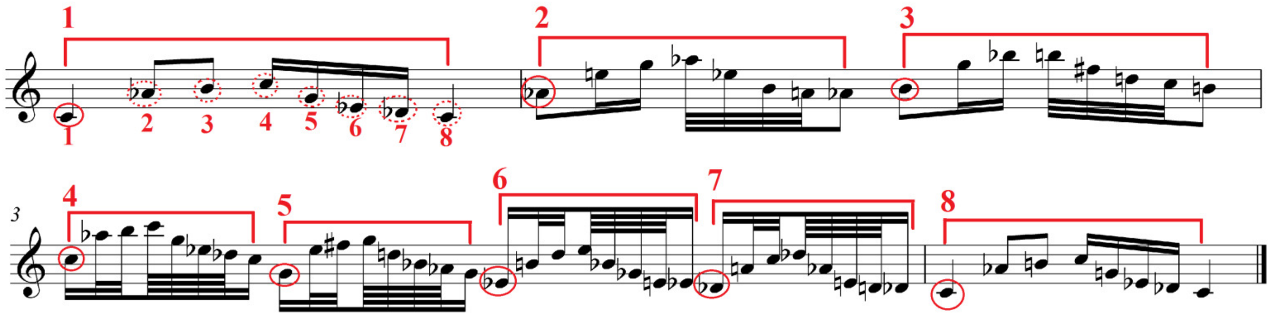


Figure 1.5.3.4 shows an example Pareyon gives as being self-similar. This example requires the same criticism as was given earlier. This example shows a high level of similarity between the two staves, but is a poor example of self-similarity. Here the bottom stave moves at 1/3 the speed of the upper, two octaves lower. This concept seems to elude many commentators - that of the *whole* being made up of parts similar to itself. Here the parts are similar to the other parts, but the macro structure and its relationship to these parts is unclear.

Fig 1.5.3.4 One of Pareyon's examples of a self-similar musical structure.[153]

Pareyon makes some observation of the possible self-similar characteristics of serialism, and in particular the integral serialism[154] as practiced by composers such as Pierre Boulez and Milton Babbitt.[155] The similarity of structures created by the serialisation of a work's musical attributes begs the same discussion as has already been posited. Only if these structures occur within a more macro structure of similar 'shape' is there truly self-similarity at work. In the case of the serialisation of properties moving in parallel[156], this is an interesting case of similarity in unison, as the scale of operation is identical. Expand or

[153] Image source: Pareyon, *op. cit.,* p.71, 331a
[154] The application of serialism to not only pitch, but tempo/durations and dynamics as well.
[155] *Op. cit.,* pp. 80-84, 165, 215, 354
[156] That is to say, where the pitches of a row are assigned their corresponding durational and dynamic properties in parallel.

contract the scale at which at least one of the properties is applied in relation to the others however, and the result is scaling invariance (true self-similarity).

A detailed accounting of the serial practices of the above mentioned composers and others as related to self-similarity is outside of the scope of this study. For one, reading into the subject revealed no substantial evidence of clearly presentable examples. Those examples that were presented were so far buried in the background of musical operations as to be demonstrable only by a show of numerical figures and equations. For further reading into these examples see the pages cited from Pareyon above,[157] and especially John Cuciurean's article titled *Self-Similarity and Compositional Strategies in the Music of Milton Babbitt*.[158]

Ilse Steynberg's dissertation, *The Applications of Fractal Geometry and Self-similarity to Art Music,* covers much of what has been discussed already with regards to a general overview of the fractal/ self-similarity concept, Mandelbrot etc.[159] As with the above mentioned sources, Steynberg gives over a significant portion of her discussion to the investigation of the aforementioned self-similarity in musical noise and composition with noise. Additionally, Steynberg discusses Lindenmayer systems[160], and their use to produce self-similar/fractal music.[161]

A discussion on Arvo Pärt's *Fratres* leads to the conclusion that there are self-similar structures within the work. Without going into great detail, it appears that Pärt's use of two rotating pitch 'wheels' to derive the work's tonal materials, and a form focussed on expansion and variation, creates many *similar* structures. It is not clearly shown how these structures are strictly self-similar in the manner that has been posited in the critiquing of the other writers above.

Steynberg also discusses György Ligeti's work *Désordre,* and its apparent fractal nature. Ligeti himself described the work as being self-similar and intentionally modelled after the Koch snowflake fractal model.[162] After an analysis of the work in which Steynberg explores the possible ways in which Ligeti may have meant "self-similar", Steynberg ultimately concludes that there is no evidence to be found that *Désordre* makes use of strict

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[157] *Op. cit.*
[158] Cuciurean, John: ' Self-Similarity and Compositional Strategies in the Music of Milton Babbitt'. *Canadian University Music Review* (1997), Vol. 17, No. 2, pp. 1-17.
[159] Ilse Steynberg: *The Applications of Fractal Geometry and Self-Similarity to Art Music* (M. A. diss., University of Pretoria. 2014).
[160] Lindenmayer systems substitute chains of symbols repeatedly, creating longer self-similar chains; it is named after Hungarian biologist Aristid Lindenmayer (1925 - 1989), Ibid*,* p. 35.
[161] Ibid*,* pp. 95-102.
[162] Ibid, p. 119.

mathematical fractals, suggesting that the work is only 'fractal inspired'.[163] Steynberg also discusses Ligeti's *L'escalier du diable*.[164]

In a lecture presented at the MaMuX seminar (Paris, Oct. 14, 2006), composer Tom Johnson described his interest and history regarding the composition of self-similar works.[165] Johnson discusses his discovery and subsequent enthusiasm for fractals before moving onto his own musical examples. Below are two such examples, taken from the visual component of the presentation.

Both figures 1.5.3.5 and 1.5.3.6 display exact scaling invariance. In the first example, the upward stemmed notes of the treble stave form the descending ostinato line C-B-A-F-D. For every repetition of this line, the down stemmed notes spell out the same line one note at a time, so that by the fifth repetition, the down stemmed notes have completed one repetition of the same line. The down-stemmed notes then proceed as an ostinato themselves, 1/5 the speed of the up-stemmed figures. The last note of each down-stemmed grouping (upward stems on the bass stave) begins a new iteration of the descending line (1/5 the speed again), so that by the end of the first system a full statement has been completed. At the end of the first system, a new cycle starts in the down-stemmed notes of the bass stave. In this way, there are four simultaneous iterations of the descending five note motif - each occurring on a scale 1/5 the speed of the previous. This is a clearly visible example of scaling invariance and self-similarity.

[163] Ibid, p. 122.
[164] Ibid, pp. 122-125.
[165] Tom Johnson: *Self-Similar Structures in my Music: an Inventory* (Paris: MaMuX seminar IRCAM, 14th October, 2006). Online paper from: http://repmus.ircam.fr/_media/mamux/saisons/saison06-2006-2007/johnson-2006-10-14.pdf (accessed July 2017).

Fig 1.5.3.5 Johnson, *Counting Keys* (1982 - 2005), self-similarity in second movement.[166]

The second example (Fig. 1.5.3.6), taken from Johnson's work for organ titled *Six-Note Melody* (1987), contains a similarly observable example of scaling invariance. As with the previous example, the upper most line moves at the fastest tempo, with each successively lower line moving slower. Here the upper line's ostinato is a descending pattern of G - Gb - F - E - Eb - D. The middle stave's version of the ostinato scales exactly for pitch, but is rhythmically altered with the addition of quaver rests. The bottom stave is rhythmically different again, with shorter note values than one would expect. It also misses E and Eb, moving directly from F to D. Johnson's *Six-Note Melody* is therefore not composed with exact scaling invariance, but is approximate.

Johnson provides many other well presented examples of self-similarity in his works throughout his presentation. These examples form what might be considered the clearest, and most deliberate attempts at genuine scaling invariance and self-similarity.

[166] Image source: *op*. cit., pg. 9.

Fig. 1.5.3.6 Johnson, *Six-Note Melody* (1987), self-similarity in lines.[167]

[167] Image source: *op. cit.*, pg. 10.

1.6 Methodology and creative process

How can these organic principles be made use of? A theoretical case study

Having discussed the general background of the organic principles (Fibonacci/Golden Section, autogenesis and self-similarity) and seen their use in the existing repertoire, it should perhaps be asked: how can these principles be used individually, and in combination, to fortify the compositional process? These questions will hopefully receive an empirical answer in the course of the compositions and their accompanying commentaries, but a reflective discussion at this point will do no harm.

In deciding the best approach to application, first it is necessary to identify some basic characteristics of each principle. Autogenesis is a *process* of growth, as is the Fibonacci series. In fact, under certain conditions, Fibonacci growth could actually be described as being *autogenetic* itself, so there is a large overlap. Self-similarity is a *condition*, it is a static end state. The Fibonacci series could actually be classed as both; it can be used to create growth as has been seen, but its numbers could also be used in isolation without any recognisable growth factor. Regarding the Golden Section, growth or contraction can be accomplished by applying the ratio to durations or pitch classes. It could also be arbitrarily applied to formal lengths in a predetermined manner - making it also a state of being, a *condition*.

Based on the above observations, it would seem the best use of the Fibonacci series is in creating growth (or contraction) of intervallic values, rhythmic values or formal section lengths. Autogenesis' place rests in the expansion of materials. Autogenesis can be applied to other types of growth that Fibonacci is not capable of describing, such as the extraction of harmonic structures from linear materials, and vice versa. Self-similarity is a condition to be aimed for using the other tools, rather than a process in itself.

With the above in mind, a composition could proceed with a musical seed/germ (rhythm, melody chord progression etc)[168] being stretched and grown in many different ways by autogenesis and the Fibonacci series, ultimately aiming for some level of self-similarity in the macro structure of the work.[169] In the case of non-tonal music, where one must resolve the issues of formal structure, harmonic system, thematic development etc,

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[168] Such germ material can be obtained by the normal sketching process. Proceeding in an unhindered manner with sketching until something of requisite interest reveals itself.

[169] Such a macro structure would have to be considered from the outset and planned for from the earliest stages, even at the creation of the primal germ material.

such a method might provide a compass. Rather than a system that produces recognisable features across different works (e.g. the twelve tone method), here each work's original DNA grows out the work from a single point, with the guidance and encouragement of the composer's hand.[170]

Figures 1.6.1 - 1.6.5 give a short example of this process at work in various stages. Fig. 1.6.2 shows Bartók's Fibonacci derived pentatonic scale grown (autogenesis) into a phrase by the addition of rhythmic values and extra notes. From this phrase is extracted a basic harmonic progression (Fig. 1.6.3). This progression is then revoiced to create more interesting voice leading (Fig. 1.6.4). Finally, a short musical example is produced with these grown elements (Fig. 1.6.5). The harmonic progression occurs in the bass clef, with the melodic material in the treble clef. Where the progression occurs once without repetition, the melodic phrase occurs five times - each time transposed in accordance with the pitches of the originating pentatonic scale itself. These transpositions create a self-similar structure between the individual phrases and the macro structure of the treble clef line, with the extracted harmony of the bass clef adding further organic unity.

Fig. 1.6.1 Bartók's Fibonacci derived pentatonic scale, as identified by Howat.[171]

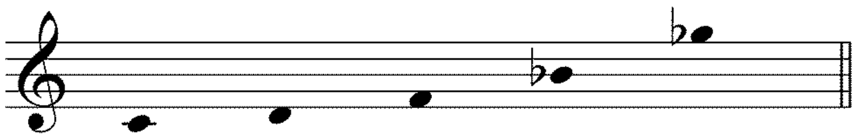
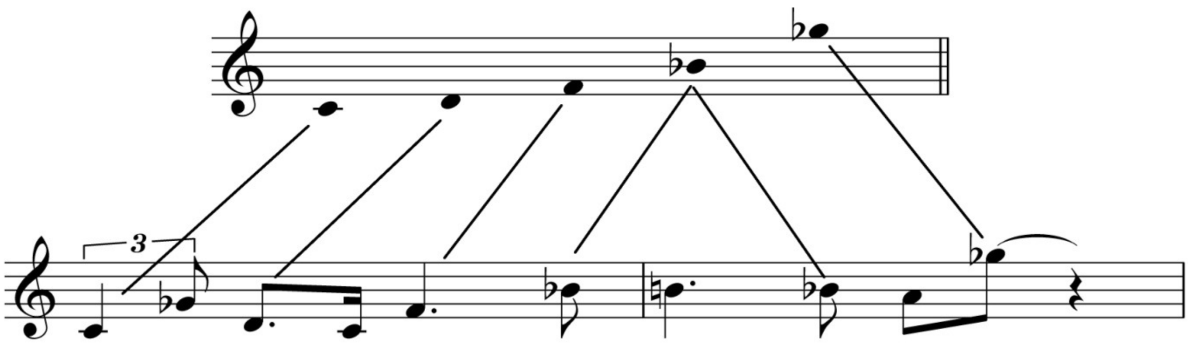


Fig. 1.6.2 Pentatonic scale grown into a phrase.



[170] That is to say, in a non-generative manner. These tools could be used to give cohesion, direction and overall unity to a work, without being reduced to simply a formulaic 'composition generator'.
[171] Howat, *op. cit.,* p. 72.

Fig. 1.6.3 Basic harmonic progression derived from phrase.

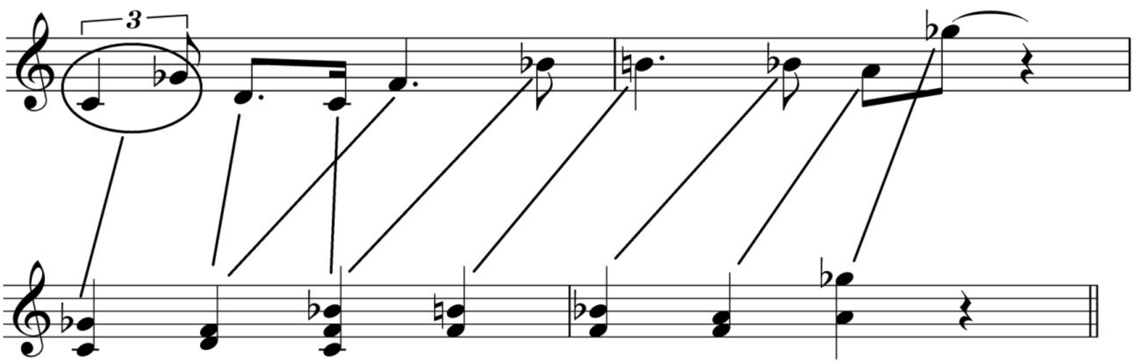


Fig. 1.6.4 Revoicing of progression.

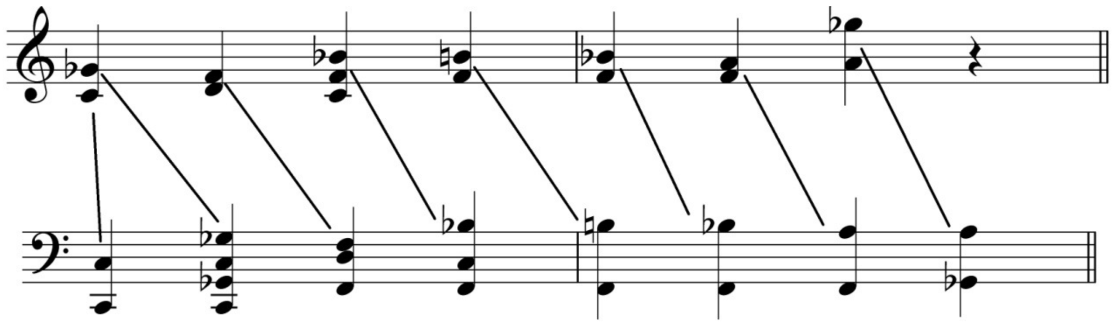
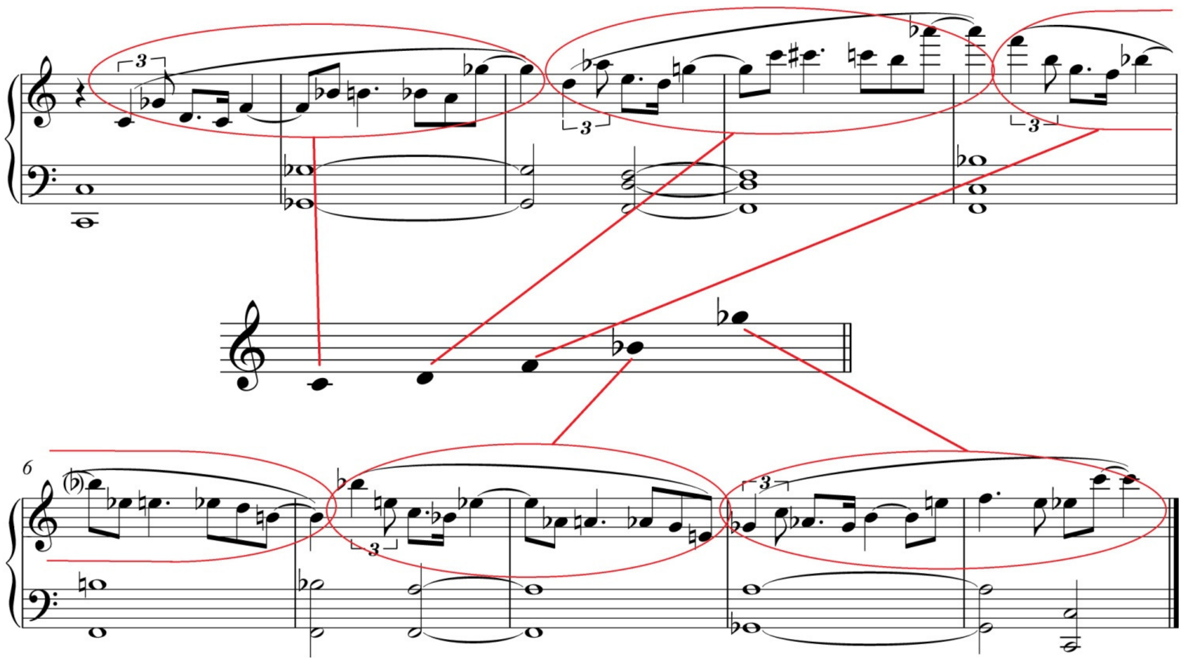


Fig. 1.6.5 Final form of experiment, with relationships to original pentatonic scale identified.



The method of stretching Bartók's pentatonic scale into a phrase is not unlike Roy Harris' approach to autogenesis as discussed previously. The extraction of harmonic materials from this linear material is also similar to what was seen in Vincent Persichetti's work.[172] Finally, the overall self-similar structure is much like the truly self-similar structures discussed by Pareyon and Tom Johnson.[173]

Despite the rigid nature of the above exercise, it serves to give some clues as to the effective use of these principles. In particular, the use of self-similarity seems especially adept in the planning of tonal centres and modulations, either locally, or on the macro scale.

Augenmusik

There are different possible approaches to the compositional philosophy when implementing these principles of organic unity. *Augenmusik* (literally "eye-music") refers to the visual 'conceit' of composing the score as a kind of visual art work in its own right. Many of the analyses and discussions above have been heavily focussed upon (visual) score examples, without much being said about the actual *sound* - the perception by the listener. As such, these tools could very well be used highly effectively in the creation of visually beautiful scores, where the organic growth is as visually apparent as that of a tree, or a beautifully complex geometric arrangement of shapes. The score then becomes art unto itself; its performance redundant and unnecessary, perhaps undesirable. An important distinction needs to be made here then: that of the score as creative artefact, versus the score intended wholly for performance. The *Augenmusik* score does not necessarily operate through time - it can be a static object, its organicism visually orientated. The score intended purely for performance - written primarily to create the sonic experience for the listener and the act of performance for the performers, occurs through time. The unfolding of its organicism may not be at all visually apparent, but the listening experience reveals it over the course of the work.

The approach to composition in this project is primarily based upon the latter concept. These principles are used here to create works that hopefully project a sense of organic unity to the listener through the duration of their performance. To that end, a considerable amount of time and effort went into the reconciliation of the drive to create works that fulfilled the composer's natural sense of aesthetics, and the need to work with the organic principles in question. The works presented are therefore in no way formulaic, or generative.

[172] Harris and Persichetti were discussed in chapter 1.5.2.
[173] Chapter 1.5.3

The Golden Section: Its omission from the project as an organic principle

The Golden Section was originally intended to be utilised along with the other organic principles as a compositional tool. However, after some initial experimentation, and more importantly, time spent pondering the issue, questions of its usefulness arose. Specifically, can it be felt as a quality occurring through time? Certainly one can admire its effect visually, and look for it in physical structures -natural, and man-made alike. To this point, the Golden Section could certainly be applied in many tricky ways to a splendid canvas of *Augenmusik*. But can it be perceived in sound, through time? Perhaps in micro scale events if manifested in an obvious enough manner (e.g. dramatic changes of timbre, or dynamics). Over the duration of a large scale work though, the situation is dubious. Perhaps if someone knew the total length of the piece, and counted bars or pulses, or whatever the given unit was, they could arrive at the correct moment. Such a thing would of course be counterproductive to the entire listening experience. Imagining for a moment that it can be perceived through time - now new questions arise. Are the durations and their perceptions affected by the natural flexibility inherent in live performances? What if a pause is held a few seconds too long, a tempo tightened and slackened - does this void the Golden Section's effect? "Yes", if the work has been planned with clock timings. Works planned in the manner of Bartók's, with measures or note values counted; perhaps these Golden Section values are not affected, as the ear adjusts for tempo changes and the like. Then one can ask: "well, does it matter if one can't perceive such durations anyway?" Perhaps it is enough that these operations contribute in a background, subconscious level.

The musings above do not aim to give any answers to the questions posed. These questions, paired with a feeling that the Golden Section is of less practical use than the Fibonacci series, led to the decision to omit it as a compositional tool.[174] Where the Fibonacci series gives 0,1,1,2,3,5,8 etc to 'play' with, we only get the one number with the Golden Section.[175] This is in no way a backhanded dismissal of the Golden Section, or of its users, or proponents. Perhaps a dedicated dissertation, wholly focussed on the creative exploitation of the Golden Section's latent potential, could answer these questions.

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[174] Except in the one instance of the pitched materials found in *Sleeping Under Mariana*.
[175] Technically two, the expanding, and contracting versions.

A.2 Commentary on *Tidal Lock*

Tidal Lock is composed for the symphony orchestra medium, and primarily focuses on the investigation of autogenesis, and to a lesser degree, self-similarity. The work is a homage to Krzysztof Penderecki's *Symphony No. 3,*[176] drawing inspiration from and referencing the 2nd, 3rd and 4th movements of that work. The work is therefore dedicated to Krzysztof Penderecki (with the composer's permission).

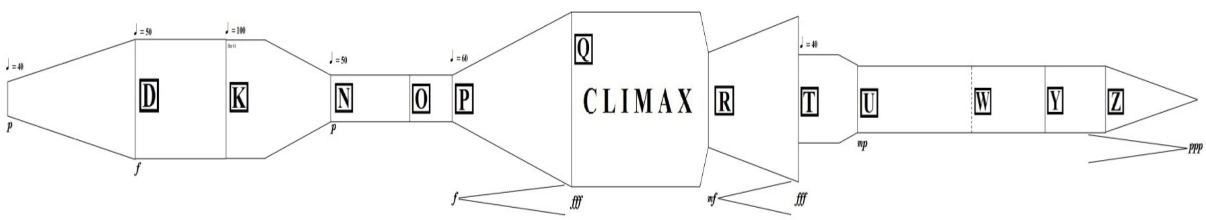
2.1 General overview of form

A general overview of the work's form is shown in Fig. 2.1 (not to exact scale), with a more detailed analysis shown over three diagrams in Fig. 2.2. Looking at Fig. 2.1, we see the basic gesture of the work is that of an asymmetrical double arch.

The work starts out with an ominous swelling and 'tolling' motif in the low strings, slowly building tension and momentum towards rehearsal letter "D". At "D" the character of the work shifts from quietly brooding and lyrical, to forte with moments of staccato and rhythmic bounce. This section serves to build the energy towards the climax of the first arch, which occurs as a fortissimo trumpet solo at "K". The first arch ends with the lead out from the trumpet solo and subsequent relaxation of tension through "M" to "N".

The second arch of the work begins at "N" in the form of a clarinet duet accompanied by a chromatically descending bass line. Tension is built throughout the build up to the work's main focal point at "Q", with a secondary (though less intense) sub climax occurring at "R". At "T" the texture thins to tutti cellos accompanied by sustained violins: a sort of quasi coda to the climax (Q) and sub climax (R). From "U" to the work's conclusion the piece slowly unwinds, featuring a return of the opening motif, and solos in the winds.

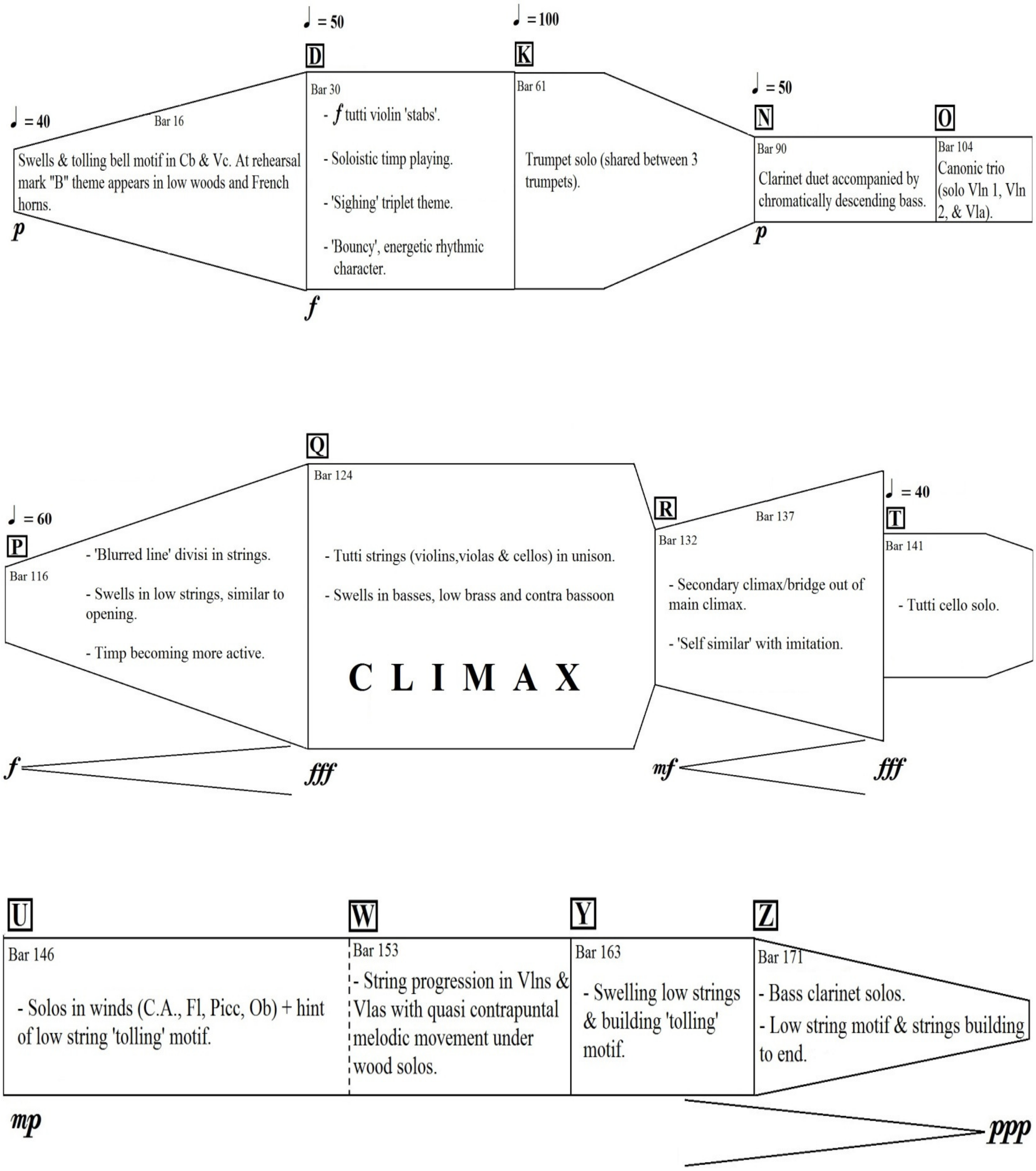
Fig. 2.1 *Tidal Lock* - General overview of form.



[176] Krzysztof Penderecki: *Symphony no. 3.* (Mainz: Schott, 1995).

Regarding the detailed form diagrams of Fig 2.2, they are included for the benefit of the reader as a means to place the various score examples into the context of the overall form, reducing the need to refer back to the orchestral score.

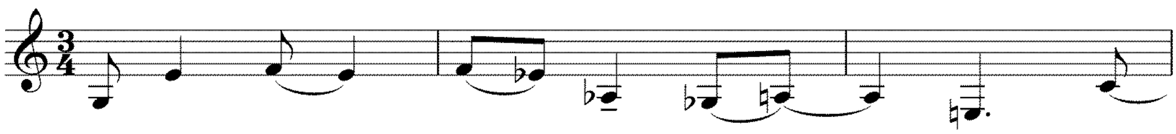
Fig. 2.2 *Tidal Lock* - Detailed view of form.



2.2 Origins of material

The genesis of the entire work spawns from a single musical seed (Fig. 2.3). The majority of the following materials are extracted from this single point (autogenesis). The material, labelled "primordial material", is a single line lyrical melody spanning the distance of a minor 9th, an interval which will later be seen to be an important feature of the work. This line could perhaps be likened to that which Montgomery described as "a small primal element, a cell possessed of a will to develop into higher forms".[177]

Fig. 2.3 *Tidal Lock* - Primordial material.



The line itself is inspired by the opening violin line of Penderecki's third movement (Fig. 2.4). Comparing the two lines, we see the tonality is retained (G), and the opening interval of a major 6th. The minor second movement of E to F in the first bar of Fig. 2.3 is referenced from the trilling gesture (G - A flat) found in the second bar of Fig. 2.4. Other than these observations, the two examples are distinct from one another.

Fig. 2.4 Penderecki *Symphony no. 3*, mvt III, bar 1 - 3, Vln I (As related to *Tidal Lock*).

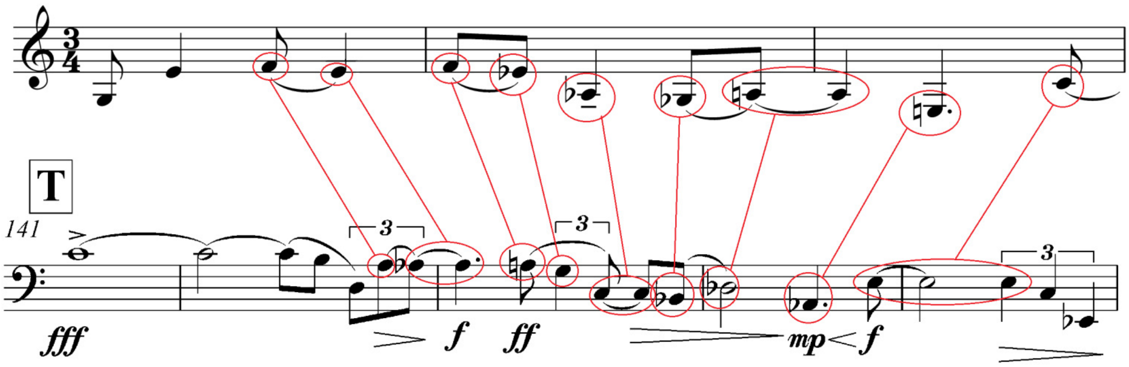
This line (Fig. 2.3), though the origin of all the grown materials to come, is worked into the heart of the work, featuring as the cello solo at rehearsal letter "T" (Fig. 2.5). At the time of composition, much of the sketch work had already been completed, and for a while it seemed as though the seed of the work's existence would serve only that purpose - spawning the other materials without featuring itself; a selfless act. By appearing so late in the work, its relationship with the preceding materials is perhaps less obvious.

As is seen in Fig. 2.5, the cello solo is transposed down a minor 6th from the original example, taking up the original line after a descending figure of minor 2nd > major 6th (C - B

[177] Montgomery, *op. cit.,* p. 18

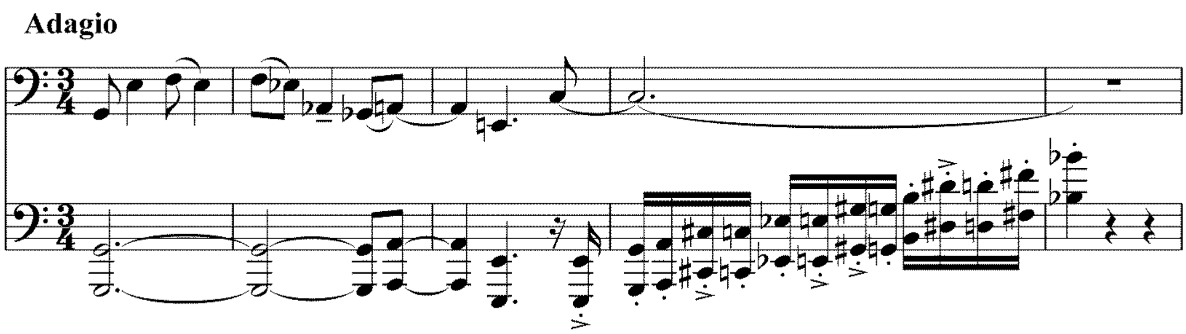
- D), and omitting the first two notes of the original idea. The descending movement of 2nd - 6th, as a retrograde inversion of the first three notes of Fig. 2.3 (G - E - F/ 6th - 2nd ascending) forms an important component of materials to come later on.

Fig. 2.5 *Tidal Lock* - Cello solo, bars 141 - 145, as related to Fig. 2.3



After the conception of the 'primordial material', an ascending bass line was composed as a complimenting figure (bottom stave of fig. 2.6). This line was derived loosely from the original idea, and gives rise to the majority of the material found in the work.

Fig 2.6 *Tidal Lock* - Bass line inspired by, and accompanying Fig. 2.3



Looking at the line itself (Fig. 2.7), we see it comprises fourteen notes with intervals spanning no larger than a major 3rd, and has the general tendency of ascension. This stands in contrast to Fig. 2.3, where the line moves mostly in leaps of 6ths, interspersed with major and minor seconds, and having a balanced line in both directions. A deliberate relationship is found here, as the fourteen note row also moves in leaps (major & minor 3rds) interspersed with major and minor seconds. This secondary line is thus drawn out by way of autogenesis.

The conditions above (a collection of materials, without designation) are the musical analogue to what Csányi described as the *zero-system* - the ground state from which autogenesis can arise.[178] The materials themselves can therefore be considered the work's *autogenetic system precursors* (AGSP) - the minimal set of appropriate components to initiate the self-organising process.[179] Here, unlike nature, the 'self-organising' is under the conscious direction of the composer.

Fig. 2.7 *Tidal Lock* - 14 note row extracted from bass line of Fig. 2.5

2.3 Examples of autogenesis from *Tidal Lock*

2.3.1 Climactic line of work

The following two examples demonstrate the direct association between the fourteen note row of Fig. 2.7 (and to a lesser degree, the primordial material of Fig.2.3), and the main climax of the work. This climatic line (Fig. 2.8) is played tutti and in unison by the violins, violas and cellos. As with Fig. 2.7, the line has the general shape of ascension.

Fig. 2.8 *Tidal Lock* - Climax line, 1st Vlns, bars 124 - 132

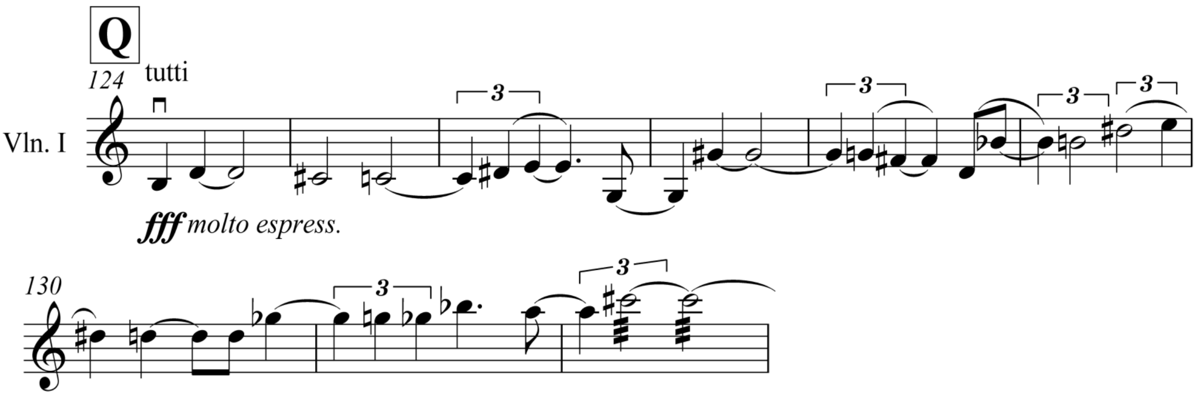


Fig. 2.9 reveals the way in which the climatic line is extracted from Fig. 2.7. Every note of the fourteen note row is utilised, with auxiliary notes added (by predominantly chromatic motion) in order to stretch the line. In bar 126 the line moves a major 6th downwards from E to G, then skipping a minor 9th upwards to G#. This three note motif

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178 Csányi, 1989, *op. cit.,* p. 44.
179 Csányi, 1998, *op. cit.,* pp. 6-7.

forms an important thematic component of the work, recurring frequently throughout. As can be seen in Fig. 2.10, this is actually an intervallic augmentation of what occurs in the third bar of Fig. 2.3. The descending major 6th leap of bar 126 and ascending minor 6th leap of bar 128 reveal a direct relationship to the major and minor 6th intervals employed in the original line of Fig. 2.3 (G - E, bar 1; E - C, bar 3).

Fig. 2.9 *Tidal Lock* - Climax line bars 124 - 129, 1st Vlns as related to 14 note row (Fig. 2.5).

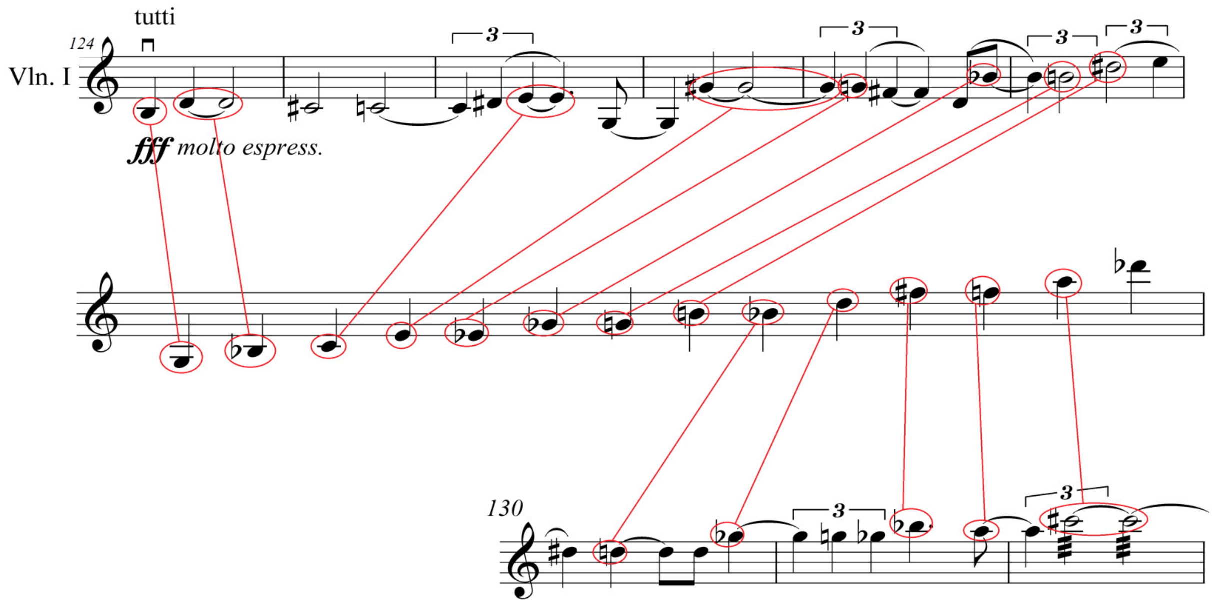
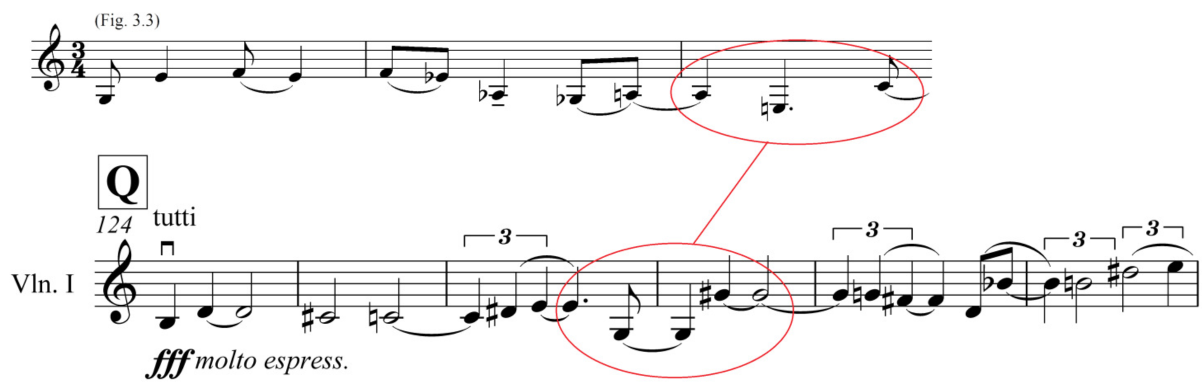


Fig. 2.10 *Tidal Lock* - Intervallic augmentation of Fig. 2.3 as seen in climatic line, bars 124 - 129



2.3.2 Harmonic construction

Autogenesis is also applied to the construction of harmonic progressions. Fig. 2.11 shows a harmonic progression consisting of progressively stacked chords. As seen in Fig. 2.12, this progression is simply the stacking of the fourteen note row of Fig. 2.7. The progression is structured so as to progressively build harmonic tension.

A functional harmonic analysis would not be appropriate here. The progression and its individual chords are created by, and bound in servitude to the fourteen note row. Any resemblance between the chord structures or progression to functional harmony, however extended by chromaticism, are entirely coincidental. With that said, the notes are not simply stacked blindly into harmonies without counciounce. Special care is paid to the spacing of the sonorities, with notes selectively dropped or delayed to affect a cohesive direction.

The first chord is created by stacking the first two notes of the row, with subsequent chords following suit, generally retaining the preceding notes as each new note is added.

The first point of interest is that the third note of the row, C, is delayed whilst tones four and five enter. Other than this exception, the order of tone entry is followed exactly. C is initially avoided to prevent the premature dissonance with Bb, allowing the first three chords to proceed with consonant sonorities.

Chord four introduces both C, and Gb simultaneously, whilst dropping G natural as the lowest tone. The introduction of both new tones together obscures the effect of the major second clash of C/Bb. G is dropped out both because it would clash too harshly with Gb, and also because Gb moves to G natural in the following chord.

Chord six adds B natural whilst raising the Bb from the preceding chord also to B natural, at the same time dropping the C. This alteration (raising of Bb to B) is necessary to allow the following chord to form the major seventh relationship between the outer notes. This of course could have been achieved by leaving the Bb in place, and adding the B natural above (in chord six). This, however, was deemed to be prematurely striking. The sudden appearance of the minor 9th draws too much attention to itself. The movement of the upper note downwards, B > Bb in chords six to seven lends the feel of a passing note, greatly smoothing the introduction of the dissonance. C is omitted in chord six to avoid the semitone/major 7th clash of B on C.

Building the density of the texture, chord eight allows what was avoided in chord seven. Namely, the sudden introduction of dissonance with D as the top note, clashing a major 7th against Eb. With another major 7th clash already present from the preceding chord (B against Bb), this new sonority is 'prepared'. Chord nine introduces yet another major 7th clash of Gb against G, moving downwards to a minor 7th in the following chord. The final two chords are added to by the final tones of the fourteen note row, resulting in a densely textured chord built entirely from stacked thirds.

Fig. 2.11 *Tidal Lock* - Harmonic progression derived from 14 note row.

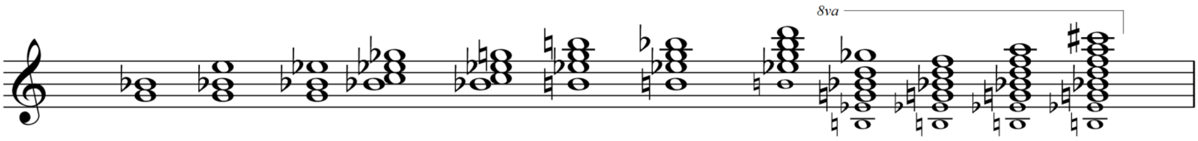
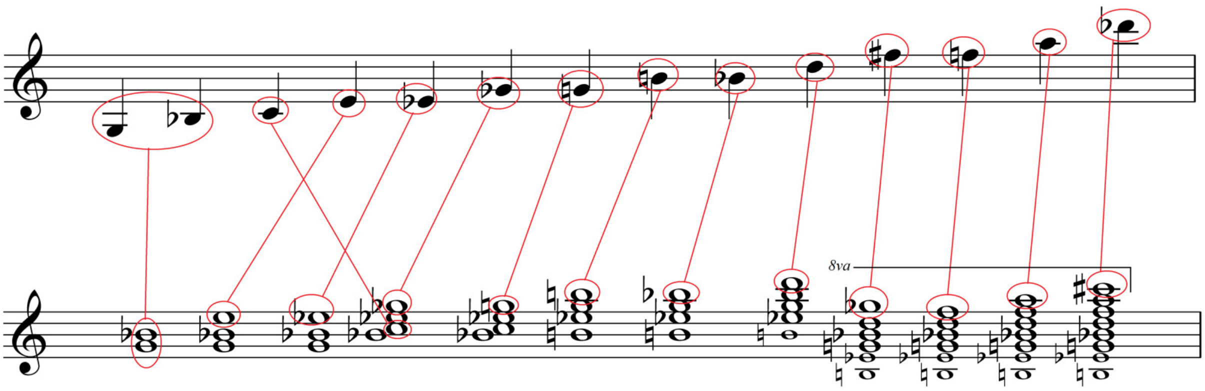


Fig. 2.12 *Tidal Lock* - Harmonic progression as related to 14 note row.



The derived harmonies are applied to a quasi contrapuntal string progression starting at rehearsal letter "U" (Fig. 2.15, transposed a semitone higher than the original progression), with Fig. 2.13 providing a numbered version of the fourteen note row for reference. In order to produce a more transparent sound, appropriate to the mood of the work at this particular juncture, a less cluttered iteration of Fig. 2.11 was produced. For immediate reference, a reduced version of the harmonies and voicings of Fig. 2.15 is shown in Fig. 2.14 (transposed down to the original key), along with the original progression. Despite the thinning of texture and dropping of notes previously sustained, the development of tension is retained.

Throughout this section of the work (rehearsal letter "U" to end of "X"), the texture is string harmonies (vln I divisi, vln II & vla), occasional utterances of a low string motif (not yet discussed) and solos between the cor anglais, flute and piccolo (rehearsal letter "U" to end of "W"). The thinning and revoicing of the harmonies, particularly towards the end of the progression, is to keep from obfuscating the solo lines occurring around the same tessitura. The fourteen note row is implemented as with Fig. 2.11, with added melodic material, and slow glissandi which add to the tension of the changing harmonies.

Fig. 2.13 *Tidal Lock* - 14 note row with numbers to facilitate interpretation of Fig.2.12

Fig. 2.14 *Tidal Lock* - Transposed harmonic reduction of Fig. 2.14 (lower stave) with Fig. 2.11 (upper stave).

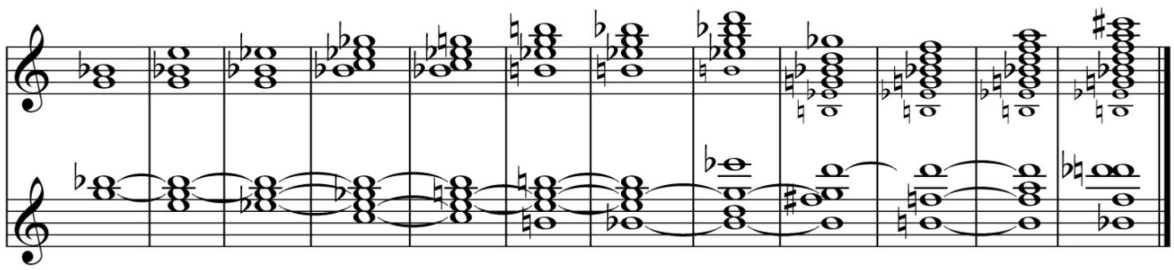
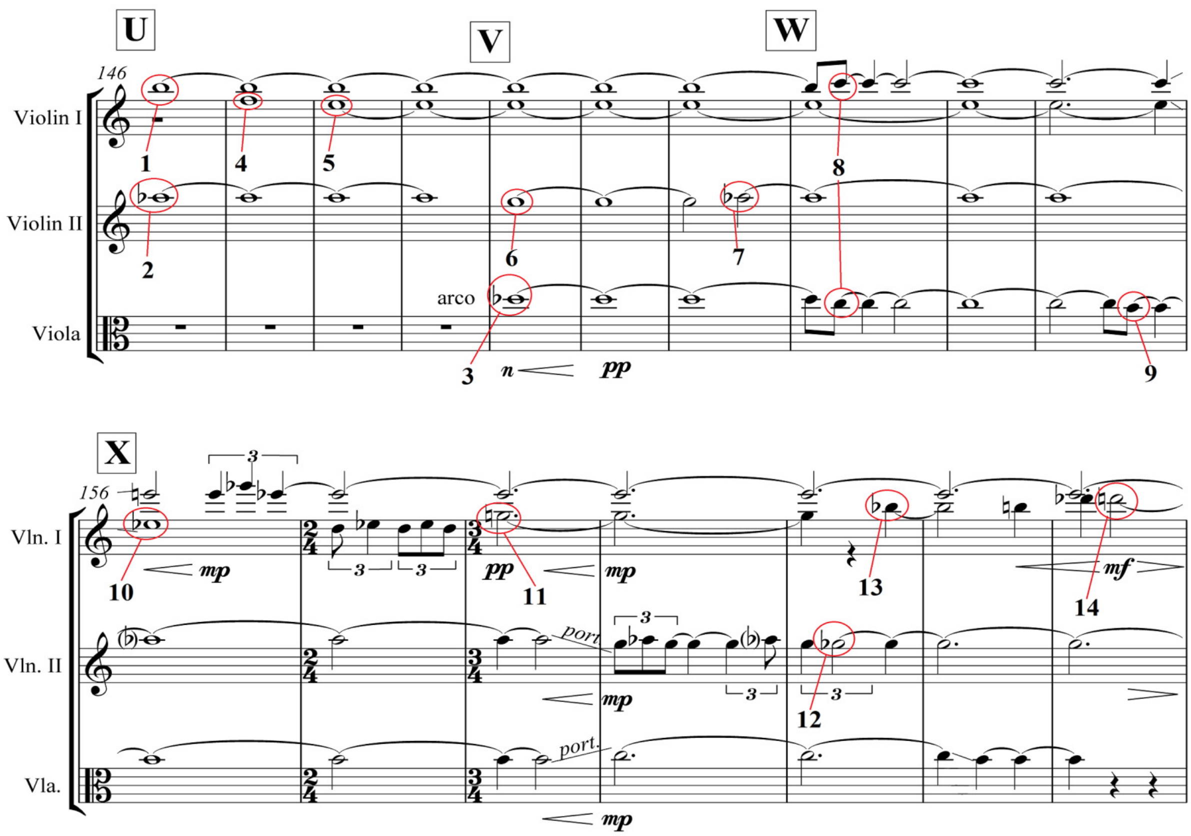
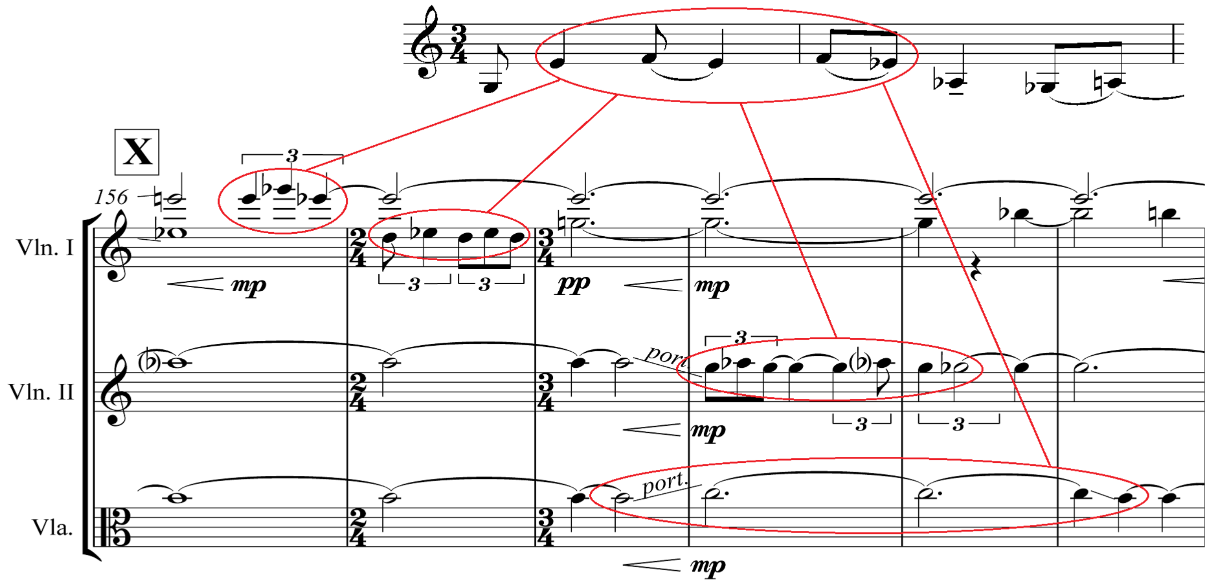


Fig. 2.15 *Tidal Lock* - Application of derived harmony to string parts in bars 146 to 162 (rehearsal mark U - X), with numbers identifying row numbers.



The melodic fragments, found in the second half of the presented excerpt (Fig. 2.15) are slow, trill like auxiliary note figures. They draw extra attention to the changing harmonies, by immediately preceding them. As seen in Fig. 2.16, this melodic material is actually drawn out from the original (primordial) idea of Fig. 2.3. The harmonic progression and its ornamentation is therefore by way of autogenesis a product of both the original idea, and the fourteen note row (itself a descendent of the original idea).

Fig. 2.16 *Tidal Lock* - Distribution of melodic material from Fig. 2.3, bars 156 - 161.



2.3.3 Growth of a linear line

Figures 2.17 to 2.21 show a straightforward approach to the growth of material from a singular point. Fig. 2.17 uses the first nine notes of the fourteen note row as a one bar ascending run. Fig. 2.18 is also a one bar ascending run, with the use of semiquaver triplets allowing the run to reach the 13th note of the row. Despite Fig. 2.18 occurring prior to Fig. 2.17 in the course of the work, the concepts presented were conceived in the order of presentation here. The sketching process explored many ideas in an exhaustive process of autogenesis experimentation; these grown and extended ideas were then laid in their respective places as the clarity of their function became apparent.

Fig. 2.17 *Tidal Lock* - Growth of a single line, horns, bar 39.

Fig. 2.18 *Tidal Lock* - Growth from a single line, bass clarinet, bar 19.

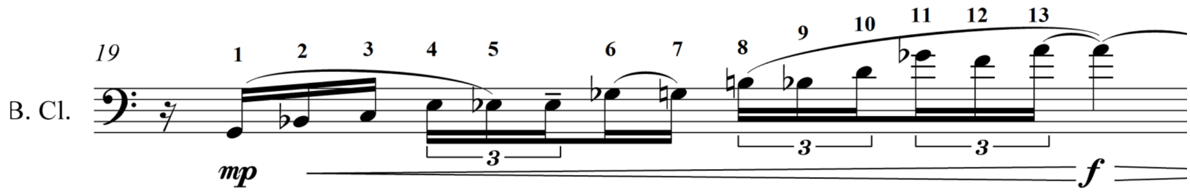
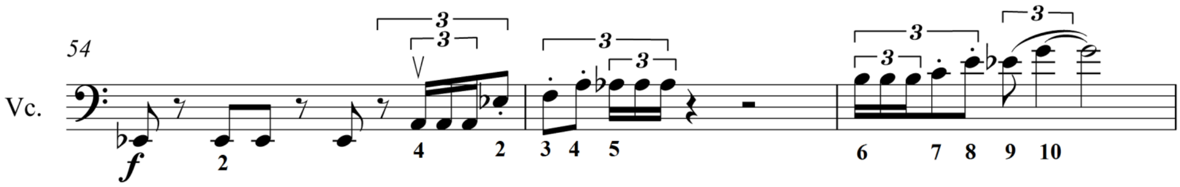


Fig. 2.19 spreads the line over three bars, interrupting the line with three beats rest and taking it back up from the next note in the series. Fig. 2.20 is essentially the same line with rhythmic ornamentation, introducing a nested triplet motif. This line misses the first tone of the series, repeating tones four and two before continuing the series.

Fig. 2.19 *Tidal Lock* - Growth of a single line trombone, bars 37 - 39.

Fig. 2.20 *Tidal Lock* - Growth of a single line, Cello, bars 54 - 56.



The timpani line of Fig. 2.21 is a rhythmic realisation of Fig. 2.20. Owing to the timpani's limited ability to rapidly change pitch, the line can only loosely follow something resembling the ascending fourteen note row of the other examples.

Fig. 2.21 *Tidal Lock* - Growth of a single line, Timpani, bars 35 - 36.

The occurrence of these excerpts within close proximity to one another (e.g. between bars 35 to 39) and in some instances overlapping one another, also demonstrates a level of self-similarity.

2.3.4 Transformation of a unison line

Taking the climax of the work (Fig. 2.22) as the point of departure, the following excerpts (Fig. 2.23 - 2.27) are examples of autogenesis by way of transformation. The concepts of growth vs. transformation are of course not exclusive to one another. Growth in itself is a transformation, and to grow, transformation is unavoidable. The acknowledgement of this is perhaps a superfluous tautology, but necessary in differentiating the previous discussion against the current one. In looking at "2.3.3 Growth of a linear line" there was an observable, logical progression where the examples 'grew' by way of additional notes/tones, added rhythmic complexity and actual length. The below examples are less obviously observable progressions of growth, but can perhaps be better understood as the 'massaging' of material into alternate but very similar forms.

Fig. 2.22 *Tidal Lock* - Transformation of unison line, tutti strings, bars 124 - 128 (climax).

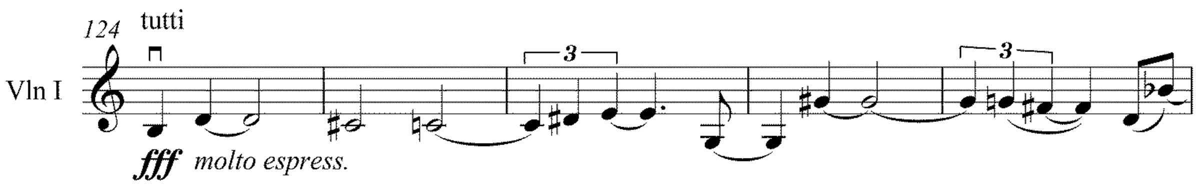


Fig. 2.23 essentially takes the first four bars of the work's climax, squashing the length down to approximately half the size via diminution of the rhythmic values. This diminution is not evenly applied, as can be seen in the reduction of the crotchet triplet in bar three of Fig. 2.22, to quaver values in bar two of Fig. 2.32 (if one considers the A flat crotchet as two tied quavers).

Fig. 2.23 *Tidal Lock* - Transformation of unison line, bassoon, bars 16 - 18

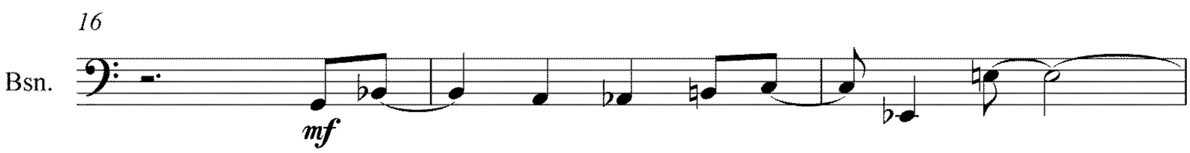


Fig. 2.24 further diminishes the length of the line above with the use of semiquavers and quaver triplets. The rhythmic feel of the line is also transformed significantly. The second note is rearticulated as the start of a semiquaver run, where before it was tied. Melodically, the line deviates from both of the previous examples by dropping a major 7th

(crotchet triplet, G - Ab) instead of a major 6th (Fig. 2.23, bar 3, C - Eb). A trait retained by the examples to follow.

Fig. 2.24 *Tidal Lock* - Transformation of unison line, bassoon, bar 12.

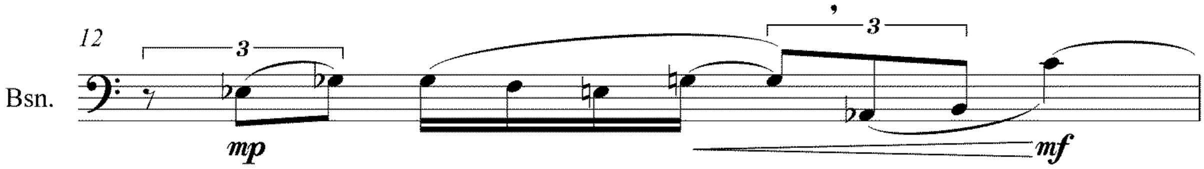


Fig. 2.25 follows Fig. 2.24 exactly until the end of the semiquaver grouping on the second beat. In Fig. 2.25 the tied G semiquaver to crotchet triplet G at the start of the third beat is removed, with the line progressing immediately to Ab.

Fig. 2.25 *Tidal Lock* - Transformation of unison line, Cor anglais, bars 15 - 16.

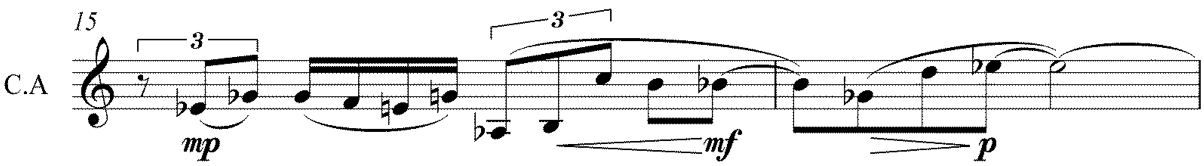


Fig. 2.26 stretches the G following the Eb - Gb crotchet triplet from a semiquaver, to a dotted quaver. A demisemiquaver triplet (Gb - F - E) is then employed, fitting the descending chromatic run into the same space as the previous two examples.

Fig. 2.26 *Tidal Lock* - Transformation of unison line, piccolo, bars 21 - 22.

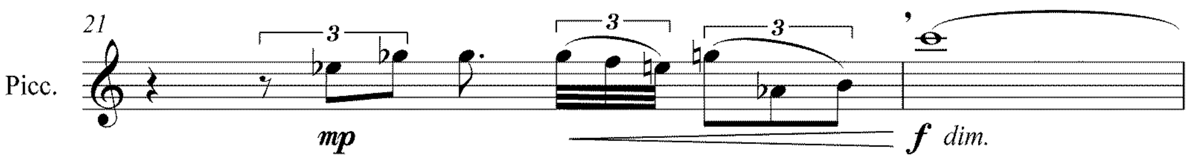
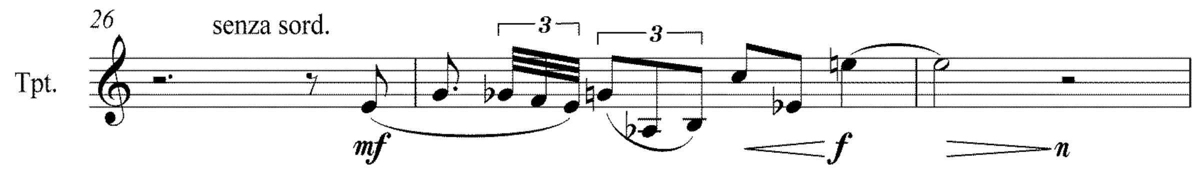


Fig. 2.27 retains the dotted quaver and demisemiquaver feature, but omits the opening crotchet triplet seen in figures 2.24 to 2.26. The line starts instead a minor 2nd higher on an E natural quaver, moving immediately to a dotted quaver G. This is to avoid clashing with E naturals held over by other instruments in bar 26 (bass clarinet & bassoon). The original tonality is resumed in the remainder of the line by descending to Gb at the demisemiquaver triplet. The line is extended at the third beat of the second bar by adding an additional minor 9th leap. This is in order to finish the line on E, blending with the other instruments already holding that tone.

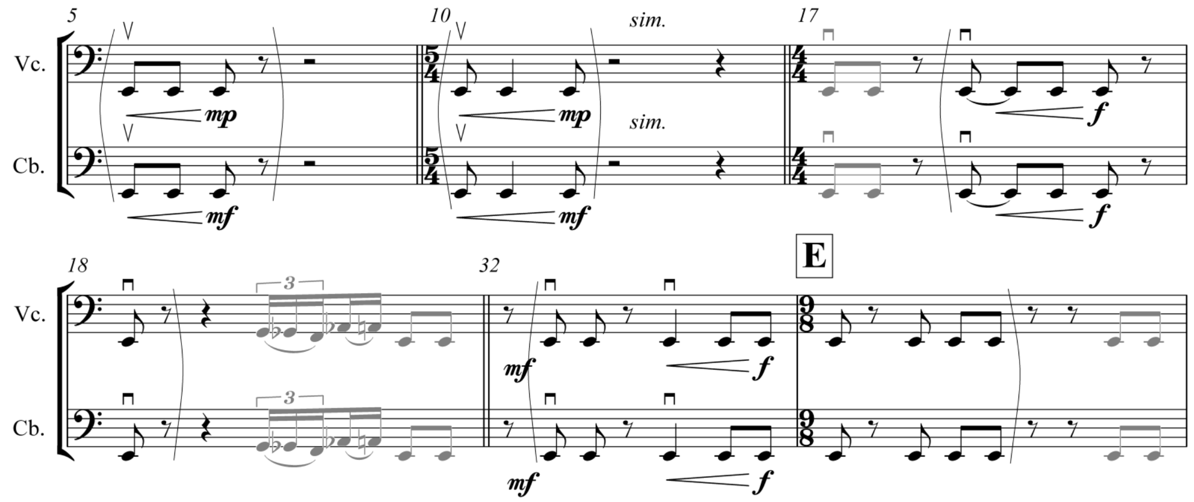
Fig. 2.27 *Tidal Lock* - Transformation of unison line, trumpet, bars 26 - 28



2.3.5 Growth of opening motif

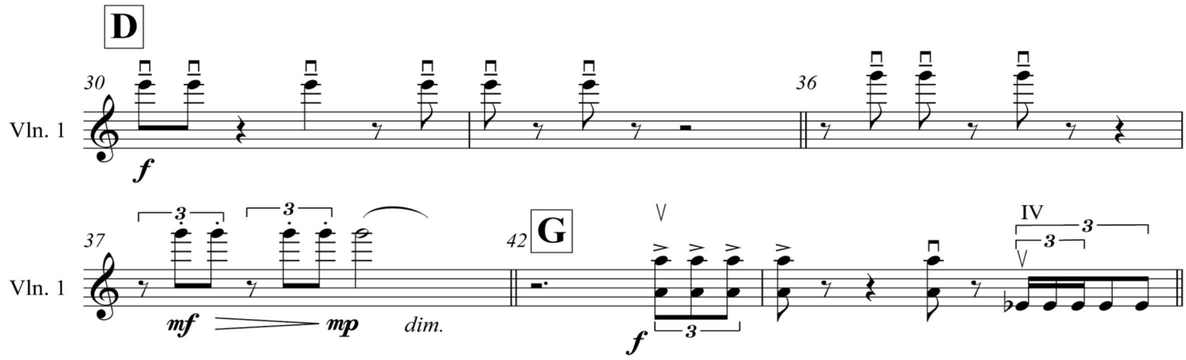
The opening of the work features a 'tolling' bell type motif in the low strings. This motif is heavily inspired by similar motifs employed by Penderecki in the opening of the 1st and 4th movements of his 3rd symphony. Starting as a three note statement, the motif is progressively lengthened by adding and lengthening notes, as can be seen in Fig. 2.28. At its zenith (bar 32), the motif reaches nine notes in length (a total of twelve quavers duration, including rests). The greyed out notes do not contribute to the shown examples.

Fig. 2.28 *Tidal Lock* - Growth of opening 'tolling' motif.



The 'tolling' motif is then taken on by the combined string section and upper woodwinds (Fig. 2.29), beginning with a six note iteration of the motif. At bar thirty seven, the rhythmic momentum of the motif is increased via the introduction of a quaver triplet figure. This concept is then extended with the introduction of the nested semiquaver figure (bar 43), seen earlier in figures 2.20 and 2.21 (cello and timpani respectively).

Fig. 2.29 *Tidal Lock* - 'Tolling' motif as upper string 'stabbing' motif, with growth, bars 30 - 31, 36 - 37 & 42 - 43.

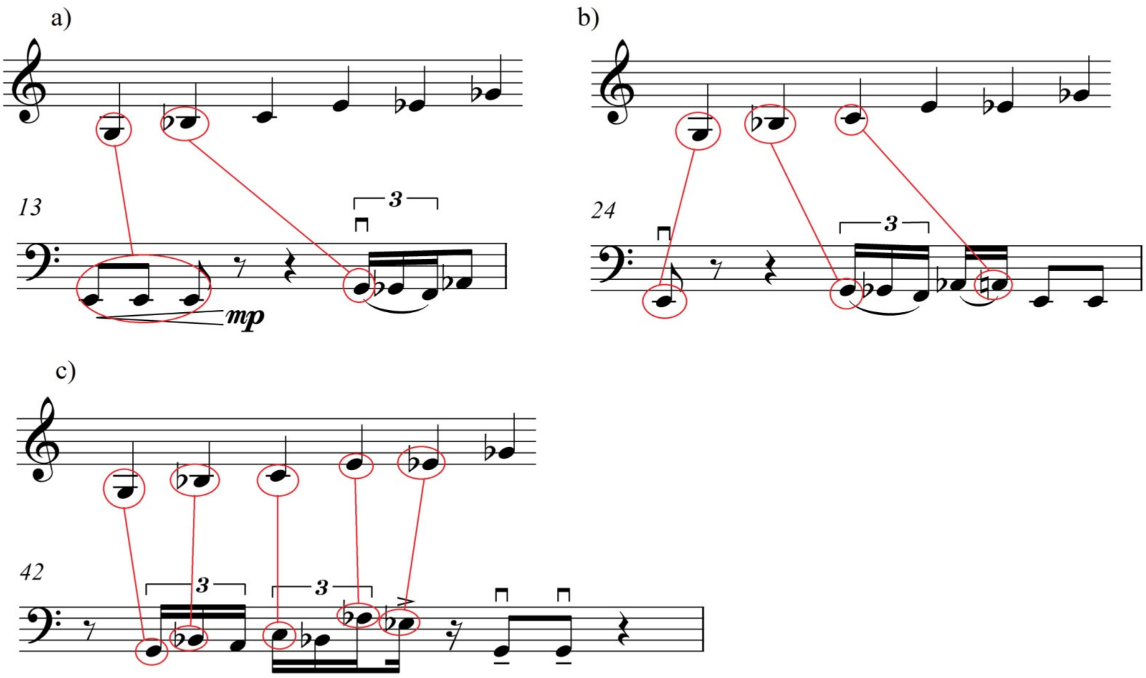


2.3.6 Growth of line in low strings

Fig. 2.30 details the growth of a line seen in the low strings (cello & contrabass). This line is stretched via the introduction of new tones from the fourteen note row. The first two examples are 'in' E, the third 'in' G - the original version of the fourteen note row. Example "A" progresses as far as the second tone, with a descending chromatic semiquaver triplet run, finishing with a minor third leap to Ab. Example "B" halves the value of Ab to a semiquaver, progressing to A natural, the third note of the series, before returning to the 'tonic', or first note of E. The third example "C" progresses to the fourth and fifth notes of the series, after the interruption of Bb, then returning to the 'tonic' of G.

In each of the examples the line is padded out with extra tones, obscuring the focus of the line. This obfuscation is intentional. If every material derived of the fourteen note row progressed in orderly fashion, without restraint, surely banality would result. The intention here then, is a more subconscious perception of coherence.

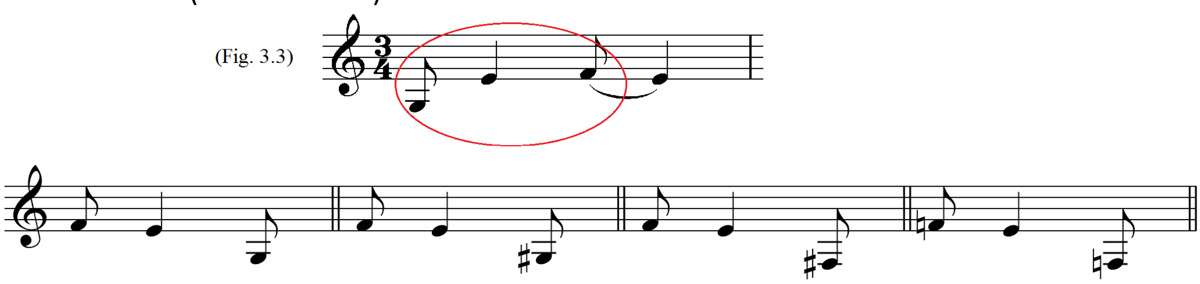
Fig. 2.30 *Tidal Lock* - Expanding low string line, bars 13, 42 & 24



2.3.7 Descending 6th/7th derived materials

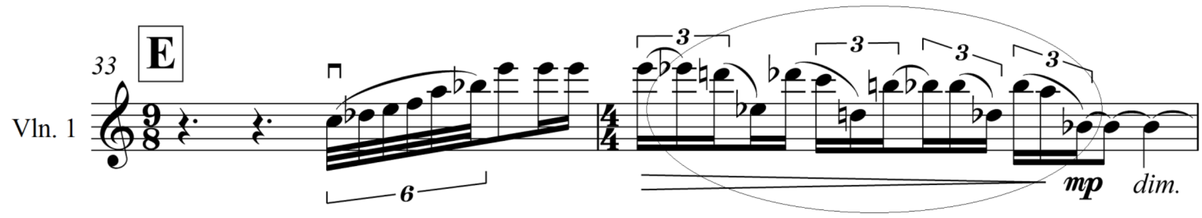
A new 'offshoot' of materials was derived by taking the first three notes of Fig. 2.3 (primordial material), G - E - F ascending, placing them in retrograde to form a descending, sighing motif. Variety is created by utilising both the major and minor 6ths, as well as major and minor 7ths in the formation of the second interval (Fig. 2.31).

Fig. 2.31 *Tidal Lock* - Fig. 2.3 opening notes (top stave) with retrograde variations (bottom stave).



This motif first occurs in the 1st and 2nd violins (Fig. 2.32). The circled passage in bar 34 reveals a chromatically descending line, broken with descending 6th and 7th leaps. The motif occurs four times: Eb - D - Eb, Db - C - D, B - Bb - Db, Bb - A - Bb, descending in a sequential manner (although not exactly).

Fig. 2.32 *Tidal Lock* - Descending 6th/7th motif, 1st Violins, bars 33 - 34.



In Fig. 2.33 the flute plays a rhythmically interrupted, harmonised version of the motif. The last notes of the first quaver triplet (G/C) are interrupted by a quaver triplet rest at the start of the next beat. The motif is completed following the rest (F/Bb - F/B). An interesting feature here is the lower flute re-articulating the note F, whilst the upper part moves down chromatically to Bb from B. This creates a pattern of alternating perfect and augmented fourth harmonies (G/C - F/B - F/Bb - F/B).

A similarly interrupted iteration of the motif is seen in the 1st and 2nd violins at bar 44 (Fig. 2.34).

Fig. 2.33 *Tidal Lock* - Descending 6th/7th motif, flutes, bars 49 - 50.

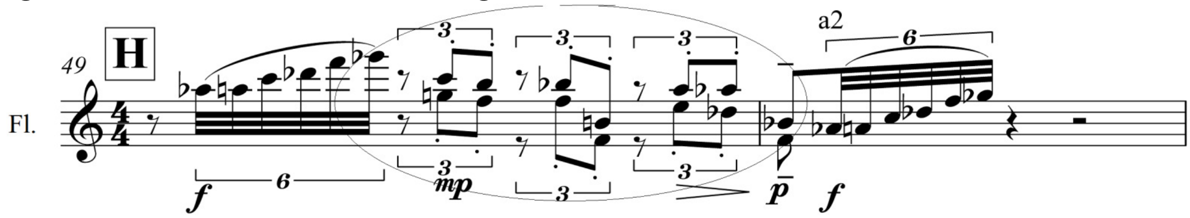
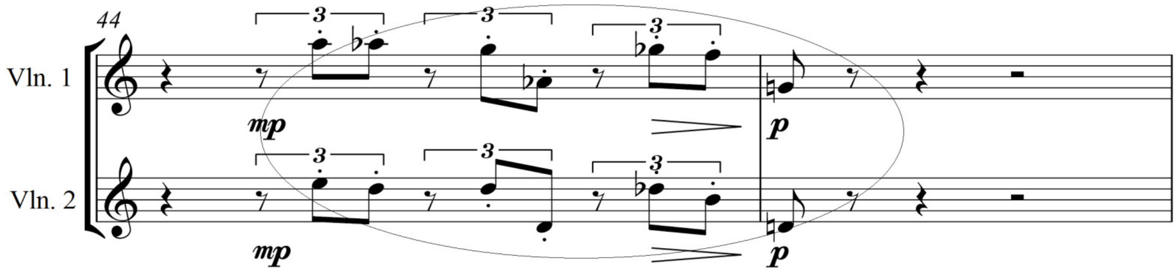


Fig. 2.34 *Tidal Lock* - Descending 6th/7th motif, 1st & 2nd violins, bars 44 - 45.



An approximation of the motif's gesture occurs in the timpani at bar 47 (Fig.2.35). The Timpani's limited ability to rapidly change pitches necessitated the resultant major 7th and octave skips (The second note of the first triplet should read Bb). Of course, in the hands of a skilled performer, the timpani would be capable of realising the motif in its complete form. However, the set of timpani intended for the premiere of the work were known to have pedalling issues. A more economical, more reliable writing choice was therefore made.

Fig. 2.35 *Tidal Lock* - Descending 6th/7th motif, timpani, bar 47.

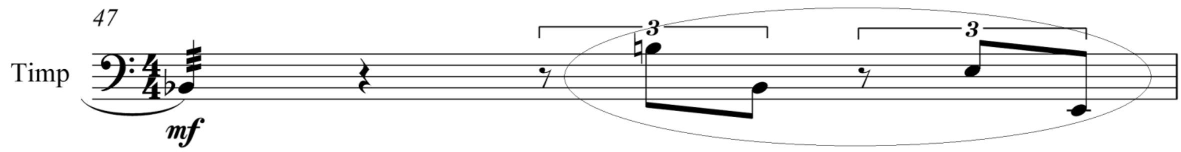
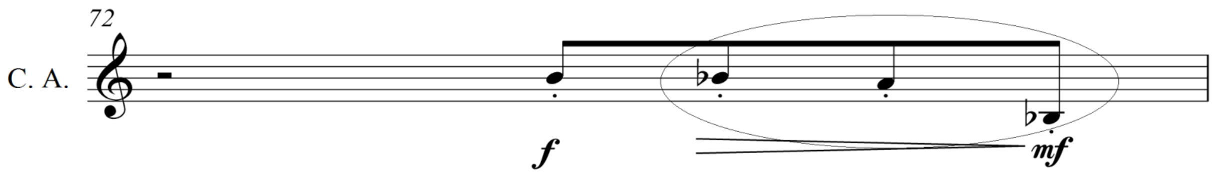


Fig. 2.36 *Tidal Lock* - Descending 6th/7th motif, cor anglais , bar 72.



The following excerpts (Fig. 2.37 - 2.40) detail the incorporation of the same descending 'sighing' motif in the woodwind solos occurring in the latter stages of the work. Three instances (circled) are seen in the flute solo of Fig. 2.37. The first two occur sequentially: E - Eb -Gb, then Db - C - Eb, with a repetition of the motif in the second bar. Similarly, the piccolo solo of Fig.2.38 spells the motif Db - C - E, with a repetition in the second bar. Here the second interval is a minor 6th, as opposed to the major 6th usage seen in the flute solo. Figures 2.39 and 2.40 utilise the major and minor 7th respectively.

Exclamation marks "(!)" in figures 2.38 - 2.40 indicate intervals not seen in the original motif. In the piccolo, a major 5th (Bb - Eb) takes the place of the 6th/7th, as it does in the cor anglais (B -E), which also as a major second as its first interval (C# - B). The bass clarinet has a diminished 5th in the place of a 6th/7th. These variations of the motif are used to create variety and interest, enforcing its nature whilst avoiding the potential banality that could arise from its strict repetition.

Fig. 2.37 *Tidal Lock* - Descending 6th/7th motif, flute solo, bars 150 - 151.

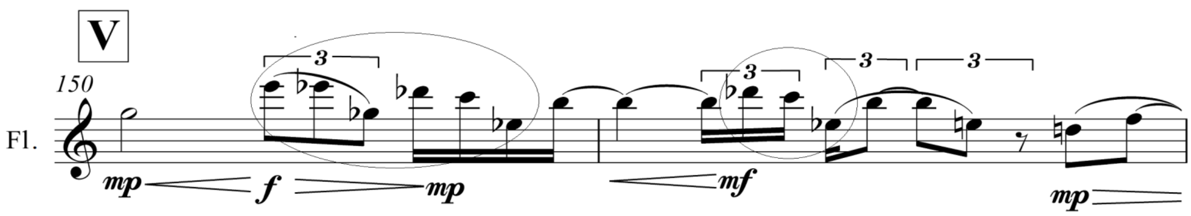


Fig. 2.38 *Tidal Lock* - Descending 6th/7th motif, piccolo solo, bars 153 - 154.

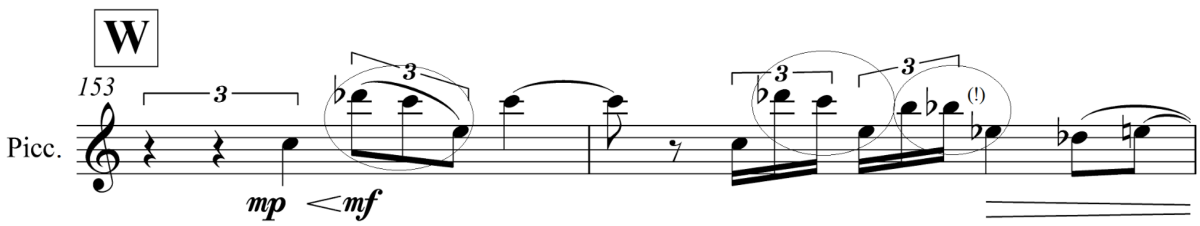


Fig. 2.39 *Tidal Lock* - Descending 6th/7th motif, cor anglais solo, bars 148 - 149.

Fig. 2.40 *Tidal Lock* - Descending 6th/7th motif, bass clarinet solo, bars 172 - 173.

2.3.8 Solo passages relating to fourteen note row, and descending 6th/7th gesture

The trumpet solo at bar 62, inspired by a similar trumpet solo in the 2nd movement of Penderecki's 3rd symphony, and the clarinet duet (1st clarinet only) at bar 90, both feature elements of the fourteen note row and descending 6th/7th motif. A numbered version of fourteen note row is provided as a point of reference in Fig.2.41 for both excerpts.

On beats three and four of bar 62 (Fig.2.41) we see a bracketed figure. This descending figure is a variation of the sighing motif. Here the motif is spelt: minor 3rd - major 7th (Eb -C - D), and is repeated as a quaver triplet on beat four. The motif in this form appears again in bar 65. Sequential versions of the original motif (circled) occur in bars 66 and 71 (as quaver triplets and semiquavers, respectively).

Much of the remaining material from the solo is comprised of fragments from the fourteen note row. These instances are numbered above the stave. Bar 62 sees the use of tones 3 - 7, with tones 6 and 7 reversed. The following bar continues the line with tones 6 -

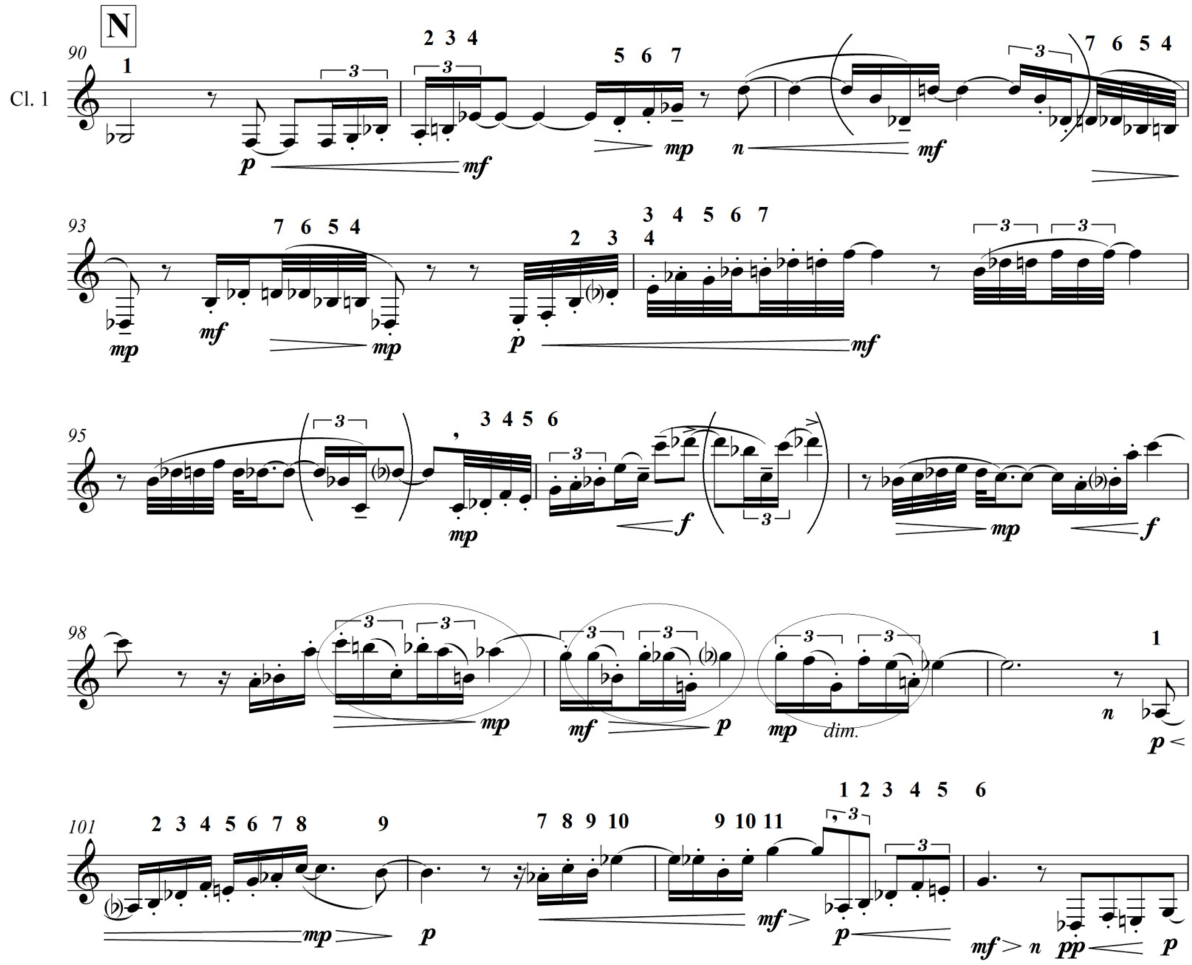
11, transposed a major 3rd down. Pitches 9 -10 (Gb - Ab) form a major 2nd, where the original line has a major 3rd. This also occurs at bar 70.

Fig. 2.41 *Tidal Lock* - Trumpet solo, bars 62 - 71.

* Major 2nd in place of major 3rd.

As with the trumpet solo discussed above, the clarinet excerpt detailed in Fig. 2.42 contains fragments of the fourteen note row, the descending 6th/7th motif and a variation form. The bracketed figures (bars 92, 95 and 96), as with the trumpet excerpt, exchange the minor second interval of the original motif for the minor 3rd. The original form of the motif can be seen circled in bars 98 and 99. Fragments of the fourteen note row are numbered above the stave as with the previous excerpt. Of particular note is the overlapping that occurs in bar 94, where the 4th note of the series (a half step up from the original) becomes the 3rd note of the row (a major 3rd up from the original).

Fig. 2.42 *Tidal Lock* - Clarinet duet (1st clarinet only), bars 90 - 104.



2.4 Examples of self-similarity from *Tidal Lock*

2.4.1 Self-similarity as a means of modulation

The following two examples utilise the fourteen note row, applying its sequence as a means of modulation. The term 'modulation' is used broadly here to describe the process of moving from one tonal centre to another, separate to the traditional mechanisms of modulation as seen in 'tonal' music.

The diagram of Fig. 2.43 shows the modulation scheme employed from bar 30 through to bar 58. The upper numbers represent bars, the boxed letters - rehearsal marks, and the lower line the changing tonality. As can be seen, the tonality progresses E > G > A > Db > C > Eb > E. This progression is the transposition of the first seven notes of the fourteen note scale.

Fig. 2.43 *Tidal Lock* - self-similarity in the form of modulation, bars 30 - 58.

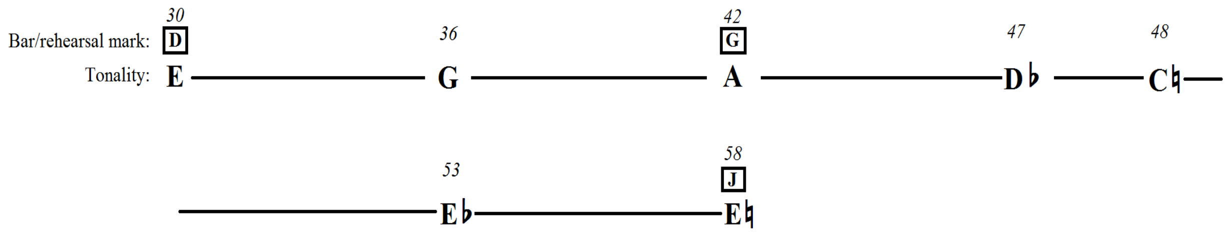


Fig. 2.44 utilises the same concept, but on a more compressed scale. In this instance the first three scale degrees are applied to three canonic entries occurring over the span of twelve bars. The entries occur in G, the original key of the line. Violin I enters at G, violin II at Bb and the violas at C.

Both examples (Fig. 2.43 & 2.44) demonstrate self-similarity by applying the micro/macro relationship found in fractal geometry. In Fig 2.43, the modulatory scheme occurs progressively. The relationship between the direction of modulation, and its direct relationship to the integral parts that constitute its fabric, is intended to be perceived on the subconscious level as a sense of cohesion.

The more overt use of self-similarity in Fig. 2.44, occurring in a more graspable passage of time, is perhaps more apparent to the attuned listener.

Fig. 2.44 *Tidal Lock* - self-similarity in tonality of canonic entries, bars 104 - 115.

2.4.2 Self-similarity simultaneously between parts

A variation of the application of self-similarity is seen below (Fig. 2.46). All eight staves contain the same four note motif, derived from the work's main climatic line (Fig. 2.45). The texture and rhythmic activity is progressively built, leading to a tense, suspended ambiguous chord at bar 140. Each part enters individually with deliberate rhythmic syncopation against the existing parts, creating a dense contrapuntal texture. The excerpt begins with rhythms constructed predominately from crotchets and crotchet triplets. As the density of the excerpt increases (e.g. bar 138) the rhythm of the stated motif effectively doubles with the use of quavers and quaver triplets. Of particular note is the low string part, which progresses at half the speed of the other parts, and is pitched a perfect fifth below.

This excerpt is simultaneously an example of self-similarity, and autogenesis; each part having an identical make up (melodically), and originating from the same sources (the 'primordial material' Fig.2.3 and fourteen note row).

The concept of Fig. 2.46 was inspired by a passage containing similar elements from Pendercki, Fig. 2.47.

Fig. 2.45 *Tidal Lock* - 4 note motif within climatic line, bars 124 - 129.

Fig. 2.46 *Tidal Lock* - Self-similarity from *Tidal Lock* bars 134 - 140.

Fig. 2.47 *Tidal Lock* - Penderecki self-similarity in *Symphony no. 3, Allegro* 2 bars after rehearsal mark 34.

Fig. 2.48 presents an excerpt whose inspiration comes from a passage in Lutosławski's *Mi-parti.* [180] This 'blurred line' is comprised of the first thirteen pitches of the ascending fourteen note row in the 1st and 2nd violins, played divisi, making a total of four independent lines. The intention here was to create a burring, or smearing of the melodic

[180] Witold Lutosławski: *Mi - Parti* (London: Chester Music, 1976).

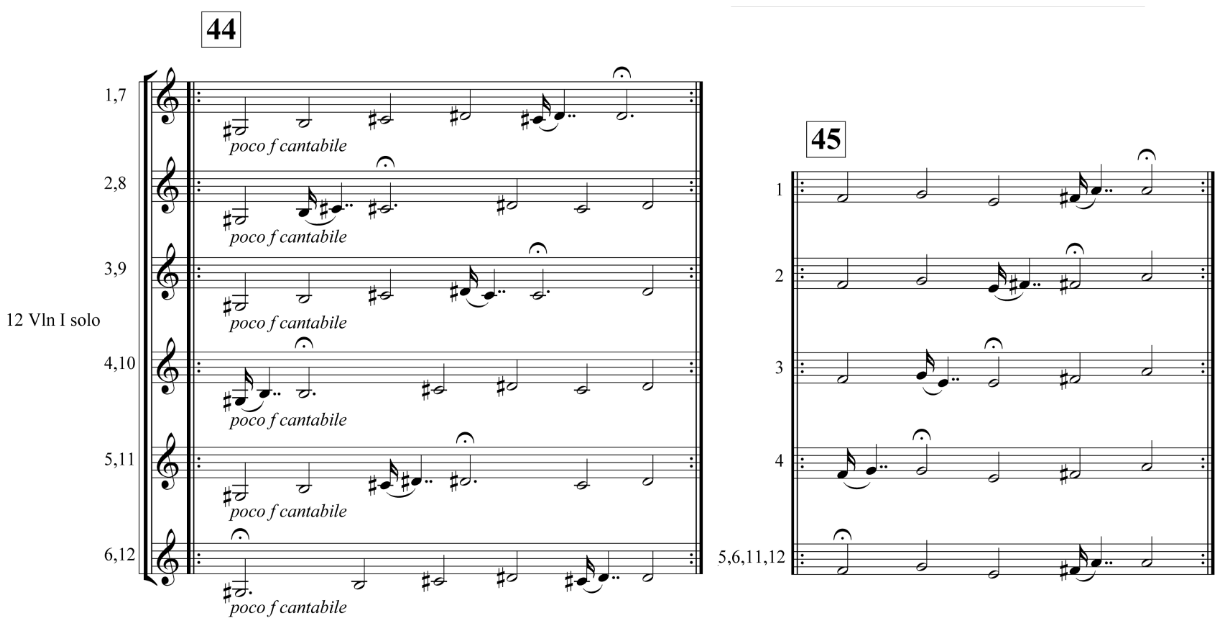
line. The instruction in the score reads:

"The Vlns should be played with a certain amount of rhythmic independence throughout the paused bars, approximating the written rhythms. Each paused bar ends when the players reach their unison note at the end of each bar."

These pauses are in bars 116, 118 and 120. This produces an aleatoric result - different each time. The aural effect of each player's interpretation within the given instruction bears a casual resemblance to micropolyphony, without the complexities of meticulously notating the effect.

Fig. 2.48 *Tidal Lock* - 'Blurred line' Tidal Lock, bars 116 - 120.

Fig 2.49 *Tidal Lock* - Blurred line from Lutosławski's *Mi-parti* rehearsal marks 44 -45.



2.5 *What This Valley Will Be Like*: reworking of *Tidal Lock* into small ensemble work (Appendix A)

What This Valley Will Be Like is an adaption and reworking of *Tidal Lock* for an ensemble containing baritone voice, flute, B flat trumpet and piano. It was written as an entry into the 2014 *Gallipoli Songs* competition, hosted by the Australian Music Centre.

The decision to rework *Tidal Lock* (as opposed to the drafting of an entirely new work) was driven by both time constraints, and the desire to be challenged by the reworking process. The biggest challenge faced was in fitting the text (respectfully taken from the diary of ANZAC solider Ellis Luciano Silas) to the melodic resources available within the existing work. Not only did the words have to be fitted within a relatively rigid construct - their meaning had to be fit within the formal narrative of the existing work also. The duality of this challenge, combined with the general challenge of reducing the orchestration to fit the given ensemble, caused such delay to the project as to negate the convenience of the reworking exercise altogether. It was nevertheless a worthwhile and valuable undertaking.

Alterations to various aspects of the original work were both necessary, and desirable. Generally, the vocal part remains faithful to the original thematic material, and is applied to the longer melodic gestures in the work (e.g. the bassoon line of Fig. 2.23 and the climax of the work, Fig. 2.22). To fit the syllabic requirements of the text, longer notes are split and repeated. A *Sprechstimme* -like vocal passage was added at bars 110-114, where no such material existed in Tidal Lock (corresponding bars 136-140 in Tidal Lock). As expected, various registral adjustments were necessary to suit the given instrumental tessituras of the ensemble.

Given that many of the original orchestral effects and colourations were not practically possible with the smaller ensemble, certain structural alterations were deemed necessary to avoid the work feeling long winded and bloated. A list of the main excisions and other alterations are given in dot points below. All bar numbers reference the original corresponding sections in Tidal Lock.

- Bars 1- 3: swells replaced by pulsing quaver motif.
- Bars 7-9 removed.
- From 3rd beat of bar 42 to 3rd beat of bar 52 removed.
- Bars 77-78 removed.
- Bars 114-123 (entire 'blurred line' section) removed.

- Bars 146-162: broken chords in piano to fill out missing string harmonies from original orchestration, some emptier bars omitted.
- Bars 164-170 removed.
- Truncated ending

A.3 Commentary on *Sleeping Under Mariana*

Sleeping Under Mariana is composed for the wind orchestra medium, and primarily focuses on the concept of pitched material derived from the Fibonacci series, and to a lesser degree, self-similarity and autogenesis. The title of the work is a reference to the Marina Trench: the deepest known abyssal trench, located near Guam in the Pacific Ocean. "*Sleeping Under...*" suggests an ominous presence slumbers under the depths. This concept was inspired by the mythological Greek realm of Tartarus: an underworld below that of Hades.

3.1 General overview of form

A basic block diagram outlining the basic form of the piece, showing the important dynamic changes and approximate lengths of sections is shown in figure 3.1. The next diagram (Fig 3.2) reveals the makeup of each section in more detail.

The basic shape/gesture of the work is that of a long crescendo (with dips and peaks) from "A" to the start of the climax at bar 145. A brief respite at "B4" (bar 171) then leads to a coda, which is really a secondary climax, employing contrasting thematic material.

Fig. 3.1 *Sleeping Under Mariana* - General overview of form.

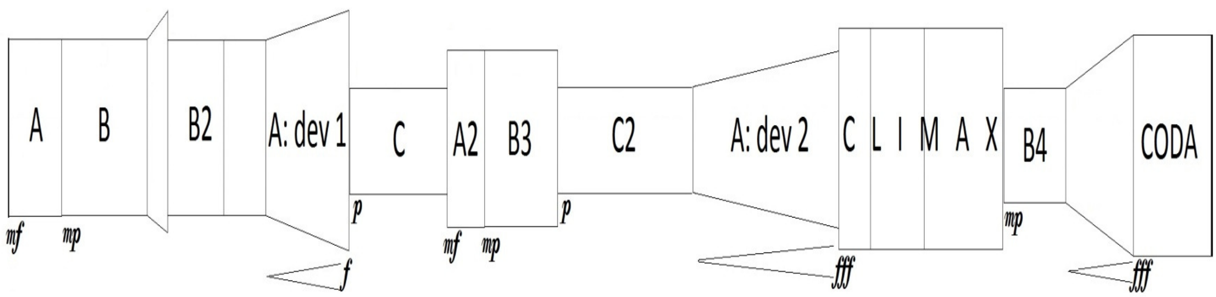
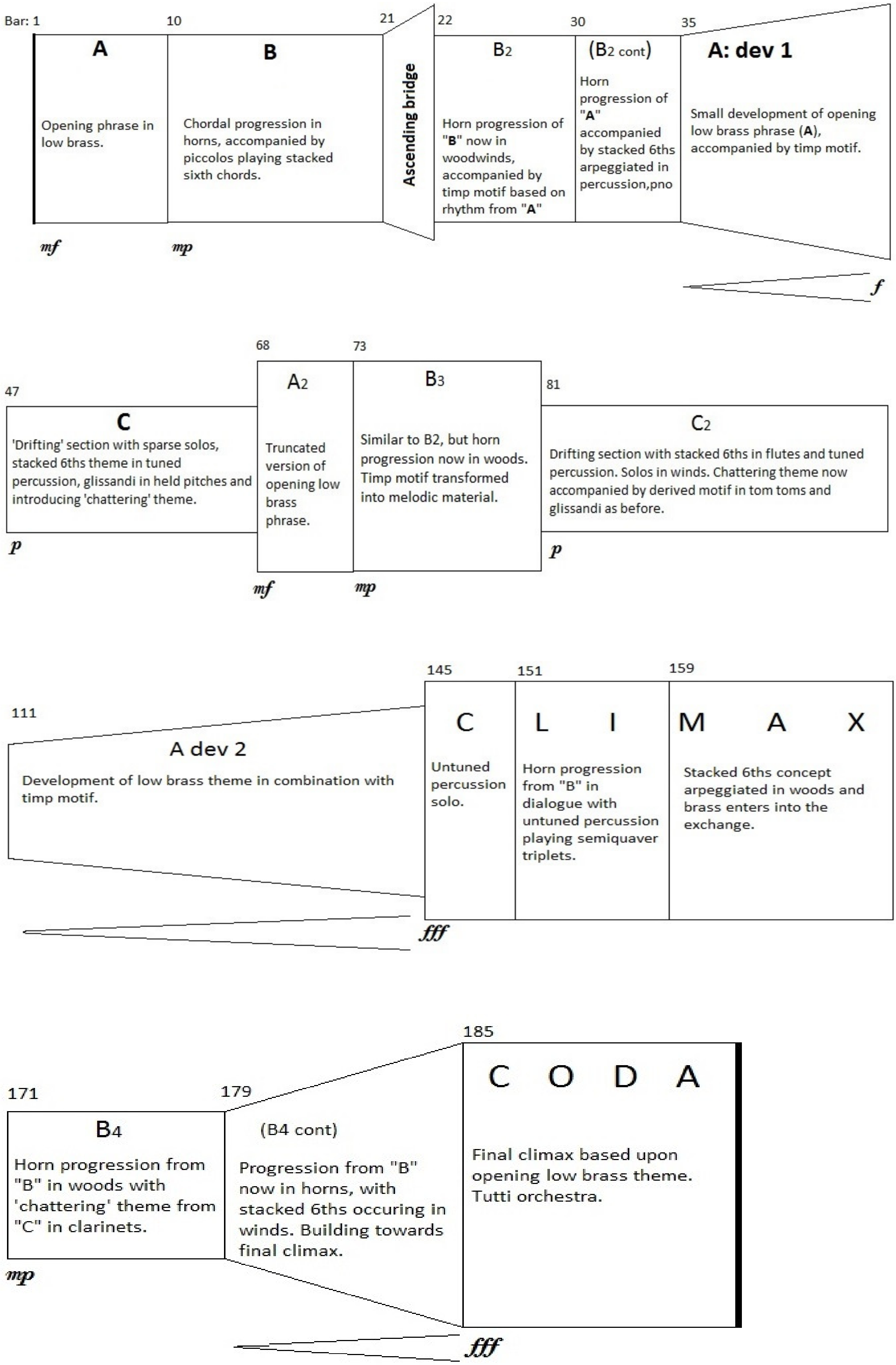


Fig. 3.2 *Sleeping Under Mariana* - Detailed view of form.

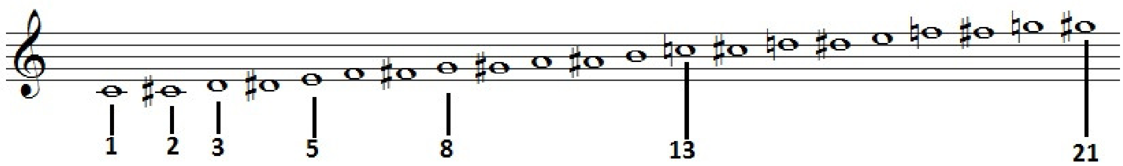


3.2 Origins of material

Prior to the preliminary sketching process, an investigation of the different possibilities offered by the Fibonacci and Lucas sequences was required. The experiments below are an extension of the examples discussed in chapter 1.5.1 by composers Bela Bartók and Don Walker.

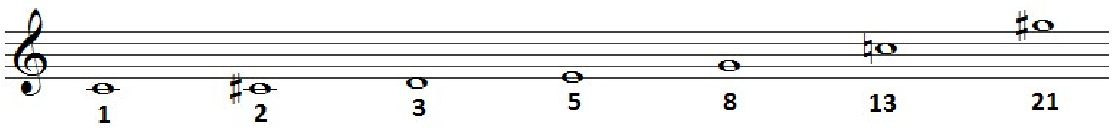
The first attempt at procuring pitched material from the Fibonacci sequence is shown in figure 3.3. In this instance, a chromatic line has notes marked out corresponding to the Fibonacci sequence, as counted in semitones. Each number is referenced back to the first note, rather than the preceding note (e.g. C to G being eight semitones, where C is counted as the second 1 in the sequence). The first two digits of the Fibonacci sequence (0, 1) are omitted in order to avoid potentially superfluous unison, semitone movement.

Fig. 3.3 *Sleeping Under Mariana* - Chromatic line with Fibonacci intersections.



With the left over notes discarded, a seven note line is revealed (fig. 3.4). This line could be continued indefinitely, applying the same methodology to the subsequent Fibonacci numbers.

Fig. 3.4 *Sleeping Under Mariana* - Reduction of Fig. 3.3 by removal of unused tones.



Swapping the last two notes, this line becomes an ascending six note scale, with the final note (C) serving as the beginning of a new octave. This scale contains the following qualities: minor and major 2nds, major 3rd, perfect and augmented 5ths.

Fig. 3.5 *Sleeping Under Mariana* - Reorganisation of Fig. 3.4 to create an ascending scale.

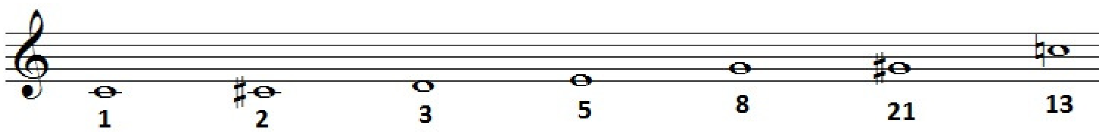
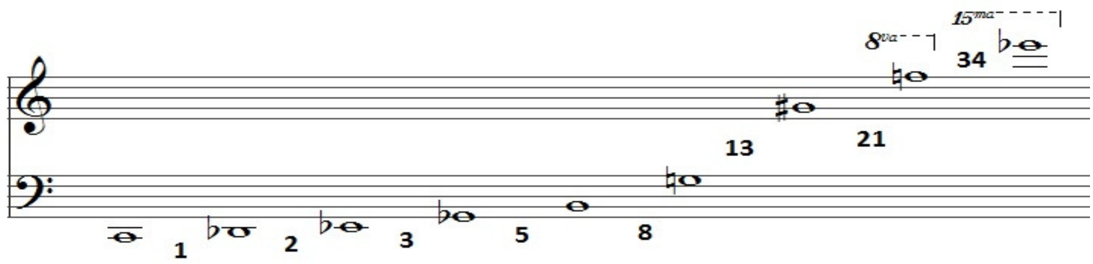


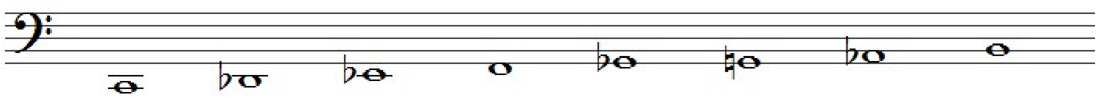
Figure 3.6 shows a new approach to the problem. Here the Fibonacci sequence is again applied to counting semitones; this time however, each digit of the sequence is referenced back to the preceding note (e.g. C to Db being one semitone apart, Db to Eb being two semitones apart etc). This yields a sequence of notes with the characteristic of progressively expanding intervallic structures.

Fig. 3.6 *Sleeping Under Mariana* - Pitch series derived by counting semitones according to Fibonacci groupings.



By reorganising these pitches in ascending order (and omitting repeated pitches), an eight note scale is produced (Fig. 3.7). This scale resembles C locrian (C, Db, Eb, F, Gb, Ab, Bb, C) with an added note (G), and major 7th (B). The chromatic F > Gb > G around the fifth creates a 'bluesy' feeling.

Fig. 3.7 *Sleeping Under Mariana* - Fig. 3.6 reorganised to create ascending scale.

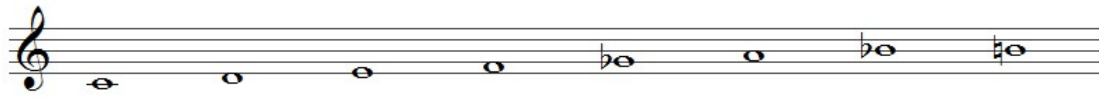


An alternative result is achieved by repeating the above experiment, starting the Fibonacci series at 21 and running it in reverse (Fig. 3.8). The resulting sequence of notes derived has the characteristic of reduced intervallic distances as the sequence ascends. Interestingly, the resultant structure of pitches resembles, visually at least, the harmonic series.

Fig. 3.8 *Sleeping Under Mariana* - Pitches derived from the Fibonacci numbers as in Fig. 3.6, but running in reverse.

As with figure 17, these notes are here organised into an ascending eight note scale (Fig. 3.9).

Fig. 3.9 *Sleeping Under Mariana* - Pitches from Fig. 3.8 reorganised to create ascending scale.



In figures 3.10, 3.11, 3.12 and 3.13 the Fibonacci series is replaced by the Lucas series (2, 1, 3, 4, 7 etc), applying the same methodologies as illustrated in figures 3.6, 3.7, 3.8 and 3.9 respectively.

Fig. 3.10 *Sleeping Under Mariana* - Pitch series derived by counting semitones according to Lucas number groupings.

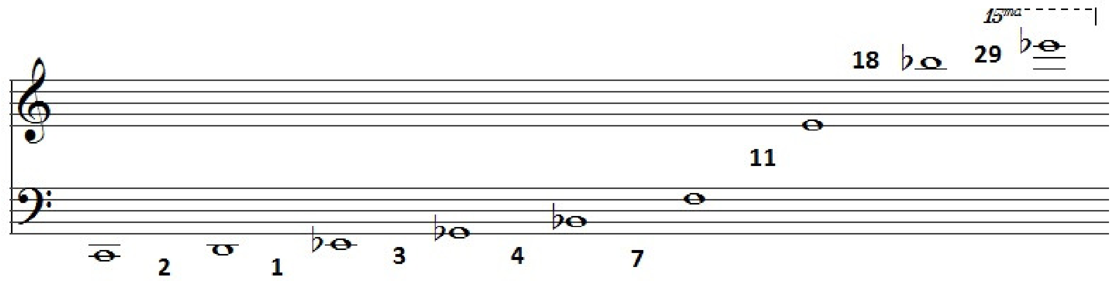


Fig. 3.11 *Sleeping Under Mariana* - Pitches from figure 3.10 reorganised to create ascending scale.

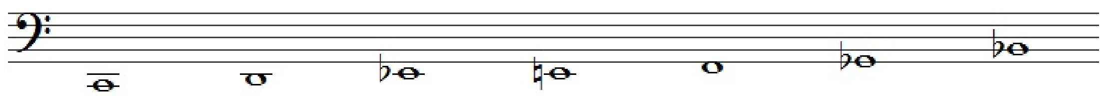


Fig. 3.12 *Sleeping Under Mariana* - Pitches derived from the Lucas series as in Fig. 3.10, but running in reverse.

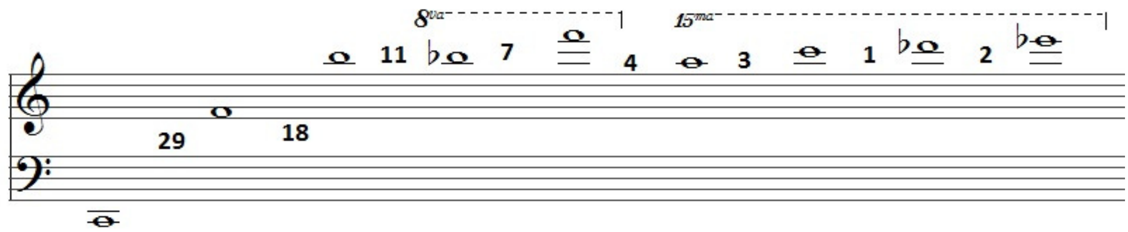


Fig. 3.13 *Sleeping Under Mariana* - Pitches from Fig. 3.12 arranged in ascending order.

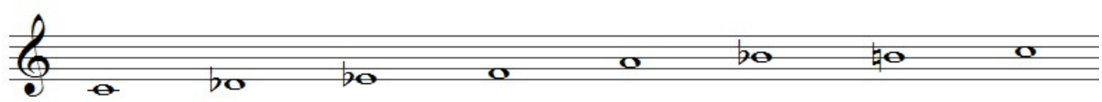


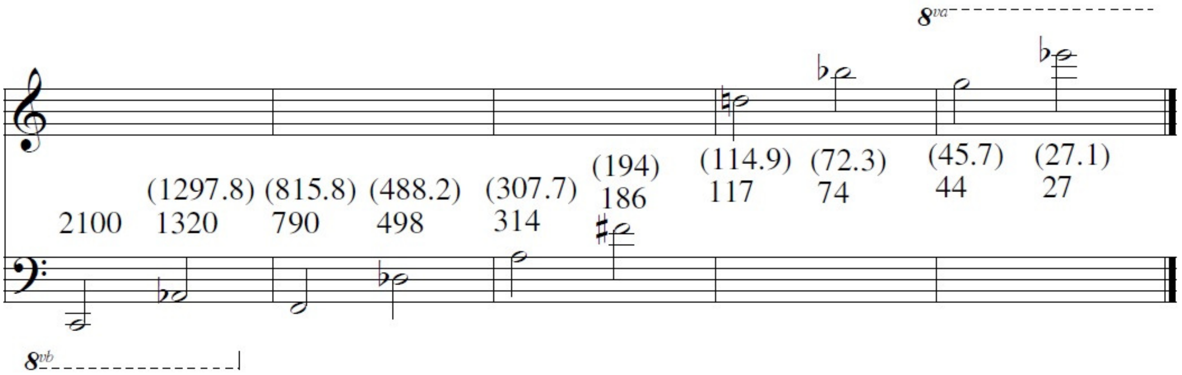
Fig. 3.14 shows the final result of the investigation. In this instance, the scale materials were extracted by applying the Golden Section (Phi - 1.618) to the vibrating wavelengths of the notes (centimetres), as opposed to the intervals as discussed in the previous example.

A brief explanation regarding the concept of vibrating wavelengths as applied to musical notes is necessary before further discussion of this example. Each note has a vibrating wavelength which is different from its frequency. C-0 (four octaves below middle C) has a frequency of 16.35 Hz, and a vibrating wavelength of 2100 (cm). As one ascends in pitch, the vibrating wavelength (cm) becomes shorter, as the frequency (Hz) increases. The in depth study of these acoustical principles is outside of the scope of this submission, for further reading refer to: *Fundamentals of Musical Acoustics* (Benade, 1990).

The first digit, 2100 (corresponding to the note C0, as shown in the example) is divided by the Golden Section ratio (Phi, 1.618), resulting in the bracketed number 1297.8 above the second note a flat. Due to the fact that there is no note that fits the number 1297.8, the nearest note is chosen according to its vibrating wavelength (in this case, A flat - 1320). The number below the bracketed number is the actual wavelength of each note in question. Each subsequent pitch is derived by the same process; the division of the previous note's wavelength by the Golden Section ratio, then rounded up to the nearest next wavelength.

An intriguing pattern arises from this method of note selection; a seemingly endless succession of two minor 6ths, followed by a major 6th. This pattern appears to repeat indefinitely, having been tested beyond thirty iterations. From the first note C, the example proceeds C > A flat (minor 6th), A flat -> F (major 6th), F > D flat (minor 6th), D flat > A natural (augmented 5th, but enharmonically equivalent to a minor 6th), A > F sharp (major 6th) etc.

Fig. 3.14 *Sleeping Under Mariana* - Pitches derived through division of vibrating wavelength by Phi.



3.3 Examples of autogenesis from *Sleeping Under Mariana*

3.3.1 Fibonacci derived 6ths material

This pattern of two minor 6ths followed by a single major 6th forms a major component of the compositional material employed in this piece. A condensed abstract from the opening is shown in Fig. 3.15. The stacked 6ths concept can be seen in the second bar of the example, where the flute and piccolo spell out the notes A, F#, D, Bb, F. The last interval, Bb to F is a perfect 5th and thus breaks the pattern of 6ths; the next in the sequence of 6ths should be G.

This break in sequence is taken in order to satisfy the creative direction of the material. As previously stated, the implementation of Fibonacci and other organic growth concepts throughout these submitted works is not intended to be adhered to prescriptively. They are used as tools where useful, and put aside when a hindrance. In this instance, from an aesthetic position, the pitch of G did not fit with the general sense of form up to this point. This perhaps begs an important question: if the materials/methods established by the discussed principles of organic growth can be discarded as such on the whims of the composer, is their value called into question? Or more pertinently: is the submission as a whole rendered somewhat impotent by such excursions? The answer in both instances, is "no", as supported by the following explanation. An inherent characteristic of organic growth is its propensity for advantageous mutation. In nature, this can come about randomly, or via natural selection. In the context of this submission, the composer assumes the role of 'natural selector' - an omnipotent guiding hand. Additionally, when such an adjustment is made, it is generally kept and passed along in the material's subsequent iterations or growth, much like the inheritance of a genetic trait.[181]

In bar 6 of the extract we see the pattern of 6ths inverted to form a pattern of 3rds. These 3rds alternate in quality as did the 6ths: major 3rd (F# - D), major 3rd (D - Bb), minor 3rd (Bb - G), major 3rd (G - Eb); bars eight and ten display the same pattern of stacked 3rds.

This example shows a clear evolution of Bartók's efforts to derive pitch sequences from numerical ratios (Fibonacci/Golden Section). This sequence of stacked 6ths (and 3rds respectively) as seen in Fig.3.15 is felt both melodically and harmonically; the articulation of each note in the sequence creates a distinctive melodic shape (a melodic shape exploited

[181] For further reading on mutation and natural selection, see: Sewall Wright: *The roles of mutation, inbreeding, crossbreeding, and selection in evolution* (1932), Vol. 1, no. 8.

more directly later in the work), whilst the stacking of the sustained tones builds lingering harmonies.

The stacked 6ths/3rds material of Fig. 3.15 is later manifested as a dynamic fanfare like passage (Fig. 3.16), with the stacked intervals being articulated as staccato semiquaver triplets that cascade upwards and downwards. The rhythmic character of this passage is introduced eight bars earlier by the timpani (Fig. 3.17).

Fig. 3.15 *Sleeping Under Mariana* - Stacked 6ths harmonies, bars 10 - 20.

Fig. 3.16 *Sleeping Under Mariana* - Stacked 6ths harmonies, bars 160 - 163.

Fig. 3.17 *Sleeping Under Mariana* - Triplet semiquaver rhythms from stacked 6ths in timpani part, bars 152 - 153.

The following three excerpts (Fig. 3.18 - 3.20) demonstrate other instances within the work where the stacked 6ths/3rds concept can be found. The two examples in the vibraphone (pedalled for sustain) exude a mysterious and introspective quality, with each phrase creating drifting harmonies which permeate the sparse orchestrations throughout the respective sections. During the ending climax of the work, the brass play an ascending motif (Fig.3.20) in gaps between the tutti orchestra's playing.

Fig. 3.18 *Sleeping Under Mariana* - Pattern of 6ths, vibes, bars 30 - 32 & 39.

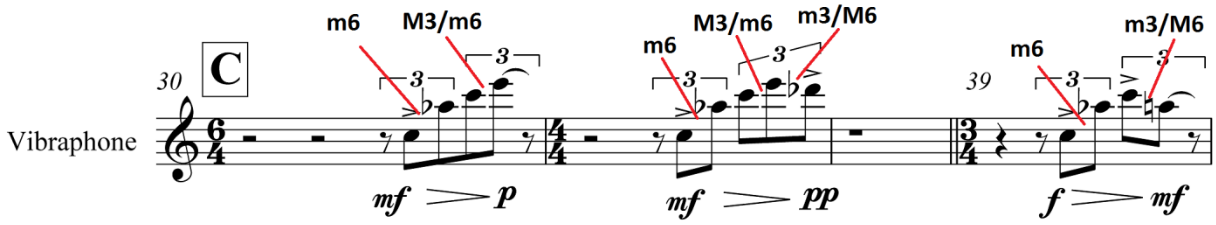


Fig. 3.19 *Sleeping Under Mariana* - Pattern of 6ths, vibes, bars 47 - 50, 56 - 57 & 66 - 67.

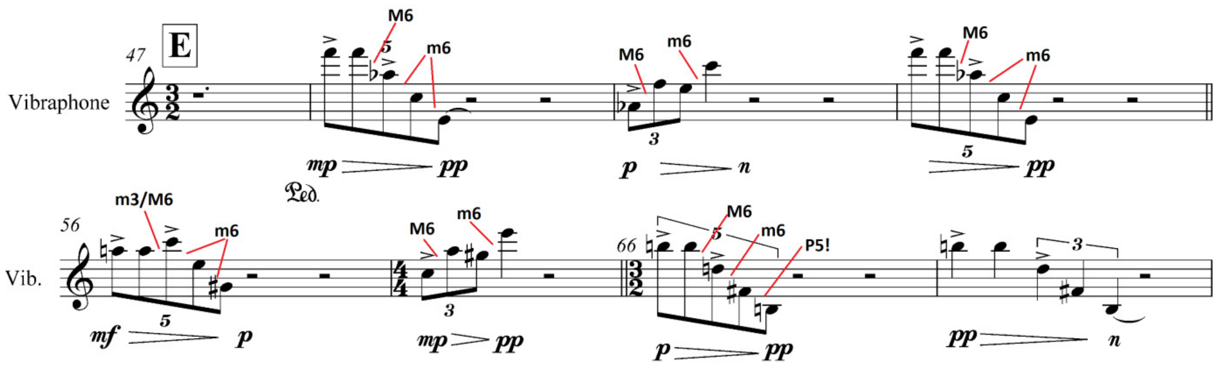
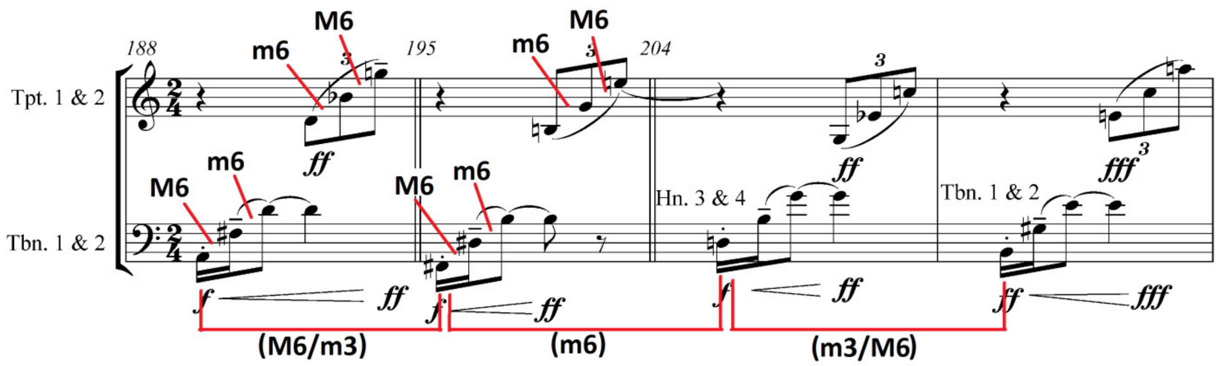


Fig. 3.20 *Sleeping Under Mariana* - Pattern of 6ths, brass, bars 188, 195 & 204 - 205.



3.3.2 'Pesante' theme

The theme introducing the work (Fig. 3.21) is entirely unrelated to the Fibonacci derived material discussed above. This theme, coined here as the 'pesante theme' (owing to the direction given to the players to interpret the line in a heavy, lumbering way) was inspired by the opening lines from Gustav Holst's *Hammersmith* (1930). A detailed analysis of this material will not be necessary, suffice to say its most characteristic features are the 7th leap at its beginning, and general rhythmic makeup.

This thematic material sees extensive development from rehearsal letter "M" (bar 111) to the percussion battery solo at "Q" (bar 145). Figures 3.22 to 3.27 identify some of the developments this theme undergoes throughout this section. Generally speaking, the theme's treatment here is mostly by way of imitation and with a semi contrapuntal texturing. The characteristic opening notes of accent > tenuto > minor 7th downward leap (inverted to major 2nd upwards leaps in figures 3.24 - 3.26, and occurring elsewhere in the section at other intervals) are used in a stretto like manner, with entries of the theme either in full, or as false entries.

Finally, this 'pesante theme' is coerced into serving as the work's final flash of excitement (Fig. 3.28). Here the theme is transformed into being decidedly less 'pesante', taking on a forceful, unyielding character.

Fig. 3.21 *Sleeping Under Mariana* - 'Pesante' theme, low brass, bars 1 - 9.

Fig. 3.22 *Sleeping Under Mariana* - 'Pesante' theme adapted into timpani line, bars 130 -132.

Fig. 3.23 *Sleeping Under Mariana* - 'Pesante' theme as rhythmic motif, piano, bars 141 - 142.

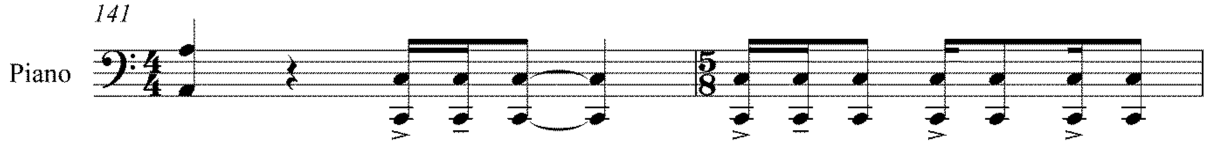


Fig. 3.24 *Sleeping Under Mariana* - 'Pesante' theme development, second flutes, bars 111 - 112.

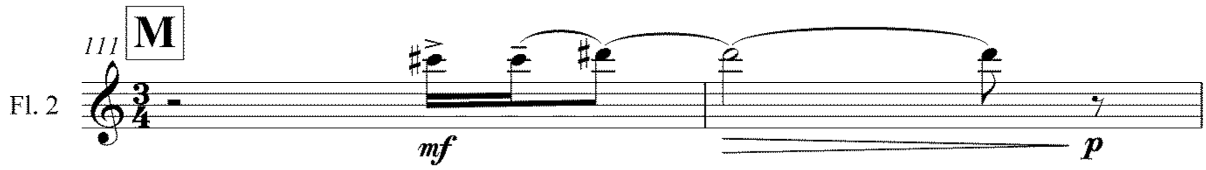


Fig. 3.25 *Sleeping Under Mariana* - 'Pesante' theme development, piccolo, bars 112 - 113.

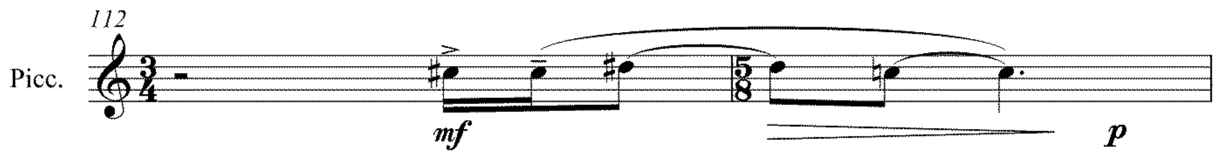


Fig. 3.26 *Sleeping Under Mariana* - 'Pesante' theme development, piccolo, bars 114 - 116.

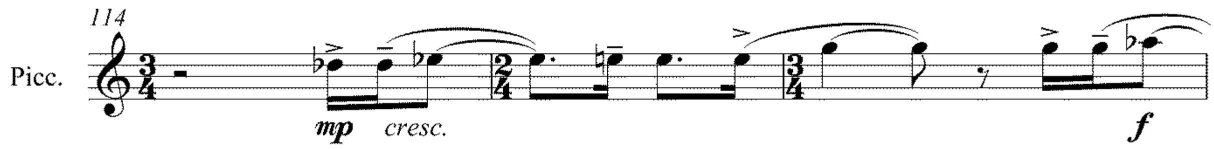


Fig. 3.27 *Sleeping Under Mariana* - 'Pesante' theme development, oboes, bars 117 - 119.

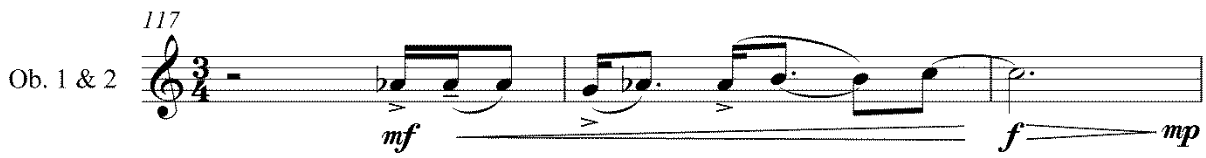
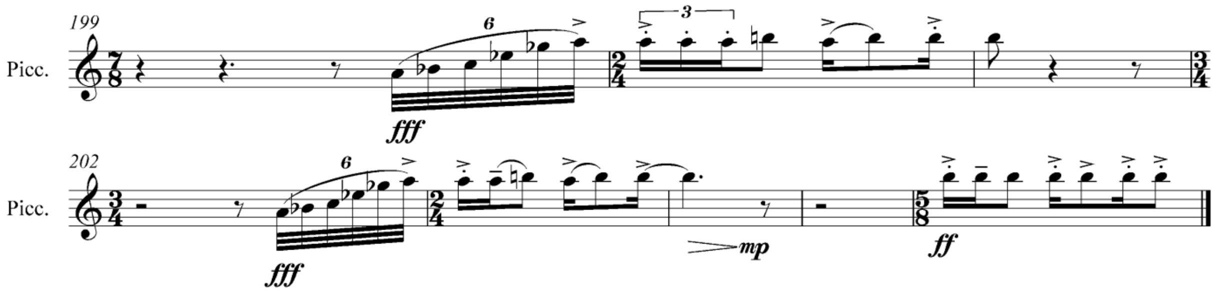


Fig. 3.28 *Sleeping Under Mariana* - 'Pesante' theme development, final climax of work, bars 199 - 206.



A.4 Commentary on *Seeking the Path that Leads Home*

Seeking the Path that Leads Home is a work composed for a trio of A clarinets. A clarinets were chosen for their comparatively darker timbre (as opposed to Bb clarinets). The work was written for the Eclectica Trio[182], and was given its premiere performance by that group in 2011. The group had complained that in their opinion, there was a shortage of challenging repertoire written for the clarinet trio medium. This work then was composed with the intention of being a challenging, engaging addition to the medium's repertoire. It should be noted that whilst three movements of the work are included in the scores and recordings, only the movement that shows the greatest use of organic growth principles is treated with a commentary here.

The title of the work is a reference to the yearning character of thematic material occurring in the work's opening and closing sections. The work's relationship to the submission lies in its use of autogenesis in its creation.

4.1 General overview of form

At the request of trio member Amanda Home (née Lovelock), whose M.Phil. dissertation[183] deals with the exploration of extended techniques on the clarinet, the work includes the use of multiphonics. A great deal of experimentation, trial and error was required in determining the most usable multiphonics to be included in the composition (both in terms of aural appeal, and stability of execution). These multiphonics occur both in the opening and closing of the work.

The general overall structure (Fig. 4.1) of the work is that of an arch with a climax at approximately the two thirds mark. The opening section of the work features multiphonics that are passed and overlapped between the players, creating intriguing harmonies and textures. Amongst the multiphonics, a yearning, lamenting line is exchanged and developed. The core material of the work occurs at bar 17: a fugue like theme that is developed until the climax of the work at bar 49. The work closes with a reprise of the opening multiphonics and yearning theme.

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[182] The Eclectica Trio are an Adelaide based clarinet trio made up of clarinettists Amanda Home (née Lovelock), Anna Coleman and Charise Penrose (née Altmann).

[183] Amanda K. Lovelock: *Exploration of selected extended clarinet techniques: a portfolio of recorded performances and exegesis.* (M.Phil diss., The University of Adelaide, 2013).

Fig. 4.1 *Seeking the Path that Leads Home* - General overview of form.

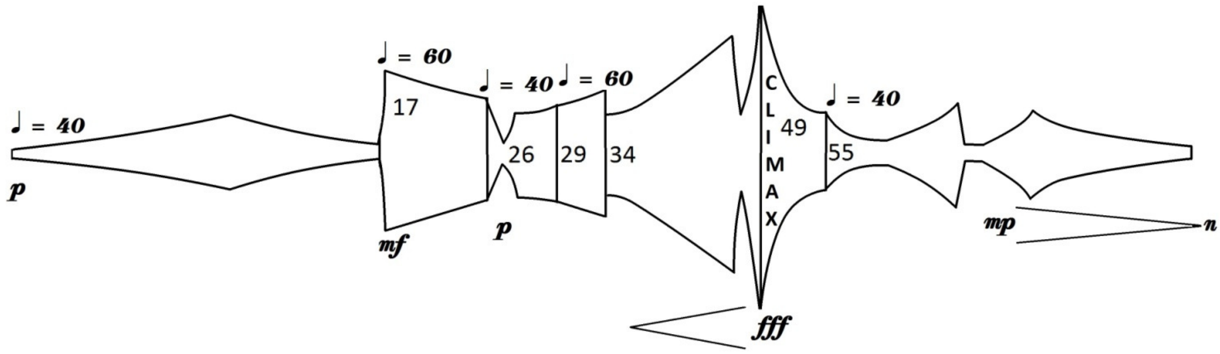
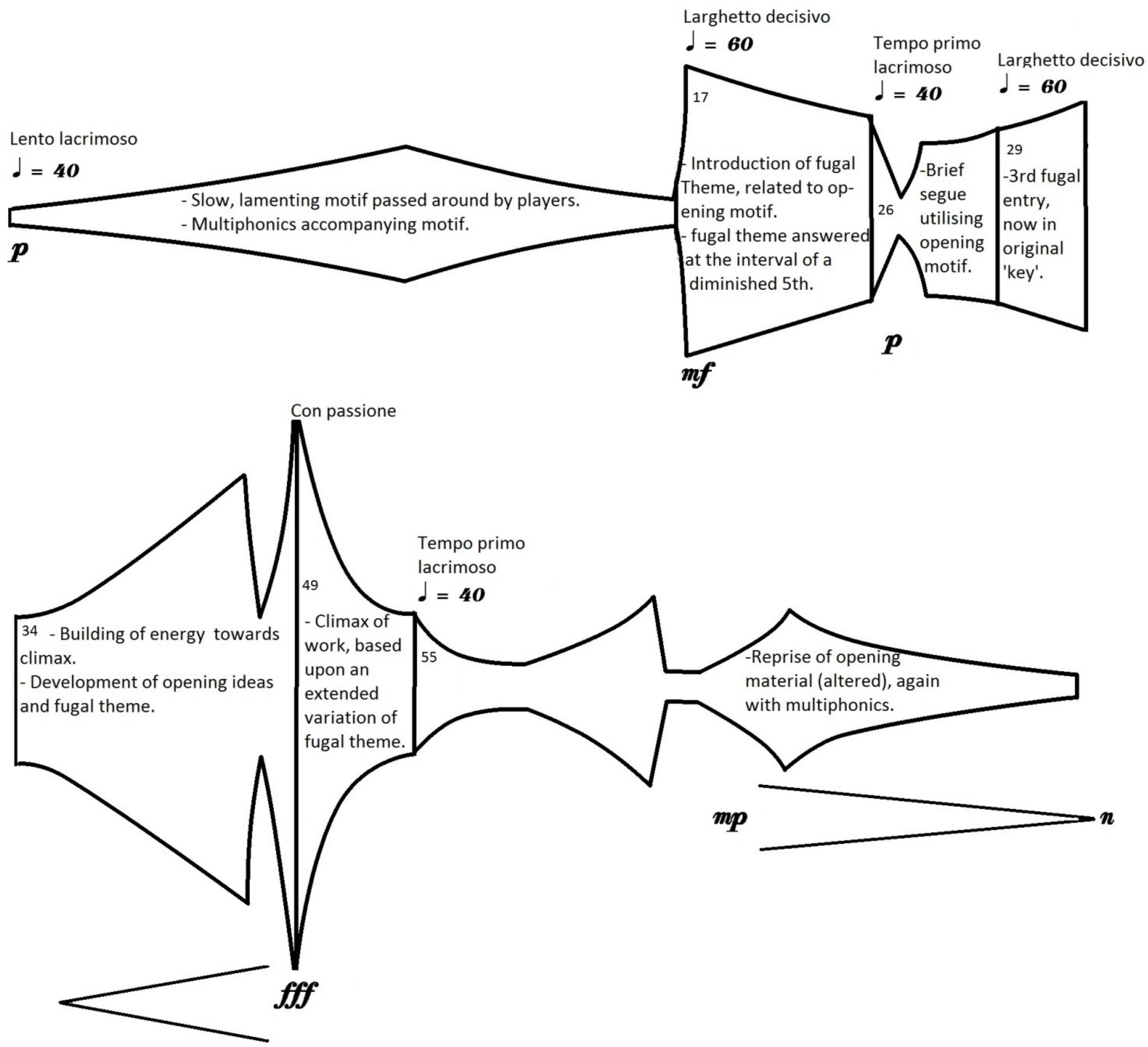


Fig. 4.2 *Seeking the Path that Leads Home* - Detailed view of form.



4.2 Origins of material

From the outset, the work was intended to be contrapuntal and fugue, or fugue like in its makeup. A fugal subject (Fig. 4.3) was written at the outset, prior to any consideration of form or other thematic materials. The line was composed freely and without consideration of tonality, knowing the character inherent in its makeup would bear out the rest of the work.

There are two main features of the fugal theme: its varied rhythmic makeup (including the demisemiquaver run, quaver, crotchet and semiquaver triplets and semiquaver quintuplet) and emphasis on the diminished 5th interval. Fig. 4.4 shows the fugal answer at the interval of a diminished 5th (Bb tonal centre), in keeping with the line's character of favouring that interval.

Fig. 4.5 shows the scale derived from the fugal subject and its answer. These scales were extracted in order to provide guidance and consistency in the composition of the work's other thematic materials. As it turns out, and completely by accident, the scalic material extracted from the fugal theme conforms to the intervallic structure of the octotonic scale (alternating tones and semitones).

Fig. 4.3 *Seeking the Path that Leads Home* - Fugue like subject, bars 17 - 21.

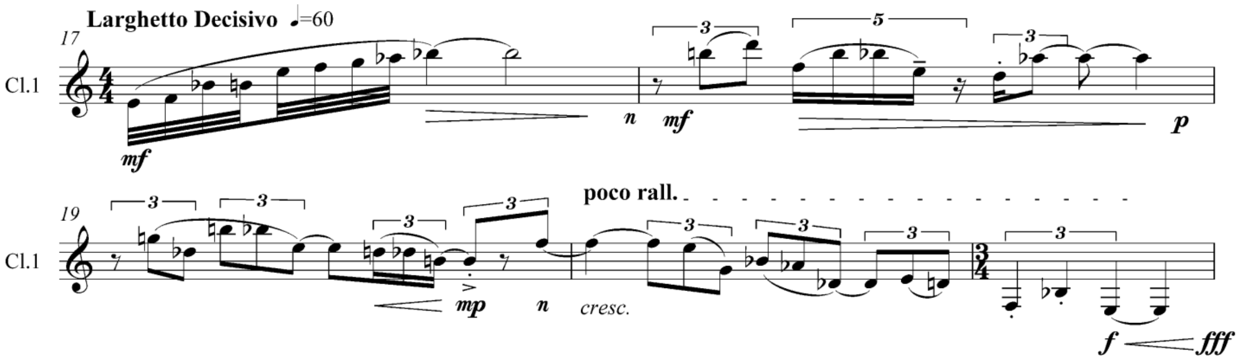


Fig. 4.4 *Seeking the Path that Leads Home* - Fugal answer at augmented 4th, bars 21 - 26.

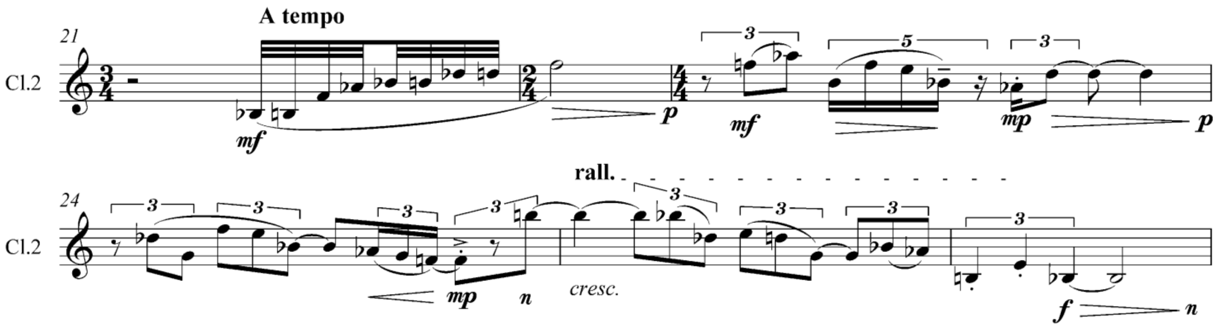
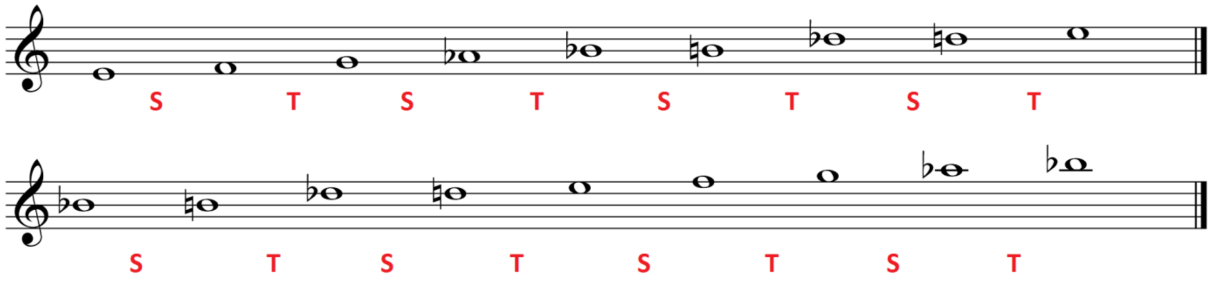


Fig. 4.5 *Seeking the Path that Leads Home* - Scale and transposition.



4.3 Examples of autogenesis

4.3.1 Fugal theme related

The opening of the work was reverse engineered from the fugal theme presented in the above discussion. In this way, this prototypical material is perhaps more akin to Goethe's *Urpflanze* then the examples presented thus far. Fragments of the theme were dispersed amongst the 'yearning' material (e.g. Cl. 3, bar 2; Cl. 1, bar 4; Cl. 2, bar 5) and multiphonics. The 'yearning/seeking' phrases themselves have no direct root connection to the fugal theme, except to say that they are borne of the same aesthetic spirit. For example, the feathered ascending run in the 3rd clarinet, whilst not the same as the demisemiquaver run in the fugal theme, does hint at its arrival. Fig. 4.6 shows a composite of the fugal theme fragments occurring throughout the opening section. Regarding the arrangement of the multiphonics: great care had to be taken in their inclusion to ensure that their tuning characteristics did not clash with the thematic material.

The climax of the work (bars 49 - 54, Fig. 4.7) takes the fugal theme, and extends it by passing it between the players with some overlapping and repetition. The ending note of the climax is a semitone lower than expected (Cl. 1, Eb), this creates a corresponding harmony with the other parts of a 9th chord (Eb, Bb, F) without 3rd. The 9th drops away, leaving an open perfect 5th - a feeling of resolution after the frenzied high point preceding it.

Fig. 4.6 *Seeking the Path that Leads Home* - Fugal subject distribution throughout opening, bars 4 - 6, 9 -10 & 13 -14.

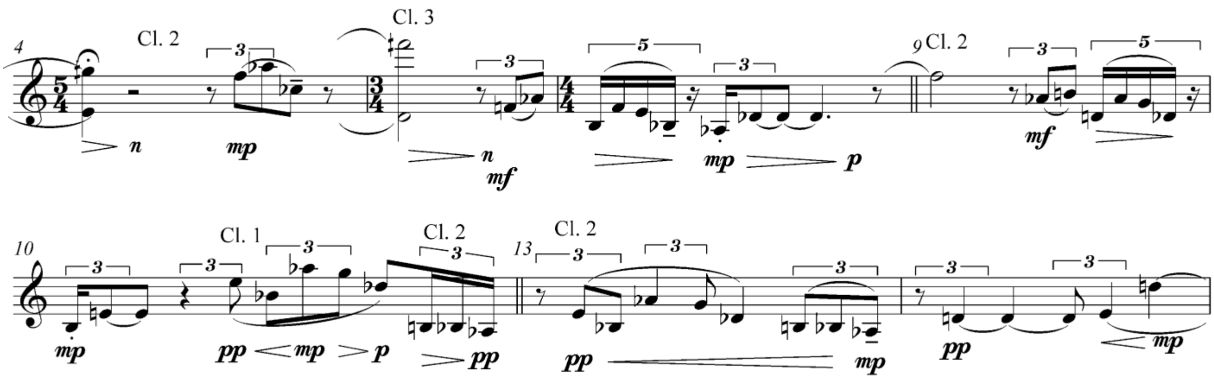
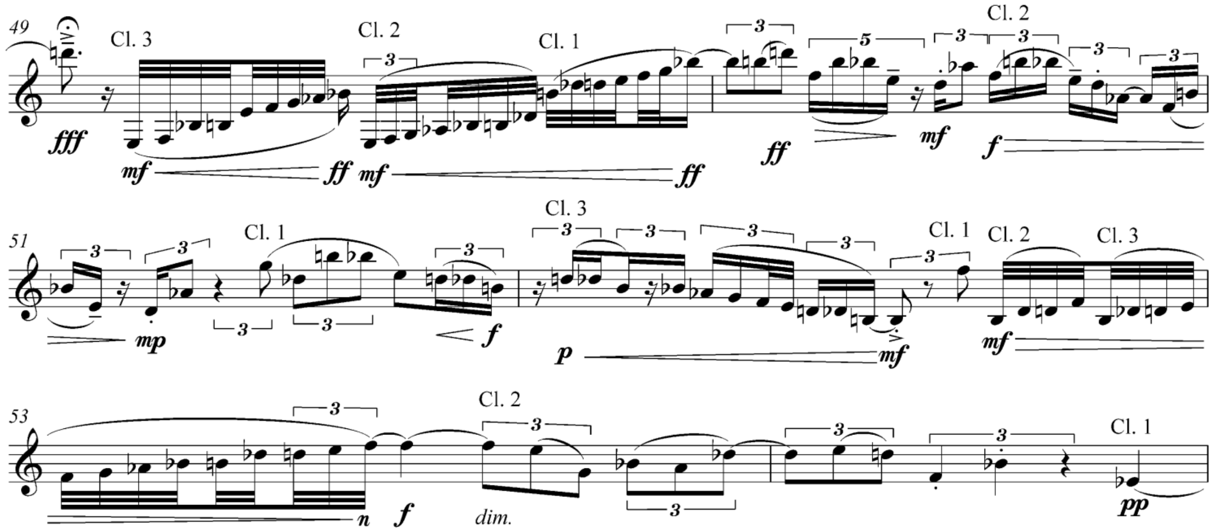


Fig. 4.7 *Seeking the Path that Leads Home* - Climax of work in the form of extended fugal theme across all parts, bars 49 - 54.



During the build up to the climax, the crotchet triplet ending to the fugal theme is utilised and developed. The use of this motif and its transformations, including the use of inversion (e.g. Fig. 4.8, bar 36) can be seen in figures 4.8 - 4.10.

Fig. 4.8 *Seeking the Path that Leads Home* - Crotchet triplet motif (end of fugal theme), bars 34 - 37.

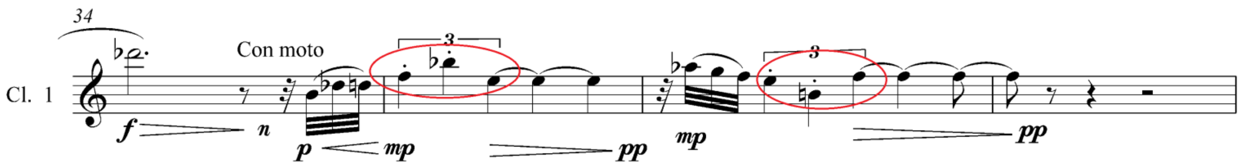


Fig. 4.9 *Seeking the Path that Leads Home* - Crotchet triplet motif, bars 39 - 40.

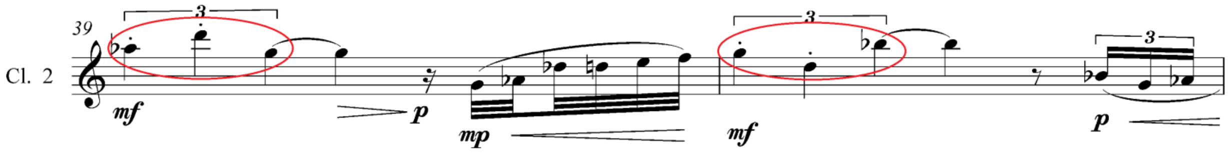
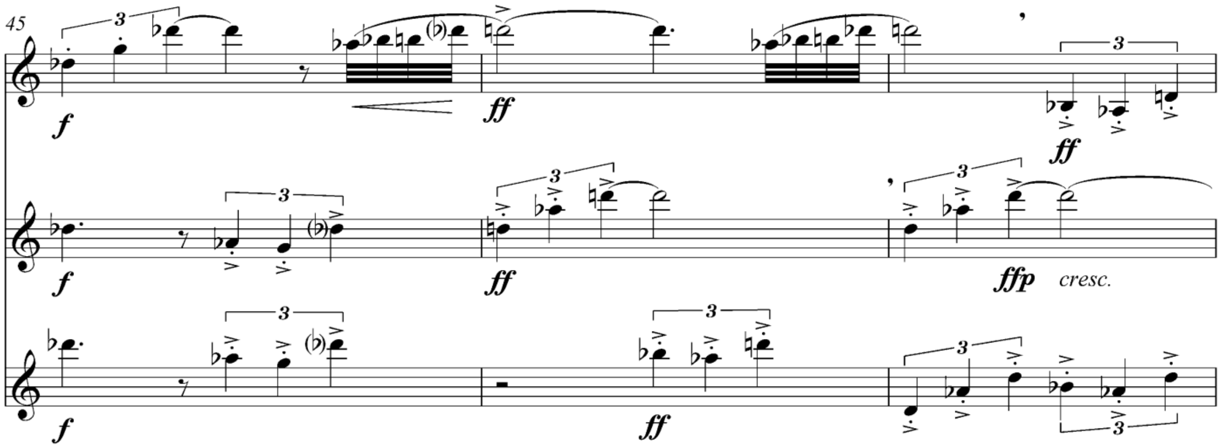


Fig. 4.10 *Seeking the Path that Leads Home* - Crotchet triplet motif, bars 45 - 47.



4.3.2 Fugal counter melody related

In parallel with the development of the crotchet triplet motif, a counter melody first appearing at bar 22 is also developed in the run to the work's climactic moment. This countermelody shares the diminished 5th trait characteristic of the piece (its span from Db - G). The transformation of this motif comes about by lengthening both vertically, and horizontally, as can be seen in the final examples (Fig. 4.11 - 4.14).

Fig. 4.11 *Seeking the Path that Leads Home* - Fugal counter melody motif, bars 22 - 23.

Fig. 4.12 *Seeking the Path that Leads Home* - Development of fugal counter melody motif, bar 28.

Fig. 4.13 *Seeking the Path that Leads Home* - Development of fugal counter melody motif, bar 34 as related to original motif.

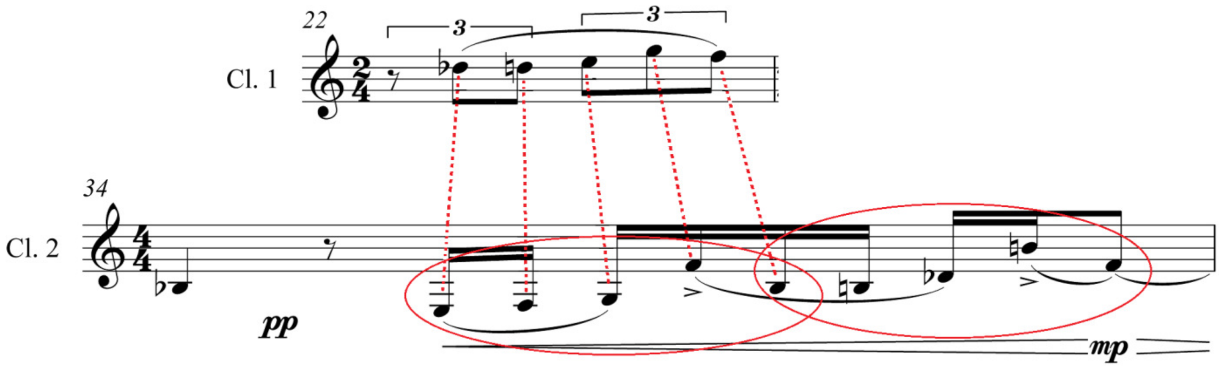


Fig. 4.14 *Seeking the Path that Leads Home* - Development of fugal counter melody motif, bar 48.

A.5 Commentary on *Darvaza* (percussion concerto)

5.1 Movement I

Darvaza is a three movement work composed for wind orchestra with percussion soloist. The work was conceived from the outset with soloist Andrew Wiering in mind as the intended performer, with the work becoming a mutually beneficial collaboration between composer and performer.

The first movement of the work is titled simply *Capriccioso* - a reference to its seemingly impulsive nature. The movement involves both tuned percussion (marimba) and various struck untuned percussion instruments (drums, metallic objects etc.), and is primarily concerned with Fibonacci/Lucas numbers and autogenesis.

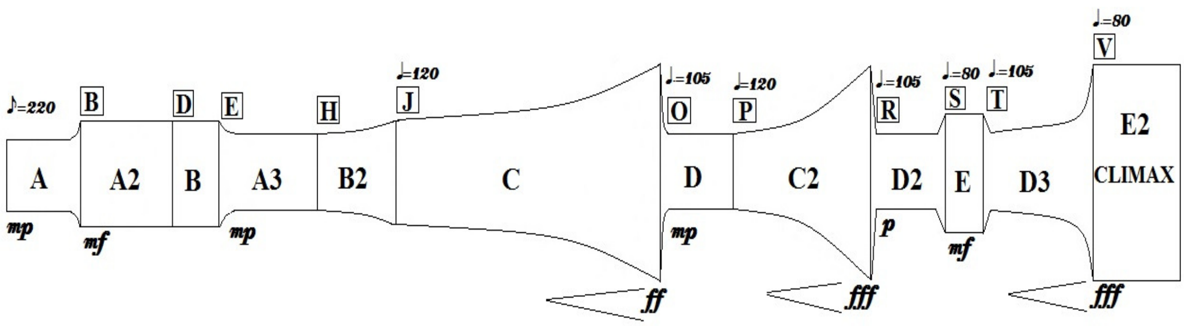
5.1.1 General overview of form

A general overview of the work's form is shown in Fig. 5.1.1, with a more detailed analysis shown over three diagrams in Fig. 5.1.2. Looking at Fig. 5.1.1, we see the work contains two climatic build ups at "C" and "C2", ending with a third and final climatic point at "E2".

Starting at "A", the work opens with the soloist playing a Fibonacci inspired ostinato type semiquaver motif . Sections "A" to "B2" are primarily concerned with the development of this semiquaver motif. Sections "D", "D2" and "D3" see the transformation of this motif, into a meandering almglocken melody.

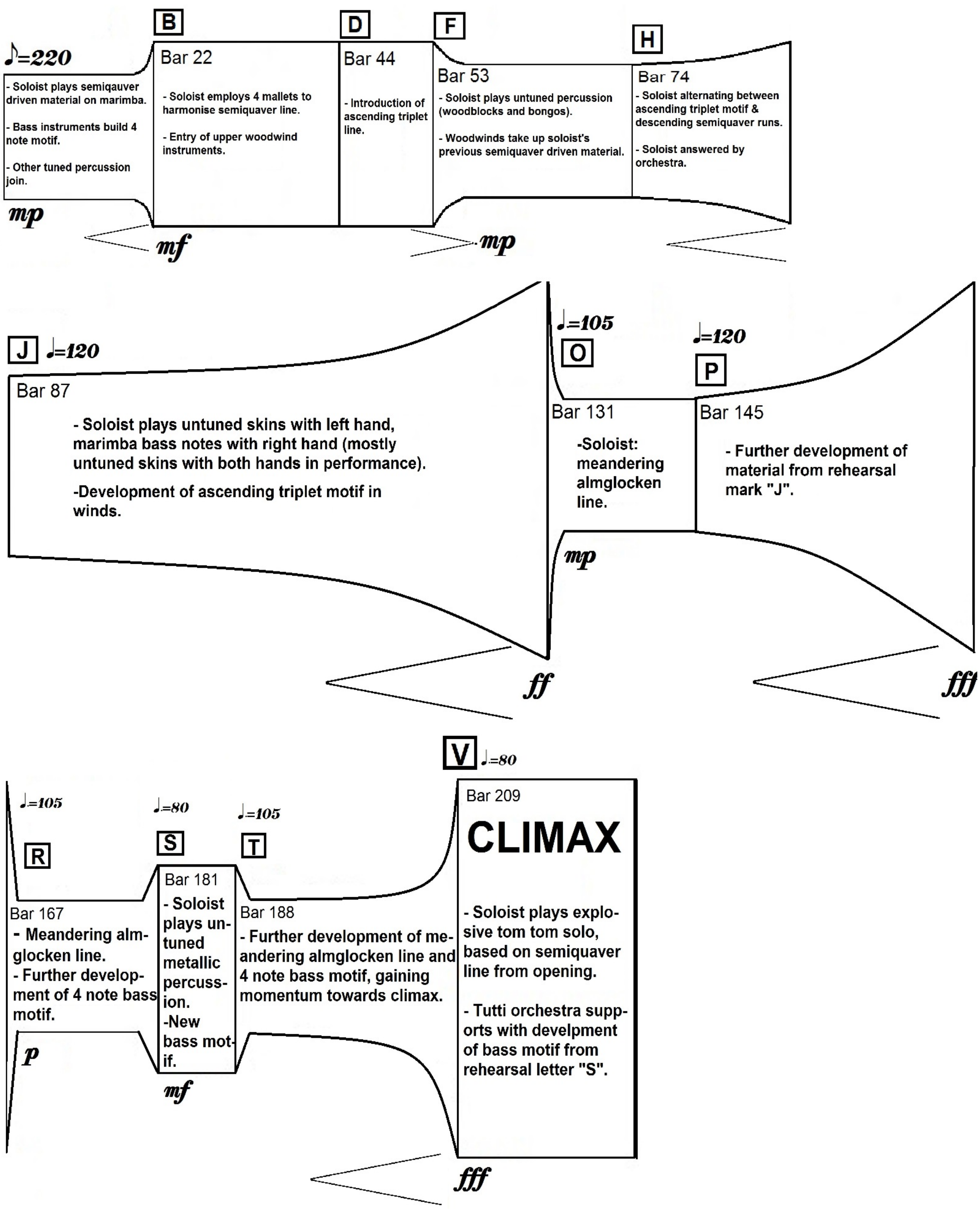
The most significant structural element of the movement, is the implementation of Fibonacci numbers to the structuring of sections/modulations from "D2" to the end of the movement.

Fig. 5.1.1 *Darvaza, Mvt I* - General overview of form.



Regarding the detailed form diagrams of Fig 5.1.2, they are included for the benefit of the reader as a means to place the various score examples into the context of the overall form, reducing the need to refer back to the orchestral score.

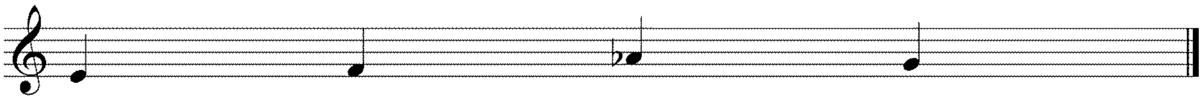
Fig. 5.1.2 *Darvaza, Mvt I* - Detailed view of form.



5.1.2 Origins of material

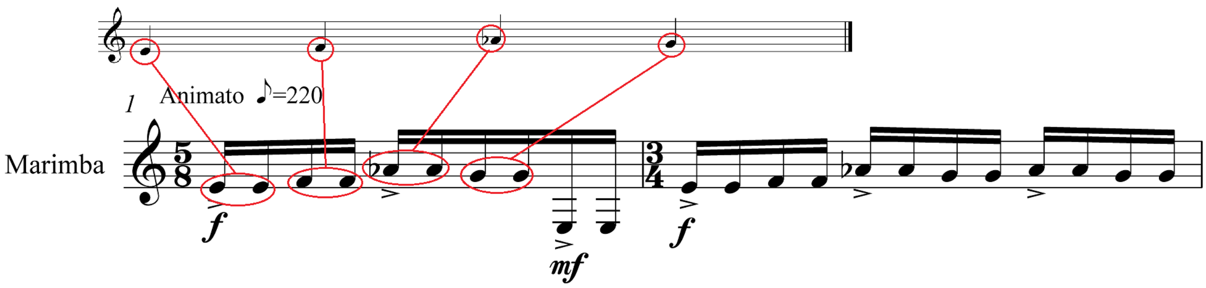
The primordial material from which the first movement is fabricated is shown in Fig. 5.1.3; a rising then falling four note motif, consisting of an ascending minor 2nd, minor 3rd, then descending minor second. This motif occurs throughout the work both in its original form, and as various transformations.

Fig. 5.1.3 *Darvaza, Mvt I* - Primordial material.



Through the repetition of the motif's pitches, a striking marimba line was created (Fig. 5.1.4). The last two semiquavers on the pitch E at the end of the bar serve an altogether different function, as will be seen in the discussion of Fibonacci numbers and their application later in this discussion.[184]

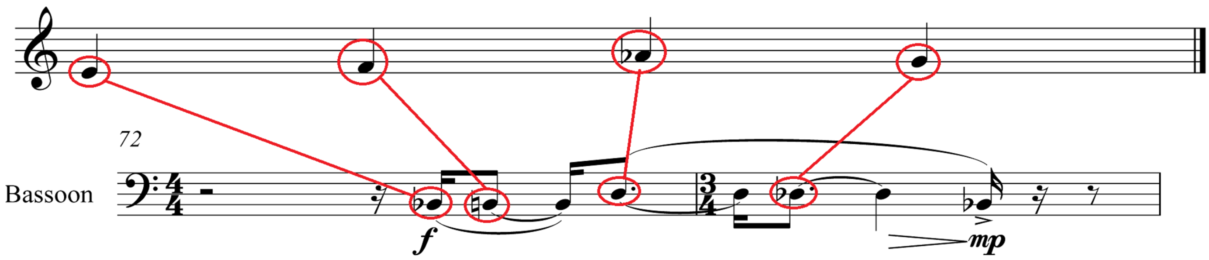
Fig. 5.1.4 *Darvaza, Mvt I* - Primordial material as applied to solo percussion, bars 1 - 2.



Another example of the application of the primordial material is the bass motif of the bassoon in bar 72 (Fig. 5.1.5). Here the four note motif retains its pitch structure, but takes on an entirely new rhythmic character. This particular motif will be seen to undergo numerous transformations, as will be discussed in the following section regarding autogenesis.

[184] 5.1.4.1 Fibonacci/Lucas as rhythmic devices, p. 122

Fig. 5.1.5 *Darvaza, Mvt I* - Primordial material as applied to four note bass motif (to be discussed), bassoon bars 72 - 73.

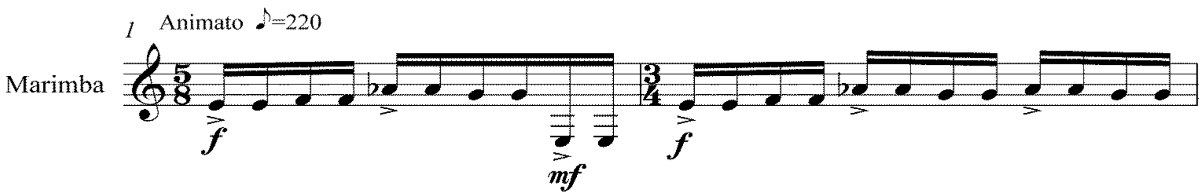


5.1.3 Examples of Autogenesis in *Darvasa Mvt 1.*

5.1.3.1 Four tone semiquaver motif

A lengthening of the four note motif was created simply by adding a repetition of the last four semiquavers (Fig. 5.1.6, last beat of bar 2).

Fig. 5.1.6 *Darvaza, Mvt I* - Marimba, bars 1 - 2.



At rehearsal letter "B" the marimba motif from bars 1 - 2 is harmonised with major sixths, transforming it into a four mallet exercise for the soloist. Fig. 5.1.7 shows the relationship of the original motif to the harmonised version.

Fig. 5.1.7 *Darvaza, Mvt I* - Four note motif as applied to four mallet material in marimba, bar 22.

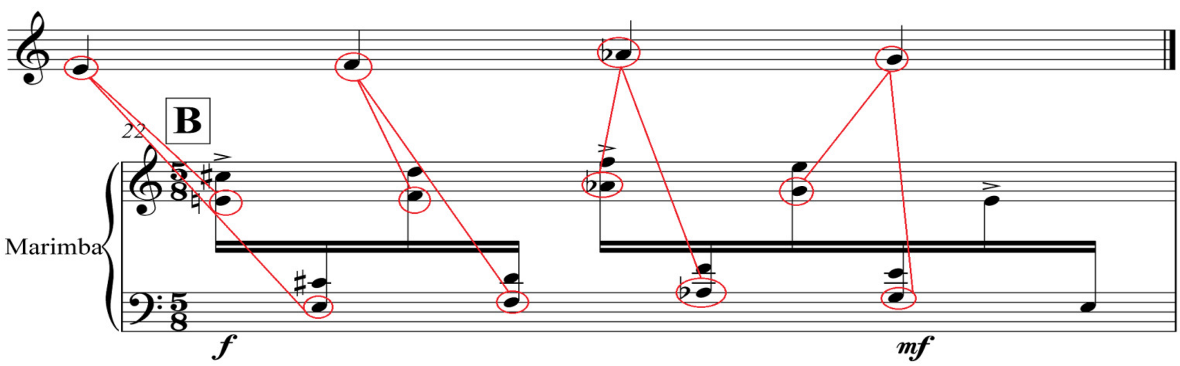
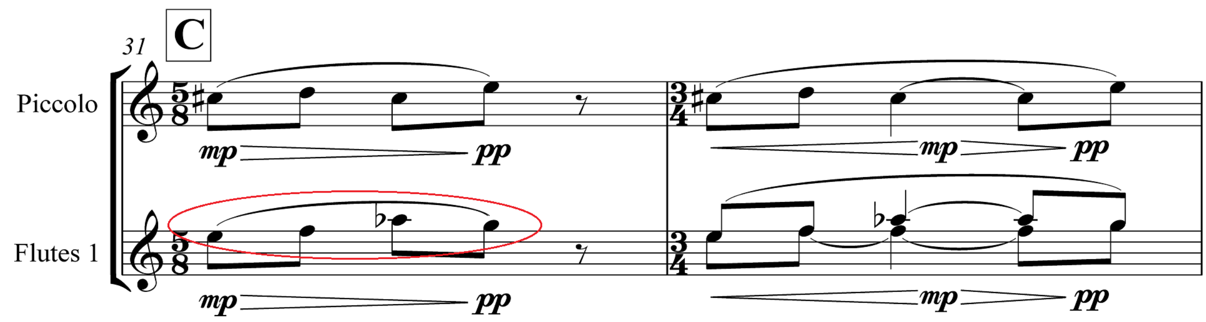


Fig. 5.1.8 shows an occurrence of the motif in the 1st flutes, the motif having been transformed here into a legato line.

Fig. 5.1.8 *Darvaza, Mvt I* - Four note motif in 1st flutes, bars 31 - 32.



Figures 5.1.9 to 5.1.11 describe the extraction of unpitched percussive material from the four note motif. The lively nature of the semiquaver motif in the opening bars of the marimba, seemed to lend itself well to development as a motif for struck, untuned percussion instruments. Figures 5.1.8 shows a direct conversion from the marimba line to a woodblock line, and similarly, 5.1.9 to miscellaneous struck metallic objects. Fig. 5.1.10 details a more extended flourish of the motif on the soloist's tom toms during the works final climax.

In each instance, the origin of the struck motivic material is unambiguous. The intention here was to have the listener fill in the gaps, as it were, internally hearing the pitched material, with only the rhythmic cues of the unpitched patterns.

Fig. 5.1.9 *Darvaza, Mvt I* - Basic shape of four note motif applied to untuned percussion, bar 53

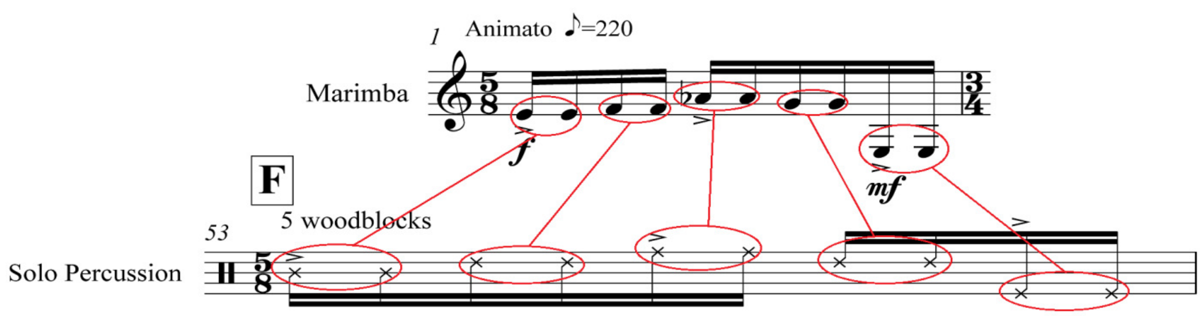


Fig. 5.1.10 *Darvaza, Mvt I* - Basic shape of four note motif applied to untuned percussion, bars 181 - 182.

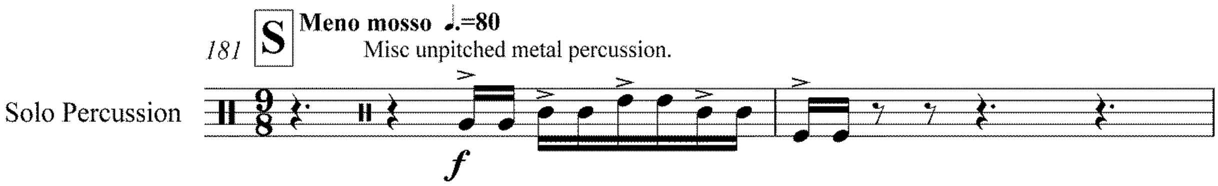
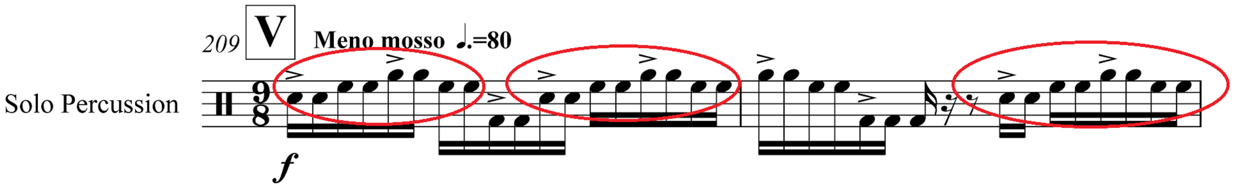


Fig. 5.1.11 *Darvaza, Mvt I* - Basic shape of four note motif applied to untuned percussion, bars 209 - 210.



The analysis of the soloist's almglocken line (Fig.5.1.11), occurring bars 131 - 144, displays perhaps the most extensive transformation/growth of the original four note motif. The groupings denoted by the lower red brackets, mark out the phrases of the line. Each phrase begins with an iteration of the four note motif.

The first three statements of the motif occur without change (bars 131 - 133). Growth of the motif occurs at the fourth phrase, beginning bar 134. Here A natural is inserted in front of Ab, making the line read: E - F - A - Ab - G. At the sixth phrase (starting end of bar 137) the original motif is extended by the addition of Gb: E - F - Ab - G - Gb.

The red brackets above the stave indicate incomplete/inexact (i.e. major 3rd in place of minor 3rd) fragments of the motif, or transpositions of the whole motif within the phrases. In bars 136 - 137 there is a sequence of three note fragments containing the 2nd, 3rd and 4th notes of the motif. Then at bar 137, a transposition of the full motif, starting on Db. There are further instances marked in Fig. 5.1.12. The pitches unaccounted for follow the 'spirit' of the motif, twisting and winding around similar intervallic patterns. The intention here was to create a mysterious, meandering passage. Apparently aleatoric in its nature, yet 'infected' with the mark of the original source.

Fig. 5.1.12 *Darvaza, Mvt I* - Four note motif stretched and manipulated in soloist's almglocken part, bars 131 - 144.

5.1.3.2 Four note bass motif

The figures below (5.1.13 - 5.1.19) deal with the four note motif as developed by the low woodwind instruments. In figures 5.1.13 and 5.1.14 the bassoon line omits the fourth note of the motif, growing the line in fig. 5.1.14 with the repetition of the Bb. Fig. 5.1.15 takes what was a somewhat pointillated line and makes it a smooth legato line, filling the gaps and adding the fourth note of the motif back (Db, bar 73).

Fig. 5.1.13 *Darvaza, Mvt I* - Four note bass motif, bassoon, bars 8 - 9.

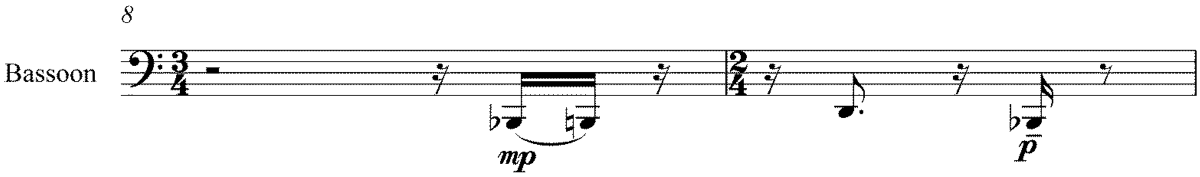
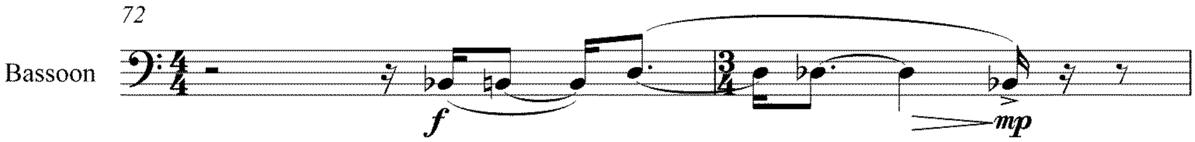


Fig. 5.1.14 *Darvaza, Mvt I* - Four note bass motif, bassoon, bars 17 - 18.

Fig. 5.1.15 *Darvaza, Mvt I* - Four note motif, bassoon, bars 72 - 73.



Figures 5.1.16 and 5.1.17 are drawn out legato iterations of the model shown in fig. 5.1.13, with the omission of the repeated first note. Here instead, the line grows with the repetition of the motif's 3rd note. Fig. 5.1.18 draws the motif out further, adding the 4th note of Ab and repeating it. Fig. 5.1.19 stretches the motif by sequential repetition, first on Gb, then Bb (bar 52).

Fig. 5.1.16 *Darvaza, Mvt I* - Four note motif, bassoon, bar 132.

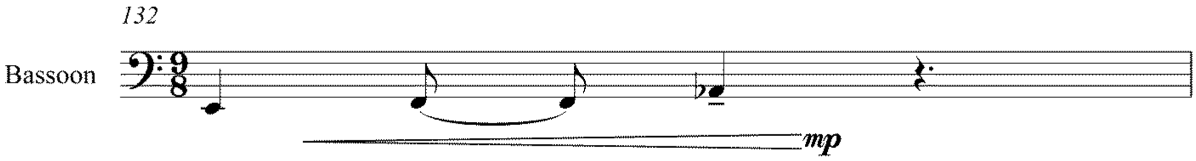
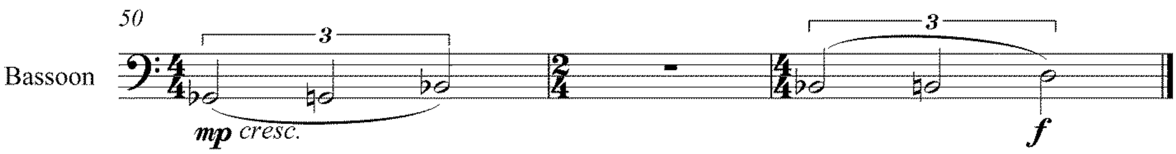


Fig. 5.1.17 *Darvaza, Mvt I* - Four note motif, bassoon, bars 135 - 136.

Fig. 5.1.18 *Darvaza, Mvt I* - Four note motif, bassoon, bars 192 - 193.

Fig. 5.1.19 *Darvaza, Mvt I* - Four note motif, bassoon, bars 50 - 52.



5.1.3.3 Ascending triplet lines based on four note motif

An ascending triplet line, spanning over four octaves, was extracted from the original four note motif (seen below in Fig. 5.1.20) by joining various alterations of the motif together in an ascending fashion. Looking at the association to the original motif (Fig. 5.1.20, small upper stave) we see the final note of the motif starting the line ascends a major 7th, rather than descending a minor second. The dashed line circling notes E - Eb - Gb - G identifies a sort of inverted version of the original motif. E moves down a semitone to Eb instead of up to F, Eb ascends a minor 3rd as expected to Gb, then up a minor second to G natural instead of descending as with the original line. The original form of the motif then follows on Gb, with the major 7th alteration continuing the upward motion of the line.

Fig. 5.1.20 *Darvaza, Mvt I* - Ascending triplet motif as related to four note motif, marimba, bar 46.

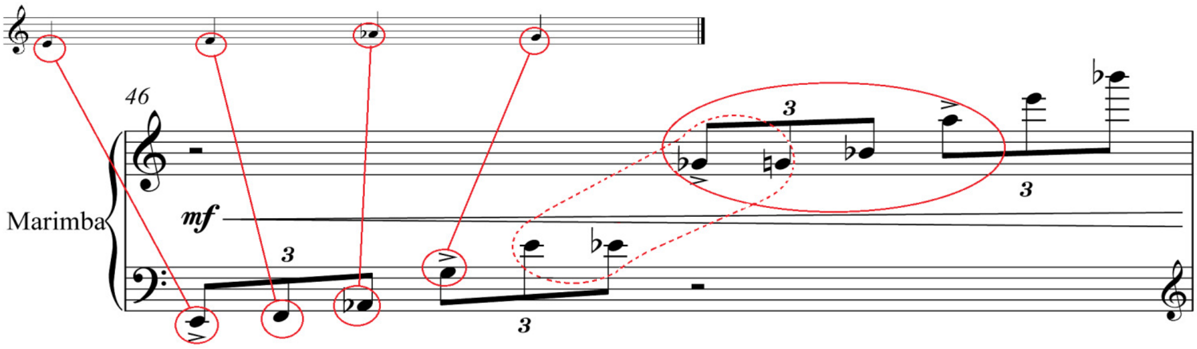


Fig. 5.1.21 shows a more closely spaced ascending line, rising just short of two octaves. The original form of the four note motif is preserved in the first four notes of the line, with the altered version following at the octave. The final two groupings of notes are of interest; a sequential repetition of the first three notes of the motif, with overlapping last and first notes.

Fig. 5.1.21 *Darvaza, Mvt I* - Ascending triplet motif, marimba, bar 52.

Fig. 5.1.22 sees a further growth of this line, doubling in length. Growth is achieved by taking the original motif sequentially upwards. Both partial and full repetitions are employed, with overlapping of first and last tones through the sequences as seen in the previous example. The partial repetition in the middle of bar 144 has a major, instead of minor 3rd between the second and third notes.

Fig. 5.1.22 *Darvaza, Mvt I* - Ascending triplet motif, bassoon, bars 143 - 144.

5.1.3.4 Ascending/descending triplet motif

The ascending triplet line naturally evolved to become an ascending/descending line. Many variations of this line simply descend chromatically, such as Fig. 5.1.23.

Figures 5.1.23 - 5.1.28 display the growth of this line, starting as a one bar phrase, and progressively tripling in size by Fig. 5.1.28. The lines means of descent include the use of full statements of the four note motif in its original form (Fig. 5.1.25, bar 98 starting on the last triplet quaver Eb) and retrograde statements of the motif (denoted by dashed encapsulations) either partial (Fig. 5.1.24, bar 93: Gb - Eb - D), or in full (Fig. 5.1.25, bar 99: Eb - F - D - Db). The retrograde versions of the motif consistently exchange the final semitone (first when retrograde) for a whole tone.

Fig. 5.1.23 *Darvaza, Mvt I* - Ascending/descending triplet motif, bass clarinet, bars 90 - 91.

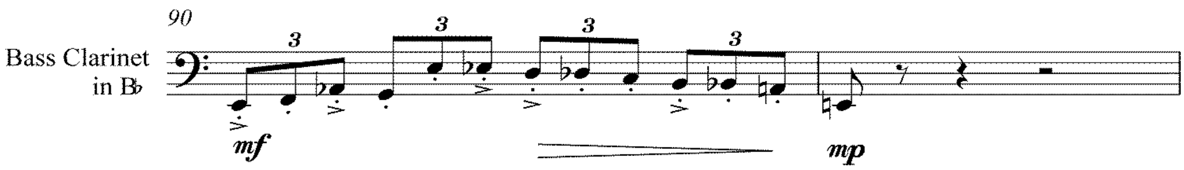


Fig. 5.1.24 *Darvaza, Mvt I* - Ascending/descending triplet motif, bass clarinet, bars 92 - 94.

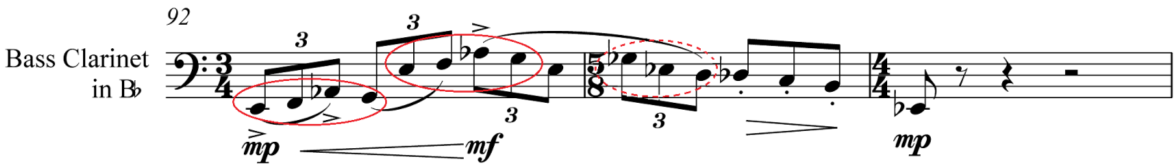


Fig. 5.1.25 *Darvaza, Mvt I* - Ascending/descending triplet motif, bass clarinet, bars 98 - 100.

Fig. 5.1.26 *Darvaza, Mvt I* - Ascending/descending triplet motif, bass clarinet, bars 128 - 129.

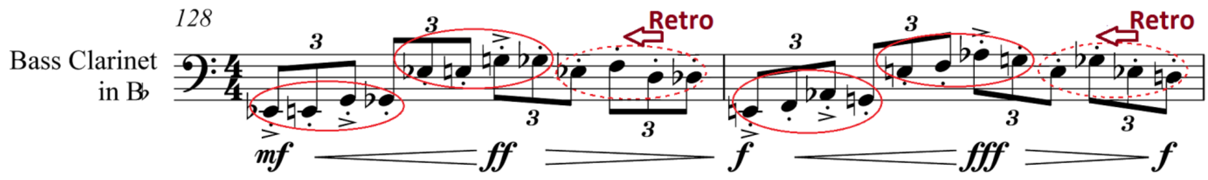


Fig. 5.1.27 *Darvaza, Mvt I* - Ascending/descending triplet motif, bass clarinet, bars 106 - 108.

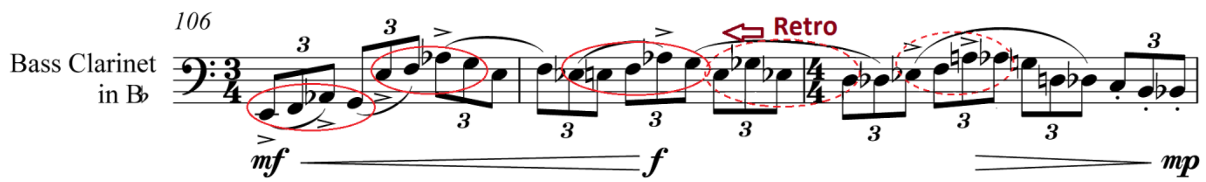


Fig. 5.1.28 *Darvaza, Mvt I* - Ascending/descending triplet motif, 1st clarinets, bars 163 - 165.

5.1.4 Examples of Fibonacci and Lucas number usage in *Darvasa Mvt I*

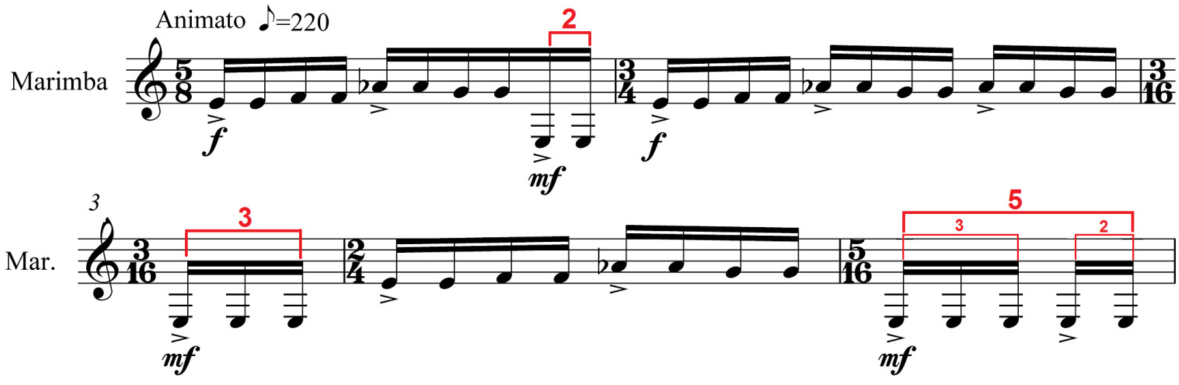
5.1.4.1 Fibonacci/Lucas as rhythmic devices

The work's main feature is the use of Fibonacci and Lucas numbers as compositional devices. These numerical sequences are applied in two ways: as a rhythmic device, and as a measure with which to plan macro structural events.

The opening bars of the soloist's marimba part (Fig. 5.1.29) feature a building rhythmic motif, previously alluded to when discussing the origins of material (section 5.1.2). Looking at bars 1, 3 and 5, we see an additive pattern marked by the annotations above the stave. Following the Fibonacci sequence, the groupings progress 2, 3, 5 (with accents marking a group of three and two).

The adherence to the Fibonacci sequence created the necessity for a bar of 3/16 (bar 3). This decision was taken consciously, knowing the problems this bar grouping might present in rehearsal (and indeed, in performance). By having only the soloist (playing straight semiquavers before and after) and low brass playing at that moment, the issue was mostly nullified, with only a couple of missteps during the rehearsal process.

Fig. 5.1.29 *Darvaza, Mvt I* - Application of Fibonacci numbers to rhythmic material, marimba, bars 1 - 5.



Figures 5.1.30 - 5.1.32 detail the use of the Lucas numbers in a similar way to the above example. The accents on the leaping octave line in bars eight and nine of the marimba (Fig. 5.1.30) create groupings corresponding with the Lucas numbers (2, 1, 3, 4, 7 etc) though not in order.

Fig. 5.1.31 and 5.1.32 (marimba and timpani, respectively) expand on this by extending the line by following the grouping of four, with the next Lucas number, a grouping of seven.

Fig. 5.1.30 *Darvaza, Mvt I* - Application of Lucas numbers to rhythmic material, marimba, bars 8 - 10.

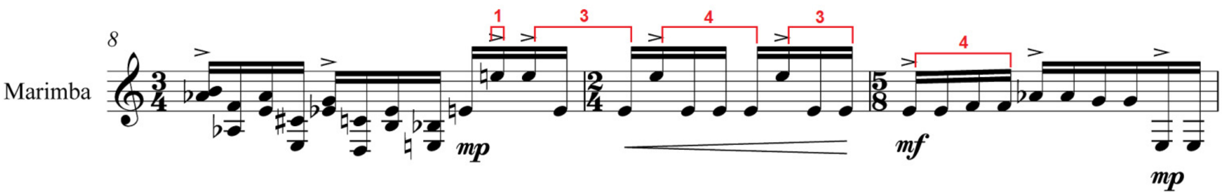


Fig. 5.1.31 *Darvaza, Mvt I* - Application of Lucas numbers to rhythmic material, marimba, bars 17 - 18.

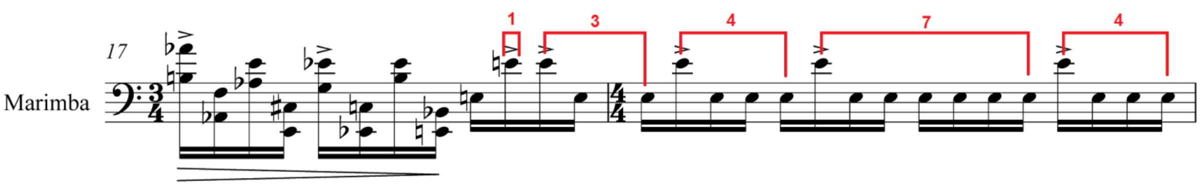
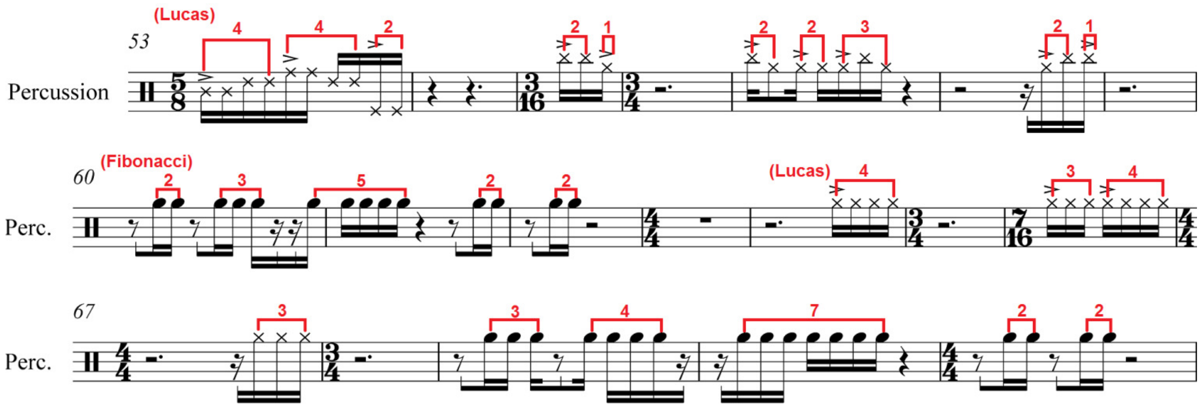


Fig. 5.1.32 *Darvaza, Mvt I* - Application of Lucas numbers to rhythmic material, timpani, bars 39 - 40.

The example of Fig. 5.1.33 below contains nothing new that will not be understood from the previous examples. Here the Lucas and Fibonacci numbers are traded back and forth (e.g. Lucas numbers: bars 53 - 59. Fibonacci: bars 60 - 62).

Fig. 5.1.33 *Darvaza, Mvt I* - Application of Lucas and Fibonacci numbers to rhythmic material, untuned percussion (soloist), bars 53 - 71.



At this late stage of the discussion, perhaps it is worth reiterating the purpose of these designs, these devices. Though the tone of presentation has perhaps erred on the 'dry' side, necessarily objective due to the nature of the devices at work - the use of these devices (Fibonacci and otherwise) is entirely directed towards a creative outcome.

The intention regarding the above examples, for instance, was to create interesting groupings which deviated from the common musical metric (groupings of 2,4,6,8 etc). Whether the listener has an awareness of the processes occurring within the composition or not, is largely irrelevant. They will be felt based upon their own merits, and more importantly of course, the manner in which they are implemented within the overall narrative of the work.

5.1.4.2 Fibonacci applied to form

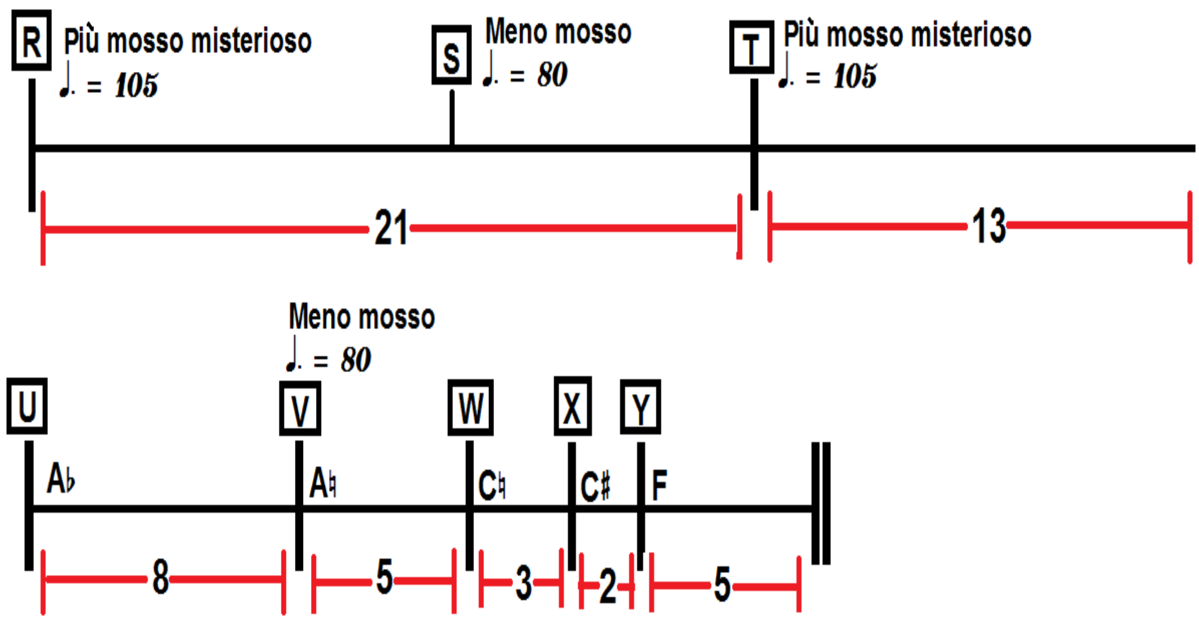
The most extravagant implementation of the Fibonacci numbers within this submission, is their application to the ending form of this work (Fig. 5.1.34, rehearsal letter "R" to the end). The application of Fibonacci proportions on the macro scale differs from the examples shown by Stockhausen in chapter 1.5.1, where proportions were considered measure to measure. Here the application is closer to Bartók's Golden Section use in *Music for Strings Percussion and Celesta*, but with Fibonacci durations.

In order to build tension towards the final climax of the work, a scheme of progressively shortening sections was composed. This has the effect of a quickening tempo; each new section arriving earlier than expected. This 'dramatic compression' is facilitated by using the Fibonacci numbers to determine the length of each new section.

Looking at Fig. 5.1.34, we see a starting length (as measured in bars of 9/8) of 21, followed by 13, 8, 5, 3, 2 and finally 5 again. This scheme follows a descending Fibonacci pattern exactly (with the exception of the additional five bars). From rehearsal letter "U" to the end, the changing of sections also coincides with the shifting of tonal centres. Each new section in the scheme below is marked out in the score by a double bar line.

Whilst this scheme appears rather eloquent 'on paper', it caused great difficulty to the natural flow of the compositional process. Fitting the desired unfolding drama within the prescribed section lengths proved to be extremely difficult and overly time consuming. Many times during the compositional process, the natural ending of a section arrived a bar or two too early, or the impending double bar line imposed itself prematurely, when the spirit of the material was not yet ready to move onto its next phase. This often necessitated a complete rewrite of the entire section, with careful consideration and planning applied to the next attempt.

Fig. 5.1.34 *Darvaza, Mvt I* - Fibonacci sequence applied to form, rehearsal mark "R" to end of movement.



5.2 *Darvaza* Movement II

The second movement of *Darvaza* was conceived with a thinner, more ensemble like texture in mind, contrasting the generally denser orchestrations of the outer movements. To this end, the work excludes the use of the wind orchestra's auxiliary percussionists, with the exception of a tam tam player who is used sparingly. The soloist plays a combination of tuned percussion throughout (marimba, vibraphone and crotales), avoiding untuned struck percussion until the final climax of the work.

The movement makes extensive use of self-similarity as a compositional tool, guiding the material on both a macro, and micro level.

5.2.1 General overview of form

A general overview of the work's form is shown in Fig. 5.2.1, with a more detailed analysis shown in Fig. 5.2.2. An important feature of this work's structure, is the manner in which the length and tonal centre of each section is dictated by the nature of the primordial material. This will be discussed in detail in section 5.2.4. Here we can make an initial observation: looking at Fig. 5.2.1, Sections "A", "H" and "L" have identical lengths as counted in crotchets. Similarly, sections "G", "K", "M" and "N" are of identical length. The blank section at the beginning (soloist ad libitum) is the same length in crotchets as the latter sections ("G, "K" etc) however, owing to the rubato applied in performance, the graphic is correspondingly longer.

The basic gesture of the work is that of a non linear crescendo, culminating in two climatic moments at the end of "L" and throughout "N".

Fig. 5.2.1 *Darvaza, Mvt II* - General overview of form.

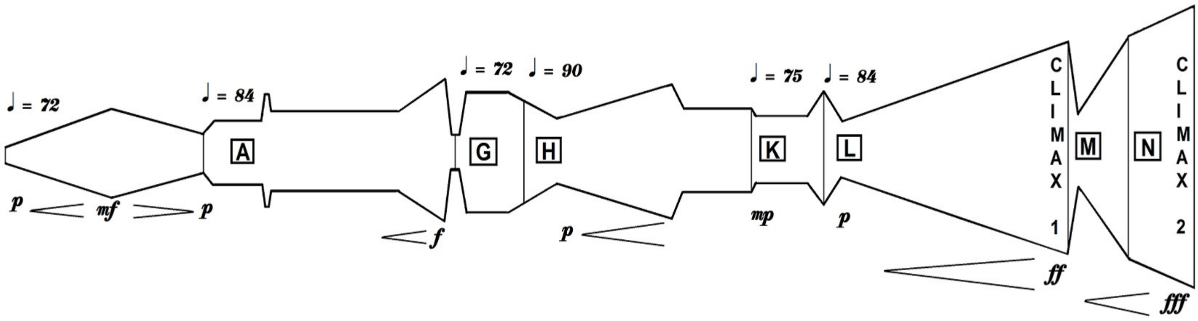
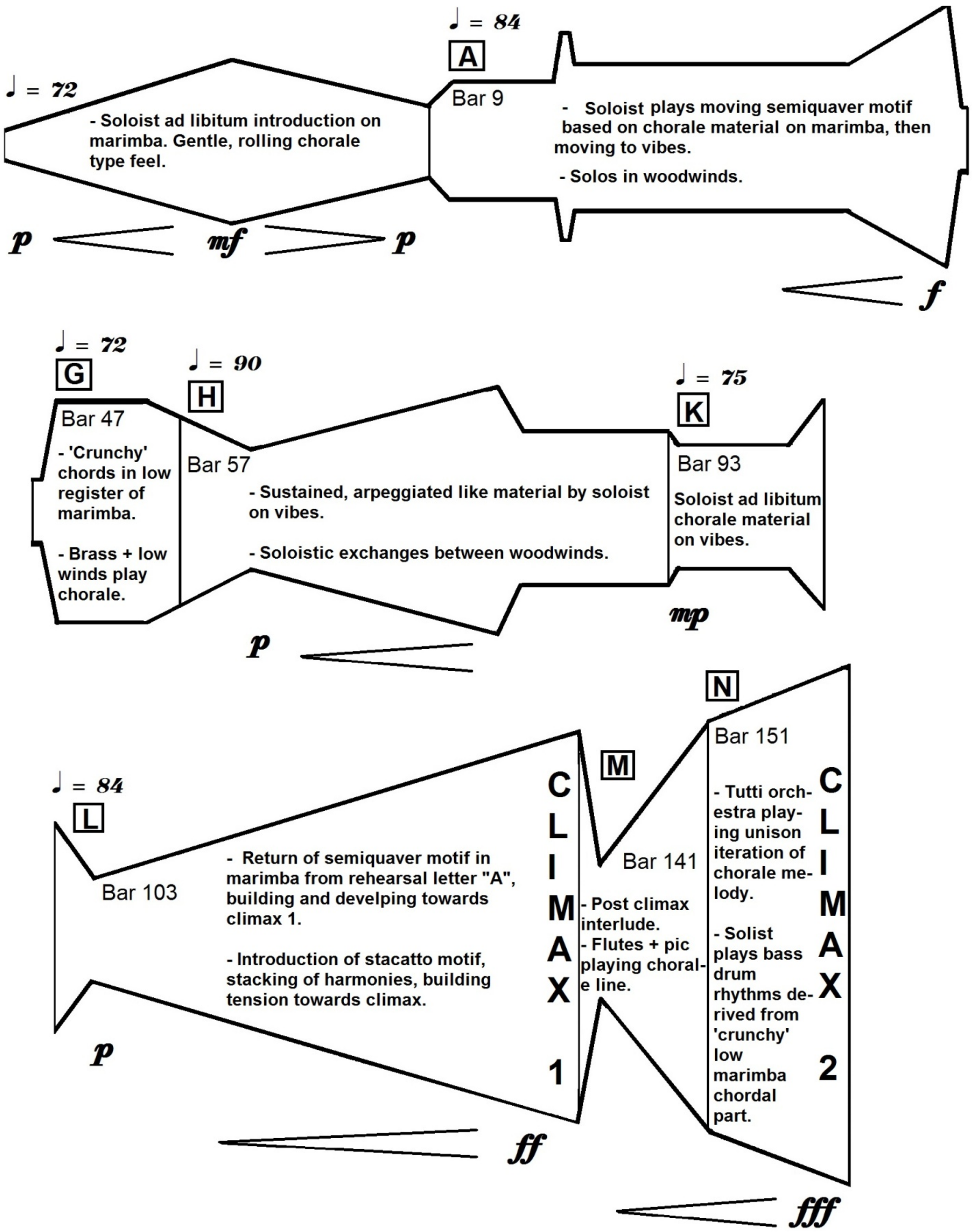


Fig. 5.2.2 *Darvaza, Mvt II* - Detailed view of form.



5.2.2 Origins of material

Unlike the outer movements of the concerto, the material for the middle movement is of an entirely different origin. The line shown in Fig. 5.2.3 forms the primordial material for the work - the *zero system* and *autogenetic system precursors*. This line is in fact borrowed from a work for string quartet titled *Incipit* (Denison, 2009). A familiarity with this line, is a familiarity with the entire work from the outset.

The character of the theme is somewhat morose, pensive. It rises a minor 7th by way of a minor 6th and major 2nd, then descends through a twisting and turning line. In writing the line, special consideration was given to what would create interesting and usable harmonies, should the line be stacked upon itself. The shorter version of the line comes to rest a minor third above the starting pitch, creating tension that is only satisfied when the longer form of the line appears.

An extended version of the line is seen in Fig. 5.2.4. This continuation of the line occurs in the original work as a counter melody, accompanying the entry of a new voice with the theme. Both versions of the theme are used throughout this second movement, with the extended line seeing use throughout the contrapuntally textured opening.

Fig. 5.2.5 details an implied scale, constructed from the theme. This constructed scaled played an important role in forging the musical fabric of *Incipit,* but was not employed in the composition of the presently discussed work. As mentioned already, the fabric of this work, was almost entire extracted from the theme itself. Figure 5.2.5 is included only as a point of interest.

Fig. 5.2.3 *Darvaza, Mvt II* - Primordial melody, as taken from *Incipit.*

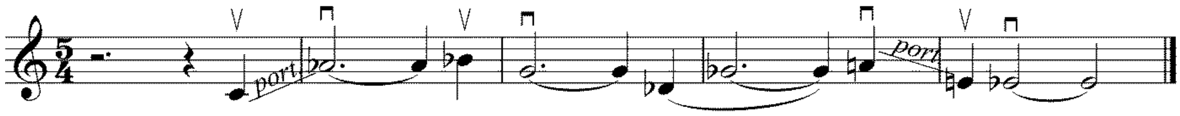


Fig. 5.2.4 *Darvaza, Mvt II* - Extended version of original line.

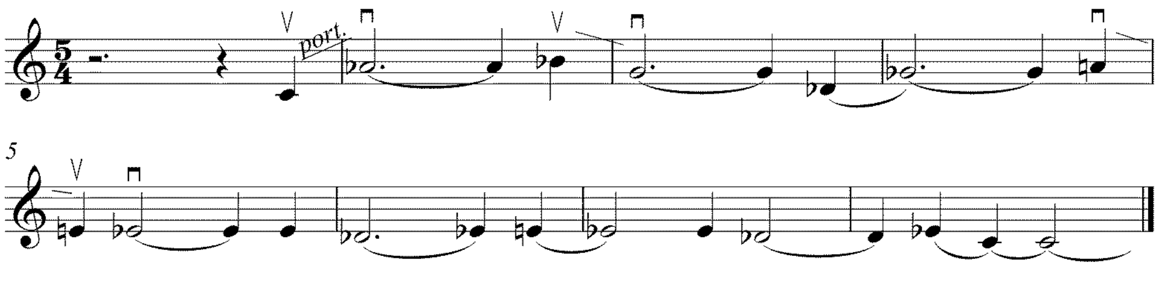


Fig. 5.2.5 *Darvaza, Mvt II* - Implied scale derived from primordial line.

5.2.3 Examples of autogenesis from *Darvaza, Mvt II*

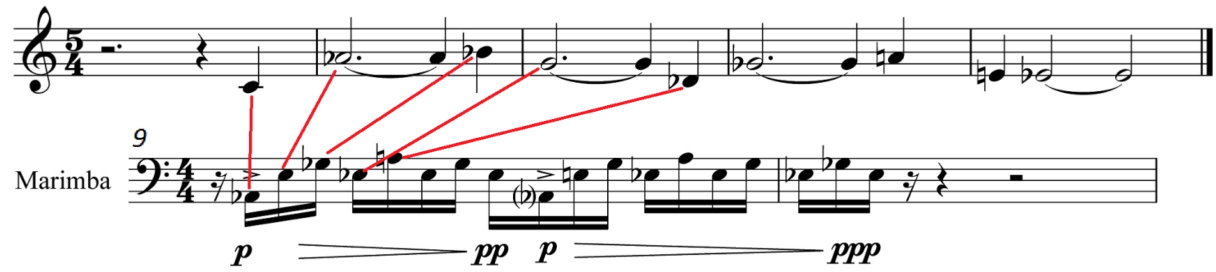
The marimba line starting at bar 9 (Fig. 5.2.6), forms a large percentage of the soloist's material throughout this second movement, particularly in the run up to the work's climax. Through this sparse, ensemble like opening section (Bars 9 - 19), it provides a rhythmic drive as each woodwind enters with the theme. The choice of low tessitura is in order to maximise resonance, whilst staying out of the way of the woodwind ranges.

This line was of course directly extracted from the theme itself. Figure 5.2.7 shows how the line uses the first five notes of the theme in sequence (dropping the fifth note an octave). The line then doubles back on itself, moving between the 3rd, 4th and 5th notes.

It will not be necessary to discuss the nature of the woodwind entries of the theme in detail, except to say that they play theme either partially, or in full. Where appropriate, rhythmic and melodic embellishments are added to create extra interest.

Fig. 5.2.6 *Darvaza, Mvt II* - Marimba, bars 9 - 10.

Fig. 5.2.7 *Darvaza, Mvt II* - Marimba, bars 9 - 10 as related to theme.



Figures 5.2.8 and 5.2.9 are further examples of lines being directly extracted from the theme. Fig. 5.2.8 is from a one bar segue, leading in the vibraphone example below. The vibraphone line (Fig. 5.2.9) uses the shorter version of the theme (Fig. 5.2.3) in its entirety, modifying only the octaves at which certain notes occur to produce a generally ascending line. Characteristic of this line is the major 7th leap at its conclusion.

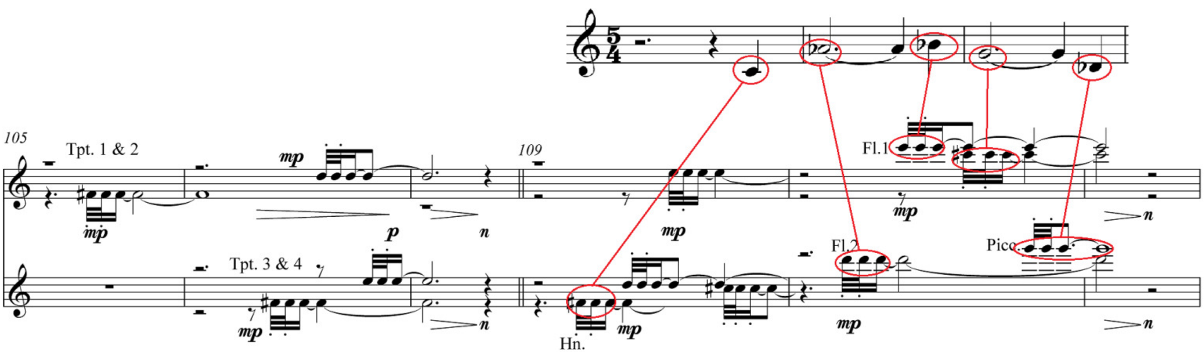
Fig. 5.2.8 *Darvaza, Mvt II* - 1st clarinets, bar 19.

Fig. 5.2.9 *Darvaza, Mvt II* - Vibraphone, bars 21 - 22.

A rhythmic motif, consisting of two staccato demisemiquavers then a held note, all on the same pitch, features in the build up to the work's climax from bars 105 - 140. This motif is fired off in rapid succession at different pitches and by different instruments, resulting in a stacking of discordant harmony. Naturally, the pitches at which the motif enters are attributable to the theme, as highlighted by Fig. 5.2.10.

This 'barbed' motif starts in the woodwind instruments and muted trumpets, where it carries a sense of ominousness. As the build up to the climax intensifies, the entries of the motif become more closely spaced and unexpected, with the unmuted trumpets delivering it with full force (bars 136 -140).

Fig. 5.2.10 *Darvaza, Mvt II* - Staccato motif analysis, bars 105 - 107 and 109 - 111.

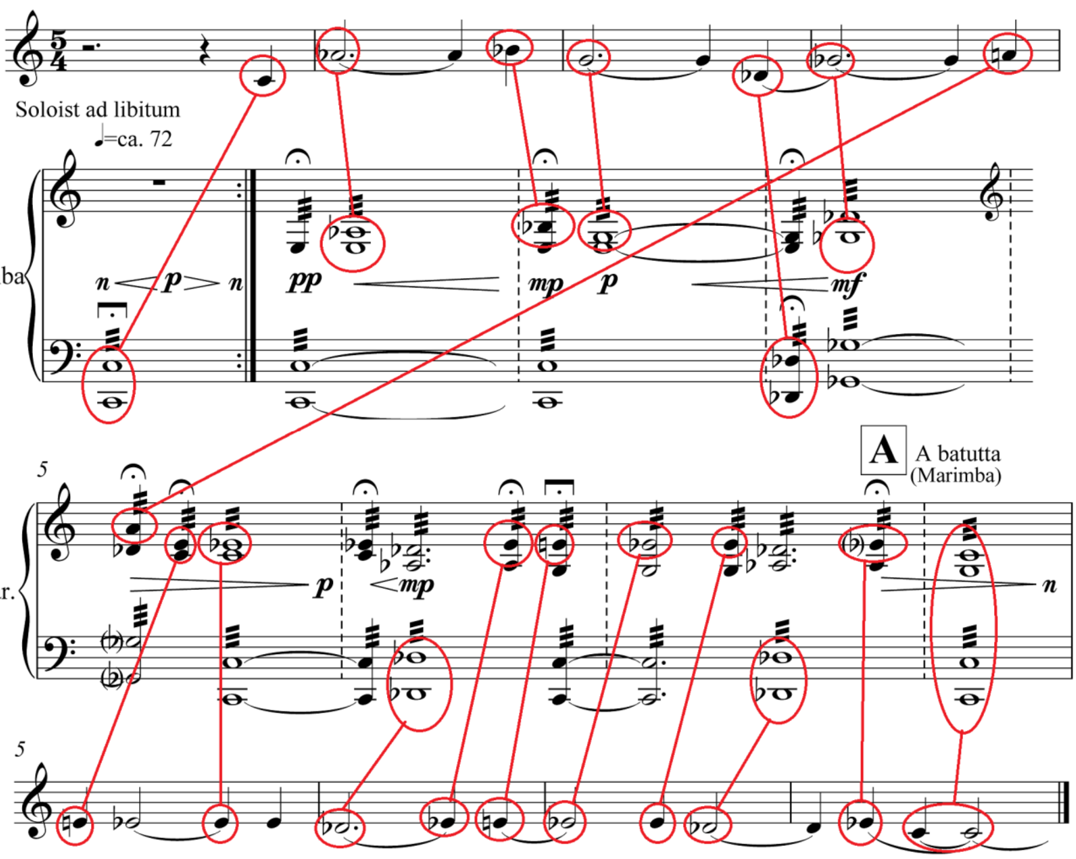


5.2.3.1 Harmonic construction

The soloist's opening chorale was constructed by stacking the notes of the theme into vertical arrangements (see Fig. 5.2.11 with analysis against original theme in top stave). By voicing the gently rolled and swelling progression in the lowest range of the concert marimba, a dark and rich timbre is achieved.

The soloist's left hand plays a bass line in octaves, changing pitch at pertinent moments in the line, and otherwise holding pedals whilst the right hand articulates the theme. In order to flesh out the harmonies, additional pitches not present in the line, but which are perhaps implied, are inserted. The second bar for instance, E in the right hand. E harmonises well against the progression from bars 2 - 4, creating the following progression: implied C major chord > 1st inversion Ab augmented > seventh chord on C with the introduction of Bb > C major and finally a C# diminished chord[185] as the bass voice moves to Db. All this accomplished with the simple introduction of one extra tone.

Fig. 5.2.11 *Darvaza, Mvt II* - Harmonic analysis of soloist's marimba opening as related to theme.



[185] Enharmonically speaking.

The soloist's cadenza like passage through bars 93 - 101, displays a multi dimensional application of the theme to harmonic construction. Fig. 5.2.12 depicts a numbered example of the theme (long version) for reference, and the soloist's vibraphone part in question (key of Db). The lower bold text numbers assigned to the accented notes outline a statement of the theme, as manifested by the harmonies. The non bold upper numbers identify a secondary statement of the theme, occurring within the shadow of the first.

The aural effect of this superimposition is a clear recognition of the line, as articulated by the accented notes. The secondary 'shadow' line contrasts as a chattering response, with its shorter note values, and wide erratic leaps.

Fig. 5.2.12 *Darvaza, Mvt II* - Harmonic analysis of vibraphone as related to theme, bars 93 - 101.

The final example of harmonically derived material comes from the first climax of the work. As seen in Fig. 5.2.13, the first five notes of the theme sequentially stack to create a dense harmony in the horns and trombones. The bars leading up to this point progressively introduce the harmony as the tonal centre shifts through C > G, Eb and finally Bb.

Fig. 5.2.13 *Darvaza, Mvt II* - Harmonic analysis of brass progression as related to theme, bars 136 - 140.

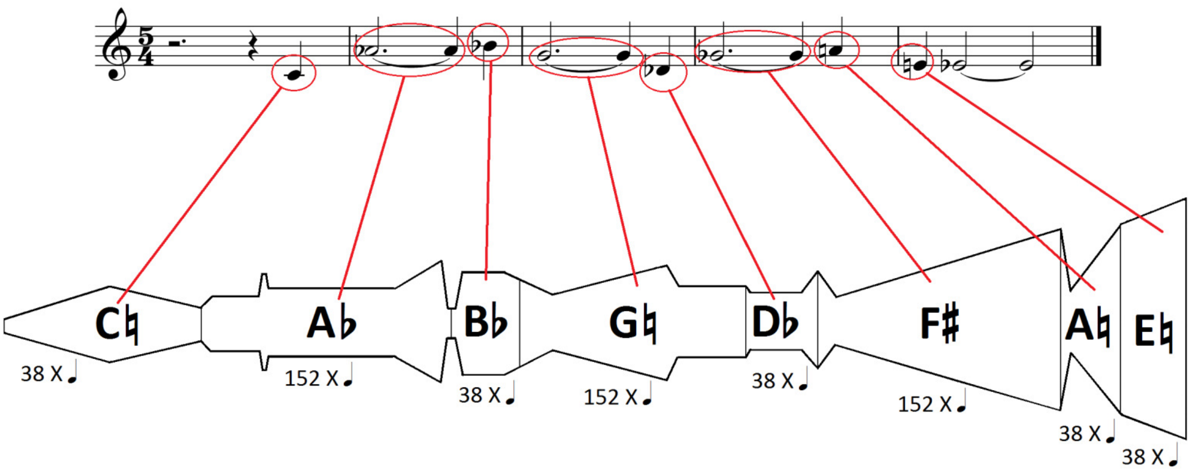
5.2.4 Examples of self-similarity from *Darvaza, Mvt II*

As stated in the introduction, the hallmark of this work is its application of self-similarity to form, both on the macro, and micro levels. The macro structure of the work in terms of section length, and tonal centre of each section, is determined entirely by the theme itself. The form of the work therefore demonstrates precise *scale invariance*, as previously described by Zohuri.[186] The diagram of Fig. 5.2.14 demonstrates this feature in an immediately graspable manner.

Looking at the theme itself, we can see that it is comprised of the two rhythmic values; crotchets, and a dotted minim tied to a crotchet (i.e. four crotchets worth). The same values are attributed to the form of the work itself. Likewise, the tonal centres of each section, as marked in the form diagram of Fig. 5.2.14 follow the theme exactly. The crotchet value sections of the form (tonal centres of C, Bb, Db, A and E) are of 38 crotchets length. The sections corresponding to four crotchets worth were arrived at by multiplying 38 by 4, giving a value of 152 crotchets.

[186] Zohuri, *op. cit.,* p. 75.

Fig. 5.2.14 *Darvaza, Mvt II* - Theme and its relationship to the macro structure of the work.



Having observed the application of the prime material to the overall form of the work, the following discussion will deal with its application to the internal workings of the sections themselves.

The graphic below (Fig. 5.2.15) depicts an analysis of the pitched material occurring throughout the second section of the work (pitched in Ab). The boxed letters represent the rehearsal letters, with the numbered, dashed lines indicating bars. The texture of the section is ensemble like, with the soloist's marimba providing rhythmic energy, whilst the woodwinds take turns playing the theme.

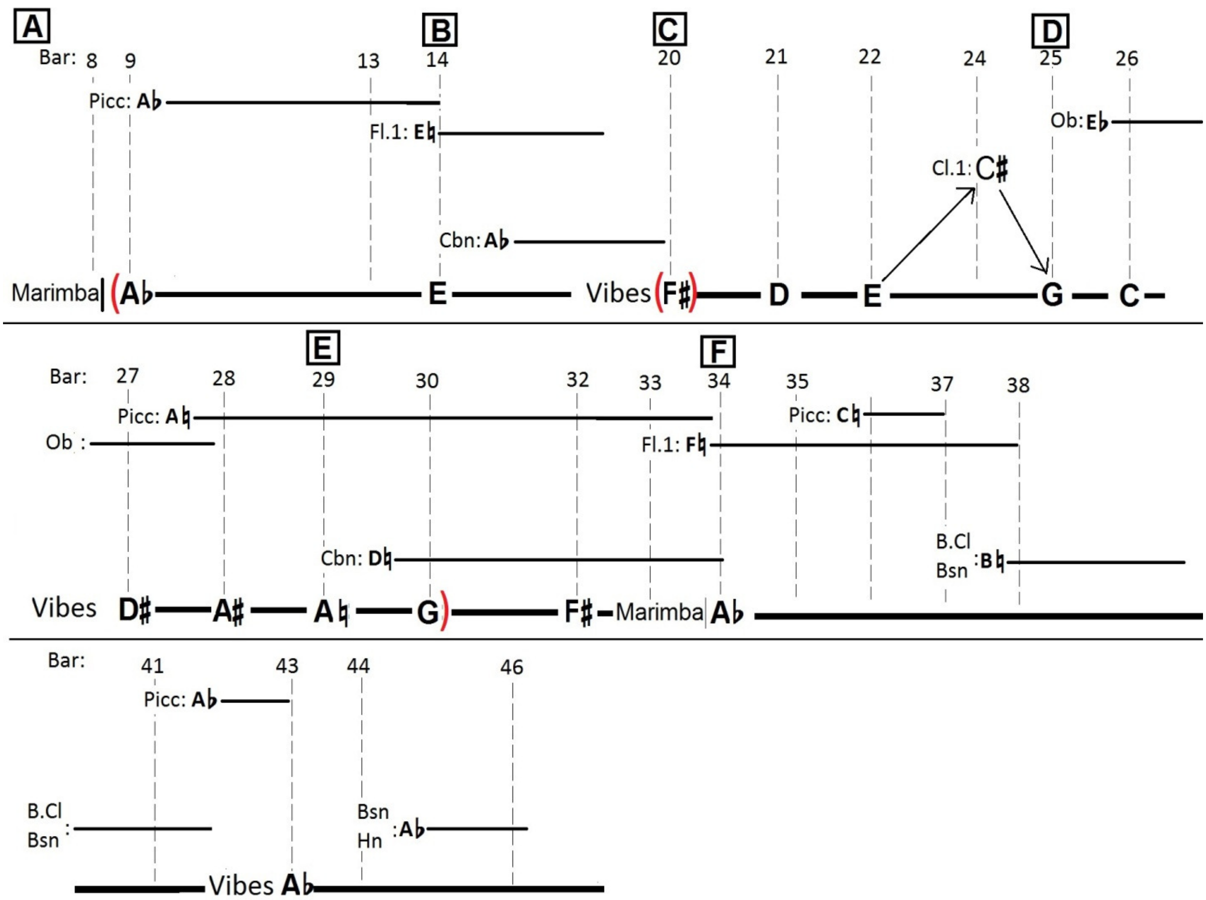
Turning our attention first to the marimba line, we see the line modulates through Ab > E > F#, as indicated by the red brackets. This spells out the first three notes of the theme in the key of Ab. Instead of proceeding to the next tone of the theme, D#, the line now restarts in the key of F#, continuing in this key until the completion of the short version of the theme (bar 30). At bar 22, the marimba plays in the tonal centre of E, then moving onto G at bar 25. C sharp should actually intervene, which in fact it does, but in the 1st clarinets, as indicated by the arrows in the graphic.

The analysis of the lines above the marimba is understood as follows. Each line states the instrument in question, the key that the instrument plays the theme (in whole or partial) and the duration (e.g. Fl. 1 has the theme in the key of E, from bar 14 to approximately bar 16, as indicated by the graphic).

In order to create multiple levels of self-similarity, the keys in which each instrument enters are arranged to spell out the line itself (in the key of Ab). It should be noted that the soloist's vibraphone in F# at bar 20 counts towards the spelling of the theme in the instrumental lines. Thus the line proceeds as follows: Picc. (Ab), Fl.1 (E), Vibes (F#), Ob. (Eb), Picc. (A), Cbn. (D), Fl.1 (F), Picc. (C), B.Cl (B). In order to reinforce the modulation scheme of the macro structure, the tonal centres are reset to Ab at the end of the section.

So it has been seen then, that in this section alone multiple levels of self-similarity are achieved. The marimba and woodwind lines above modulate through schemes which spell out the theme, and internally, the marimba line and woodwind lines themselves playing versions of the theme.

Fig. 5.2.15 *Darvaza, Mvt II* - self-similarity analysis, bars 8 - 46 (Ab tonal section).



Much of what was discussed regarding the above analysis, applies to the analysis of bars 57 - 91 below (Fig. 5.2.16). Here again the soloist's vibraphone part moves through keys which spell out the theme, this time in G. There are returns to the home key of G, denoted by the non bold, smaller text (e.g. bar 61).

The accompanying instrumental parts proceed in a different manner than was seen in the previous example. Here the theme is progressively spelt out in the section's tonality (G) across the instruments. Referencing Fig. 5.2.16 against Fig. 5.2.17 will give clarity to this concept. Looking back at Fig 5.2.16; at bar 57, the oboe has the first three notes of the theme: G, Eb, F. Then at bar 60, the first four notes: G, Eb, F, D. The first flute at bar 62 then takes the line further with: G, Eb, F, D, Ab. Between the aforementioned diagrams, one can follow the progression of the theme to its conclusion at bar 71, where it then resumes in part from bar 75.

Fig. 5.2.16 *Darvaza, Mvt II* - self-similarity analysis, bars 57 - 91 (G tonal section).

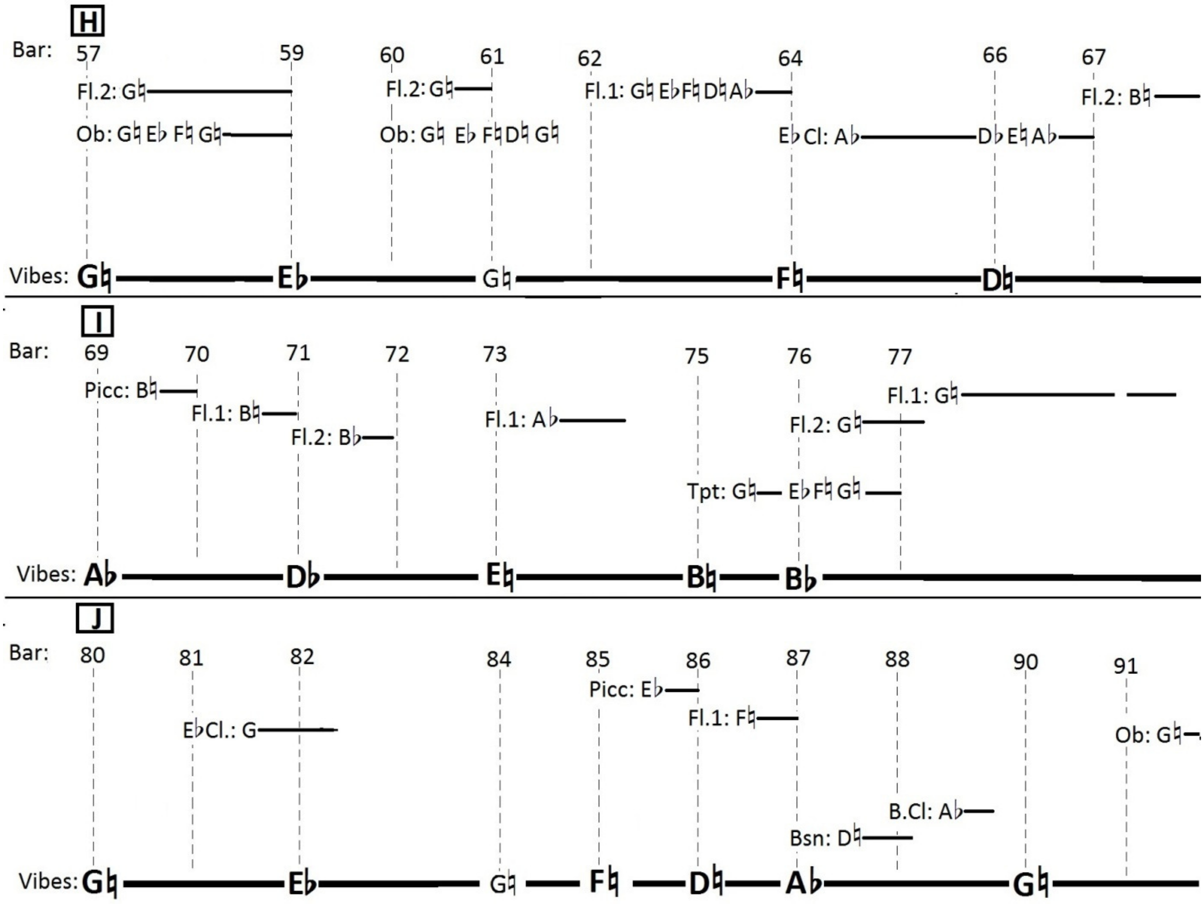
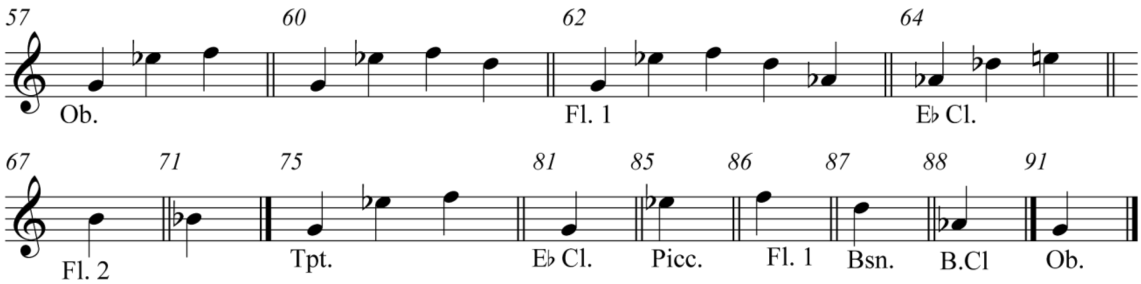


Fig. 5.2.17 *Darvaza, Mvt II* - Progressive spelling out of theme across instruments, as related to Fig. 5.2.16.

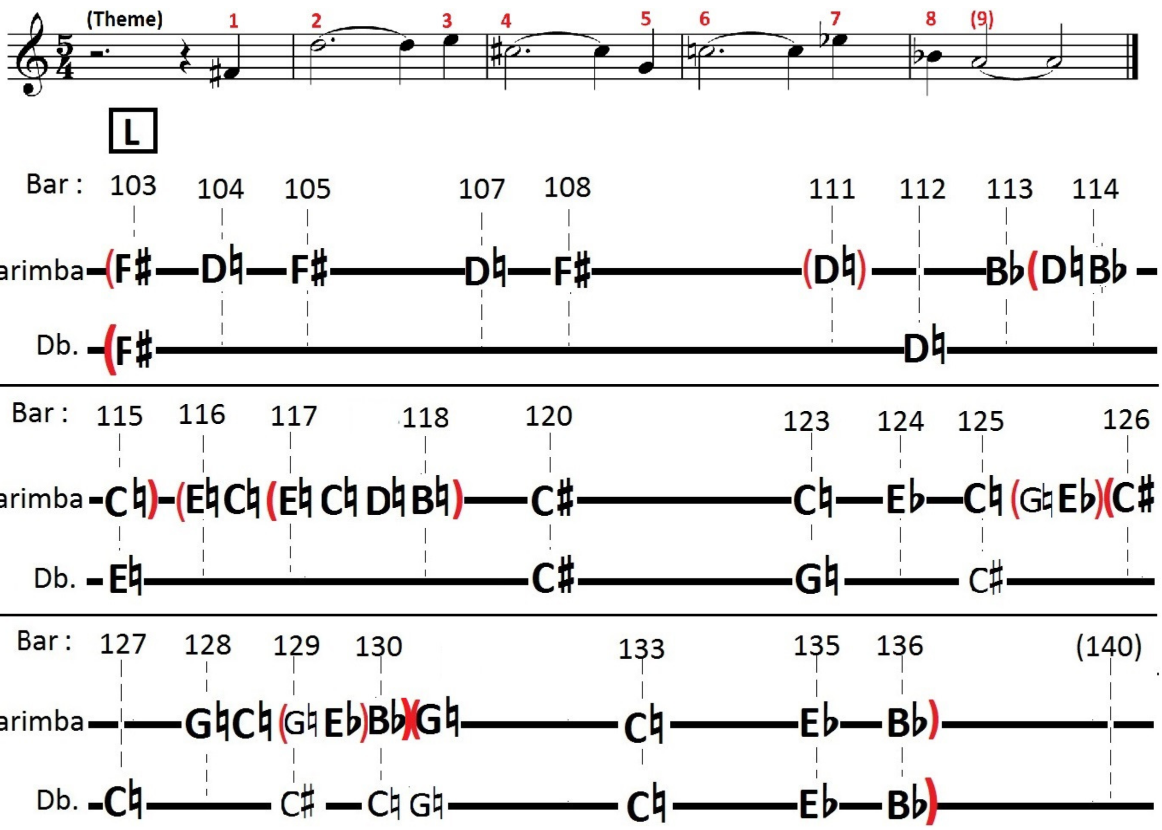


Bars 103 - 140 (Fig. 5.2.18) display a similar model of self-similarity as has been shown in the above examples. Here the double bass plays the theme (in key of F#) in long pedal tones, as outlined in the below analysis. The lower smaller font denotes passing tones not attributable to the line.

Unlike the previous examples, the accompanying material (soloist on marimba) follows the pitch changes of the double bass. Bars 103 - 111 see the marimba moving between the first and second pitches of the theme, F# and D. When the bass moves to D, the soloist follows suit, moving through D, Bb and C. From bar 117 - 118 the soloist moves through the first four notes of the theme in E. At bar 26 the soloist moves through the 4th - 8th notes of the theme (C# > G > C > Eb > Bb), repeating this sequence from the 5th to 8th note from bars 130 - 136, in so doing, realigning with the bass pedal movement.

As the following section's tonal centre is in A, this section intentionally comes to rest of Bb, rather than the 9th and final tone of the shorter version of the theme, which is also A. The effect and function of this is rather convenient, with the following macro section having the tonality of the final pitch of the current transposition of the line (F#).

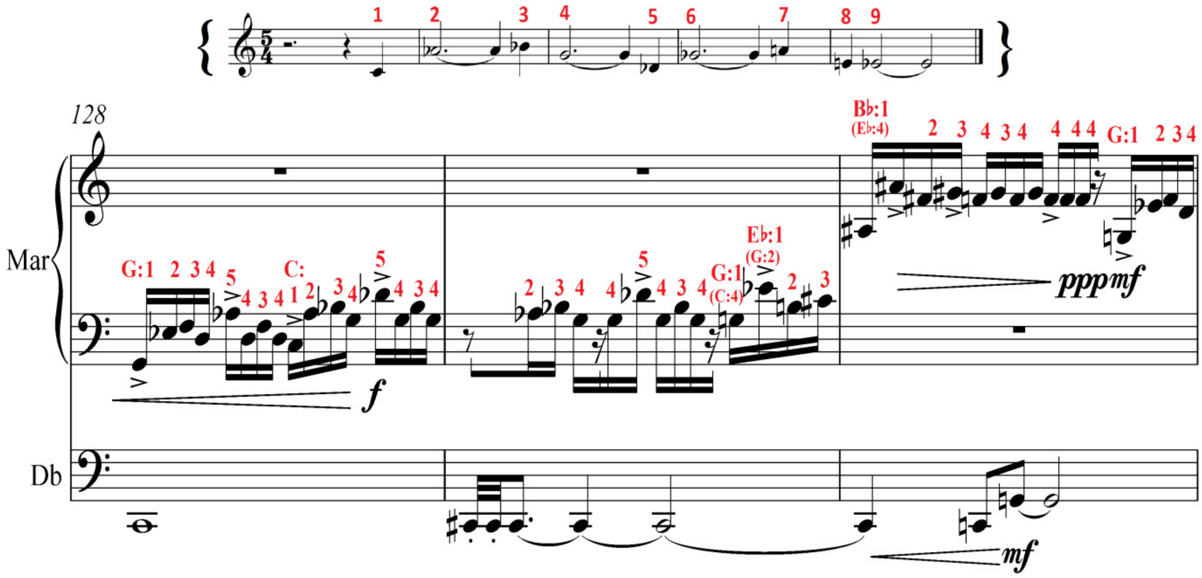
Fig. 5.2.18 *Darvaza, Mvt II* - self-similarity analysis, bars 103 - 140 (F# tonal section).



It would be easy to become lost amongst the potential abstractness of the above diagrams discussing the macro form of the sections in question. Referencing the previous diagram against the zoomed in analysis of bars 128 - 130 (Fig, 5.2.19), the mechanisms at work become immediately clear.

The marimba line is annotated with the numbers corresponding to numbered theme in the top stave of the diagram, along with letters denoting the pitch of modulation. Of particular interest are the moments the line overlaps its next modulation; bar 130 for example, where the fourth note of the theme in Eb, becomes the first note of the theme in Bb. Many similar instances of overlap can be found throughout this section.

Fig. 5.2.19 *Darvaza, Mvt II* - self-similarity within marimba line, bars 128 - 130.



5.3 *Darvaza,* Movement III

The third movement of the concerto sees a return of the auxiliary percussion players in the orchestra, and a thickening of the orchestration, much like the first movement. The composed material of the movement is necessarily less than that of the first two, owing to the inclusion of the soloist's cadenza. The intended effect of the composition is to bookend the concerto, bringing back elements from the first movement and ending in an impressive and dramatic fashion.

Regarding the cadenza: the initial plan was to compose it through, incorporating concepts of organic growth throughout. However, this idea was found to be most distasteful by the soloist, who perhaps rightly did not want to be hemmed in by draconian notations. A compromise was struck, whereby the soloist agreed to maintain an awareness throughout the cadenza, implementing motifs from the concerto, and playing on Fibonacci as a rhythmic device where possible (or remembered). How much of this came through in the actual performance of the cadenza is of course a highly subjective question.

As with the first movement, this last movement primarily concerns itself with the use of Fibonacci and Lucas numbers as compositional tools.

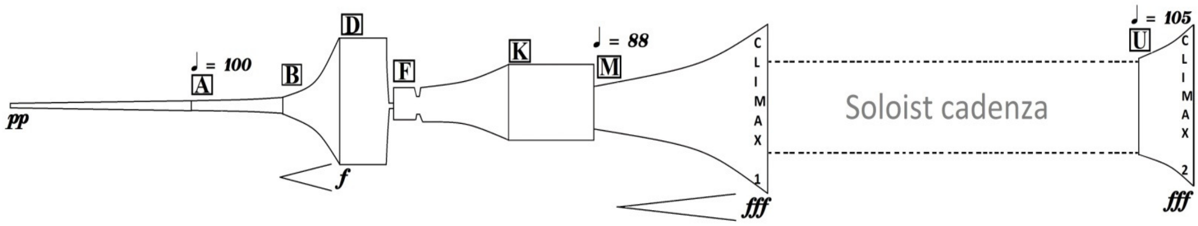
5.3.1 General overview of form

The most immediate observation that can be made looking at Fig. 5.3.1, is the inclusion of the soloist's cadenza towards the end of the movement. Being that Fig. 5.3.1 is to scale, relative to the provided recording, it is apparent that the cadenza occupies a relatively large percentage of the movement. This was of course, as is the tradition, at the soloist's discretion. Compositionally, the preference would be for a more balanced approach. Perhaps 50 - 70% of the length of cadenza presented here. This is of course wishful thinking. Besides, if the soloist has enjoyed playing the work, that may well be encouragement for over indulgence; a small price to pay as a composer.

The soloist begins the work with an unaccompanied improvisation, bowing various gongs and cymbals to achieve interesting harmonic effects. The choice of metallic sounds is in deliberate contrast to the previous movement, where this timbre was kept at a minimum. At rehearsal letter "A" timpani and bass drum enter, playing figures derived from the Lucas numbers, whilst the soloist adopts a bowed and tapped waterphone.[187] At "B" there is the entry of snare drum, and the soloist moves to struck metallic sounds. The intention is that these timbres, having been held back during the middle movement, will be perceived with renewed interest.

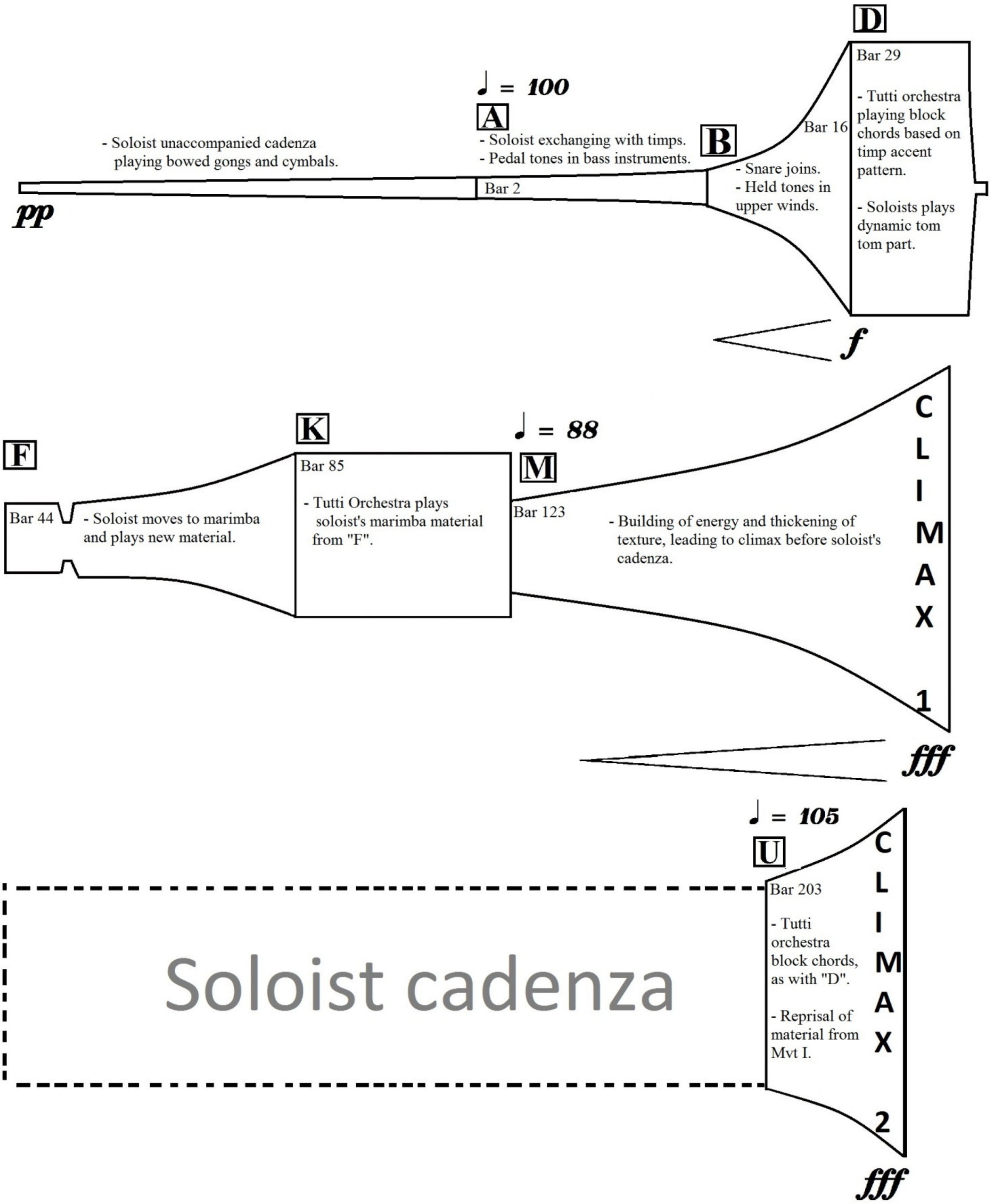
After the soloist's cadenza, the final climax of the work incorporates elements both of the previous material from this movement, and material from the first movement, bookending the form.

Fig. 5.3.1 *Darvaza, Mvt III* - General overview of form.



[187] The waterphone is a percussion instrument with a hollow metal resonator, filled with a portion of water, with brass rods emanating from the resonator. The rods can be struck, or bowed, and pitches affected by moving the water in the resonator.

Fig. 5.3.2 *Darvaza, Mvt III* - Detailed form.



5.3.2 Examples of Fibonacci and Lucas number usage in *Darvasa Mvt III*

The use of Fibonacci and Lucas numbers throughout *Darvaza, Mvt III,* primarily concerns their use in building additive rhythmic structures in both pitched and unpitched material. The use of Lucas numbers in the determination of accent points in the timpani line of Fig. 5.3.3, and the corresponding rhythm extracted to the bass drum line above, will be seen later to form an important rhythmic motor for much of the work.

The nature of this rhythmic motif is that of a simple group of semiquavers through the bar, with accents marking groupings corresponding to the Lucas numbers. The bass drum above shadows only the accented notes. The potential of this shadow rhythm to become its own entity (as will be seen later), was immediately obvious during the compositional process.

Fig. 5.3.4 extends the concept above, with bars of 9/8 and 5/4 respectively. The bar of 9/8 receives an extra grouping of two, with the 5/4 adding an additional pairing of single accents.

Fig. 5.3.3 *Darvaza, Mvt III* - Lucas numbers in timpani, rehearsal letter "A".

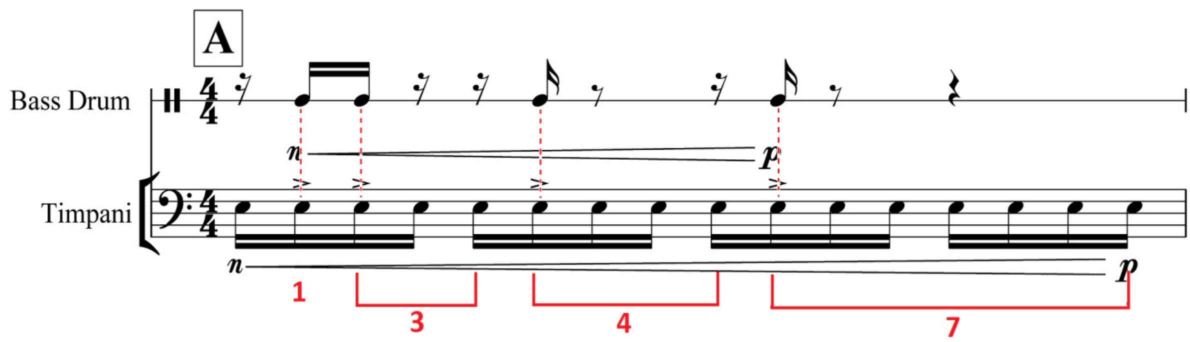
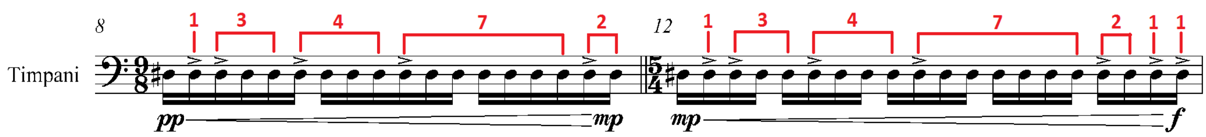


Fig. 5.3.4 *Darvaza, Mvt III* - Lucas numbers in timpani, bars 8 & 12.



The snare drum enters at bar 16 (Fig. 5.3.5), playing with groupings again derived from the Lucas numbers. Here the patterns ebb and flow, growing and shrinking in a call and response scheme with the soloist.

The soloist plays the motif of bar 17 (Fig. 5.3.6) from bars 17 - 23, after which time a switch to tom toms is made, where the soloist plays figures in the rests seen in the snare drum of Fig. 5.3.5. This motif is purely additive, growing in semiquaver groupings from 2 - 5.

The cadenza like bar of 28 is a good example of Fibonacci usage. The use of feathered beams allows the odd groupings of five and thirteen to be implemented here without issue, creating a build up of energy and excitement as the soloist pounds out the groupings, each with more vigour than the last.

Fig. 5.3.5 *Darvaza, Mvt III* - Lucas numbers in snare drum, bars 16 - 27.

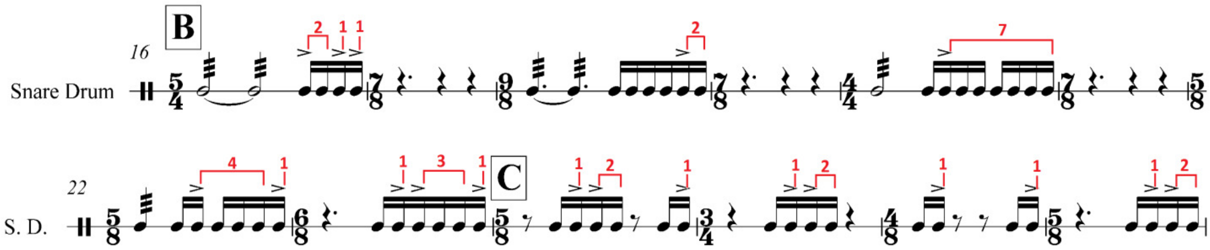
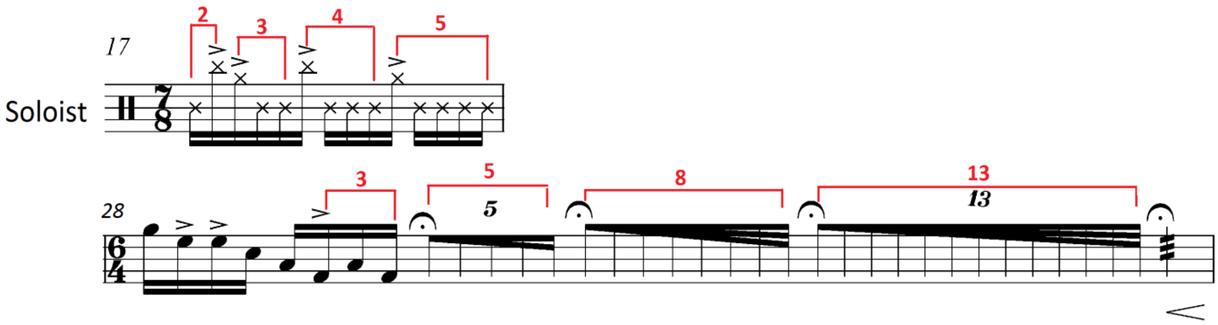


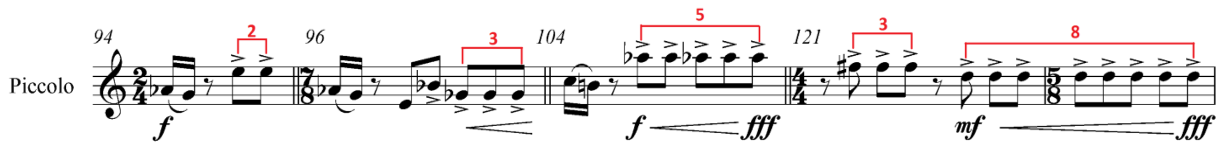
Fig. 5.3.6 *Darvaza, Mvt III* - Growing line and Fibonacci numbers in solo percussion, bars 28.



Further examples of Fibonacci usage can be found in the soloist's marimba line (Fig. 5.3.7) and tutti orchestra (Fig. 5.3.8). In each example, an emphasised moment of punctuation is given over to a repeated sequence of tones. These punctuation moments grow in length to the next Fibonacci number each time they appear.

Fig. 5.3.7 *Darvaza, Mvt III* - Fibonacci numbers in soloist's marimba, bars 45, 51 & 61.

Fig. 5.3.8 *Darvaza, Mvt III* - Fibonacci numbers in tutti orchestra, bars 95, 96, 104 & 121 - 122.



The final two examples (Fig 5.3.9 and 5.3.10) make use of the Lucas numbers in a similar way to the examples above, with the lines growing in length each time they are stated.

Here however, a deviation from the strict numerical sequence is made. In the case of the trumpet line in bars 113 - 114, a grouping of five is included and in the snare drum at bar 187, a grouping of six. These inclusions of anomalous groupings make an important point. That is, that the creative narrative at all times overrides all other operations. In both instances, the adjustments were made to suit the demands inherent to the unfolding of the form. Prescriptively applying the 'correct' groupings when such means would be aurally out of place, would be at the peril of the work's creative integrity.

Fig. 5.3.9 *Darvaza, Mvt III* - Fibonacci and Lucas numbers in staccato motif, bars 111 - 114 & 121.

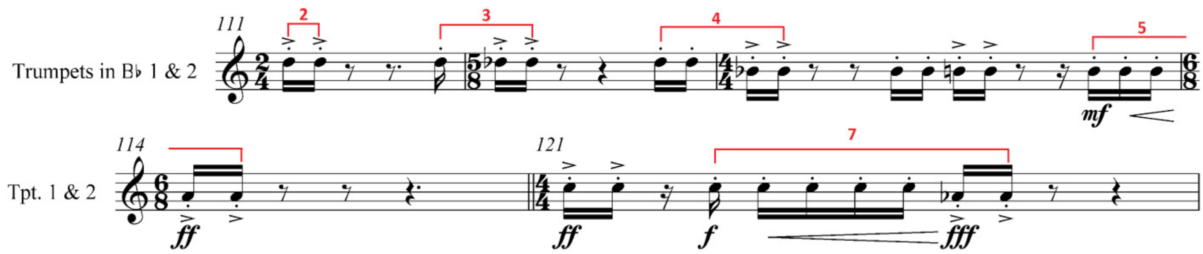
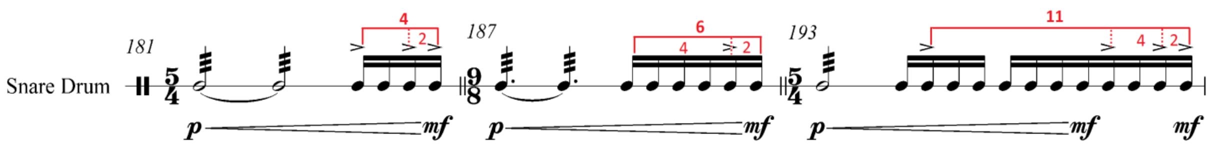


Fig. 5.3.10 *Darvaza, Mvt III* - Lucas numbers in snare drum, bars 181, 187 & 193.



5.3.3 Examples of autogenesis from *Darvasa Mvt III*

Figures 5.3.11 and 5.3.12 describe the tutti orchestral 'stabs' occurring at rehearsal mark "D", and after the soloist's cadenza (bars 29 - 43 and 203 - 227). Here the soloist trades back and forth with the orchestra, playing dynamic tom tom fills in the bars of rest. This same shadowing of accents occurred at rehearsal letter "A", where the bass drum shadowed the timpani's accents (Fig. 5.3.3).

The pitched material making up the harmony of the chords comes from the four note motif found in the first movement. As figure 5.3.12 shows, the original four note motif is simply stacked vertically. This produces a discordant harmony which adds to the energy and tension of the moment.

Fig. 5.3.11 *Darvaza, Mvt III* - Rhythmic motif obtained from Fig. 5.3.3, tutti orchestra, bars 29 - 33.

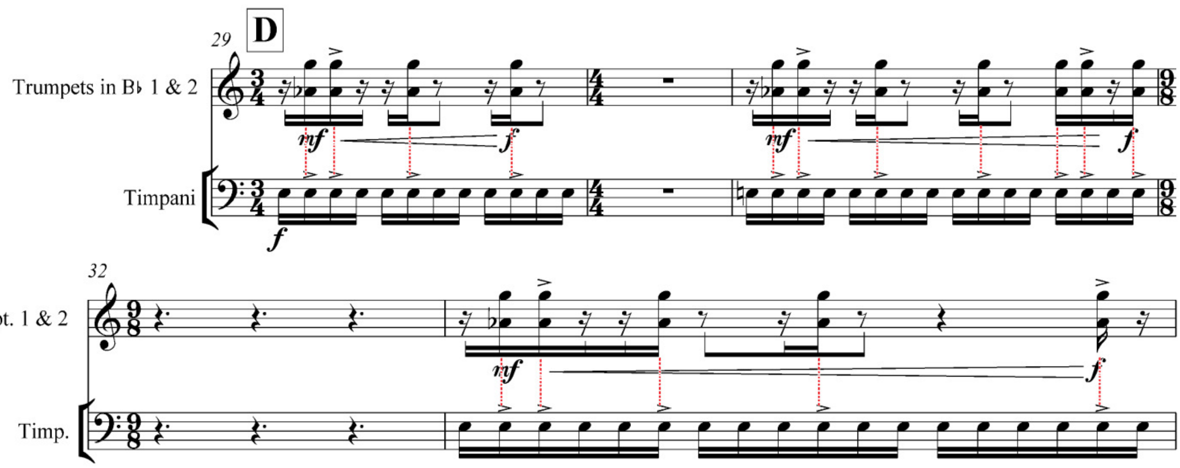
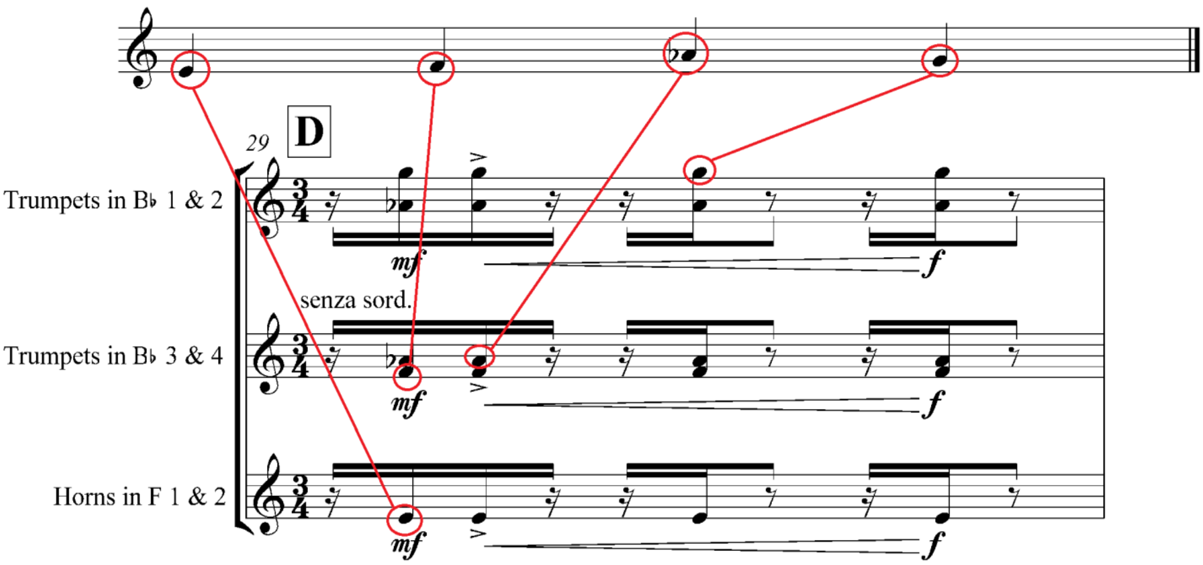


Fig. 5.3.12 *Darvaza, Mvt III* - Pitched material of Fig. 5.3.11 as related to *Mvt I* four note motif, bar 29.



Figures 5.3.13 - 5.3.15 show how the four note motif from *Mvt I* and its variations are further implemented in the material of *Mvt III.* For example, the opening marimba line from *Mvt I* is directly quoted in bars 203 - 204 in the piccolo (Fig. 5.3.13). The final two bars of the work sees the same line in the trumpets, horns, alto and tenor saxophones and soloist playing tom toms (Fig. 5.3.15). Figure 5.3.14 shows the juxtaposition of the Lucas number derived rhythmic 'stabs' from rehearsal letter "D", against the *Mvt I* four note motif line from the marimba.

Fig. 5.3.13 *Darvaza, Mvt III* - Marimba opening line from *Mvt I* in piccolo, bars 203 - 204

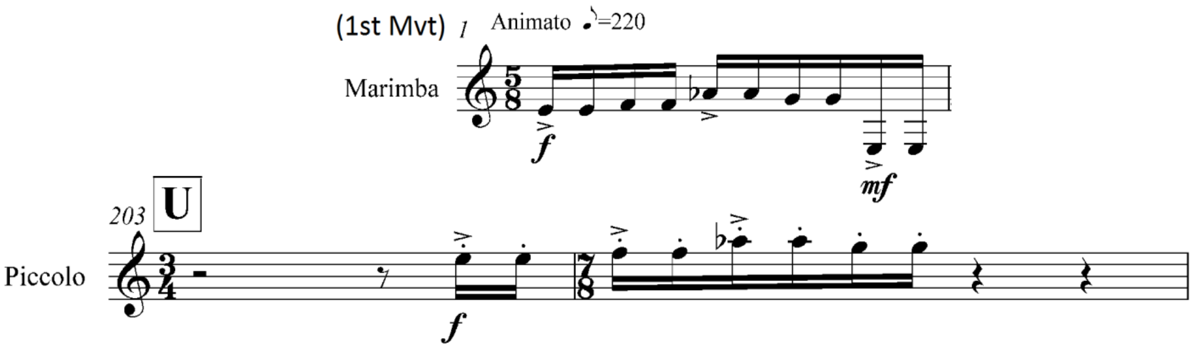


Fig. 5.3.14 *Darvaza, Mvt III - Mvt I* marimba material juxtaposed against rhythmic motif from Fig. 5.3.11, bars 226 - 227.

Fig. 5.3.15 *Darvaza, Mvt III* - Trumpet line of Fig. 5.3.14 in solo percussion part, bars 226 - 227.

During the run up to the cadenza (bars 171 - 201) there appears an ominous ascending line, heard predominately in the brass, two examples of which are given below (Fig. 5.3.16 and 5.3.17). This line appears with various rhythmic values assigned to its pitches, so that it always seems unpredictable and threatening. It overlaps itself, and at times appears in canonic imitation.

The origin of the line, as could by now perhaps be predicted, lies in the same four note motif from *Mvt I.* A simple adjustment of moving the last note up an octave was made, producing a characteristic feature of a major 7th leap.

Fig. 5.3.16 *Darvaza, Mvt III* - Four note motif of *Mvt I* transformed into bass line, bars 66 - 67.

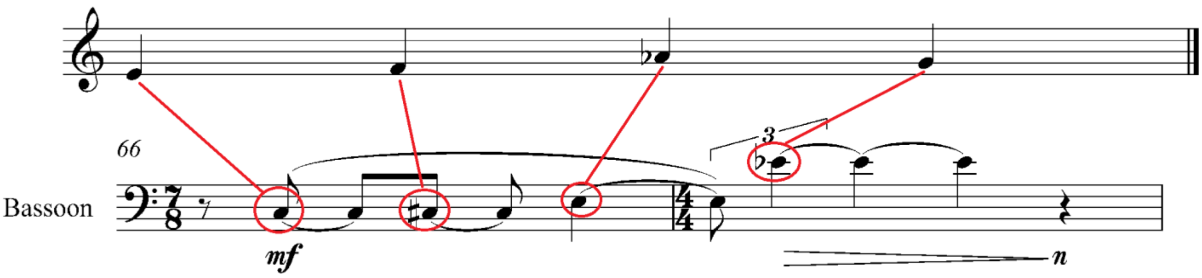


Fig. 5.3.17 *Darvaza, Mvt III* - Extended variation of bass line shown in Fig. 5.3.16, bars 178 - 181.

A.6 Conclusion

From the outset of the project, the intention was to progress towards the simultaneous utilisation of the three principles of organicism in combination. Ultimately, this envisionment never quite bore its fruit. The three concepts (Fibonacci series, autogenesis and self-similarity) would on the face of it, appear to be good bedfellows. In principle, there is actually no reason why a work could not be composed employing all three as the fundamental compositional tools. The compositional experience however was something akin to: "too many cooks spoil the broth". There was a very real struggle between the need to create works that were in line with the composer's sense of aesthetics, and the desire to incorporate the use of these principles to their maximum potential. Without careful attention however, they became prescriptive, and in so doing, became restrictive. Organic growth in nature seems to be anything but rigid - it is the antithesis of rigid, of predictability. The biggest challenge in this regard was the creation of large self-similar structures, such as was seen in the percussion concerto's second movement and the first movement's Fibonacci derived formal sections. To satisfy the materials own desires within a set amount of bars, with set points of modulation - that is indeed a challenge, if one is also trying to accommodate a sense of aesthetics. The use of self-similarity on smaller scales however, proved very effective, especially in informing the movement of tonal centres. Autogenesis was at every turn useful and entirely flexible - its uses limited only by the resourcefulness of the one using it. Fibonacci, like self-similarity was flexible and useful on the smaller scale, such as the development of rhythmic expositions such as those seen in the third movement of the percussion concerto. The application of Fibonacci to the macro structure incurred the same challenges as did self-similarity.

The project's achievement and contribution to the discipline lie in the exploration of a compositional philosophy directed towards the creation of works which from their most primitive stages, inform their own development in an intrinsic and axiomatic nature.[188] Each work becomes its own system; every work receives an individual treatment that is inherent within its early building blocks. This is unique to the traditional situation, where works are conceived within the technical and stylistic bounds of an established system (e.g. functional harmony, twelve tone methods etc.). Whilst the compositional use of the Fibonacci series and the Golden Section have been well documented, the areas of autogenesis and self-similarity to date have been comparatively unchartered territories.

[188] The three organic principles discussed, used in various combinations.

Directions for future investigations

It quickly became clear during the composition of the works, that any of the three organic principles could individually be the basis for a dissertation. Whilst this project has focussed on all three - individually to a degree, and in combination - future investigations might do well to exhaustively focus on just one. The focus could actually be quite narrow, for instance: 'autogenesis: extraction of harmonic materials from linear lines'. One could equally delve more strictly into the combination of organic principles in the manner of this project, perhaps leaning harder towards the mathematical area of fractals, for instance. Compositions based in organic processes might be pursued in the *Augenmusik* style, operating as still frames in time.

A very sophisticated, but potentially interesting route to follow might be that of allying one's processes to actual biological processes in nature. Finding a notational analogue for the many processes involved in the replication of DNA for example. Such a thing would be akin to a musical transcription of a real biological process.

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PART B

Musical Scores

TIDAL LOCK

For Orchestra.

Nicholas Denison

2011

TIDAL LOCK

for Orchestra

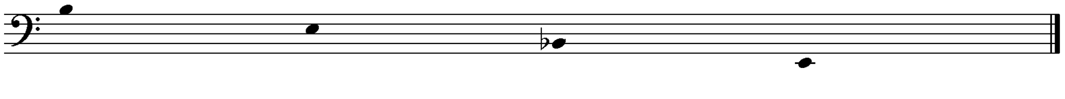
Dedicated to Maestro Krzysztof Penderecki

Instrumentation:

Piccolo
2 Flutes
Oboe
Cor Anglais
2 Clarinets in A
Bass Clarinet
2 Bassoons
Contrabassoon
4 Horns in F
3 Trumpets in B flat
2 Trombones
Bass Trombone
Tuba
Timpani
Percussion 1 (Crotales (bowed), Xylophone, Tubular Bells)
Percussion 2 (Vibraphone (struck and bowed), Bass drum)
Percussion 3 (Large Tam tam)
Violins 1
Violins 2
Violas
Violoncellos
Contrabasses

Score in C. All instruments sound as written except those that transpose at the octave or double octave.

Timpani



TIDAL LOCK

Nicholas J. Denison

Dedicated to Maestro Krzysztof Penderecki


A
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
con sord.
a1
Tbn.
B. Tbn.
Tba.
Timp.
soft mallets
port.
Crot.
arco
Vib.
Vln. I
Vln. II
Vla.
Vc.
sim.
Db.


11
Picc.
Fl.
1.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
1.
a 2.
Cbsn.
Hns.
con sord.
con sord.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
port.
Crot.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
pp
ppp
mp
mf
p
n


B
16
Picc.
Fl.
a2
mp
mf
Ob.
C. A.
p
n
pp
Cl.
B. Cl.
f
Bsn.
Cbsn.
senza sord.
solo 1.
2.4.
Hns.
Tpts.
con sord.
Tbn.
a 2
B. Tbn.
Tba.
Timp.
To Tub. B.
Crot.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.


C
21
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Crot.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
dim.
1.
a 2
(stopped)
3.
(open)
a 2.
senza sord.
hard mallets
Tubular Bells
To B. D.


26
D Più mosso ♩=50
7/8
4/4 poco accel.
Picc.
Fl.
Ob.
C. A.
Cl.
a 2
B. Cl.
Bsn.
Cbsn.
a 2.
(open)
Hns.
senza sord.
a1
a2
Tpts.
senza sord.
Tbn.
B. Tbn.
Tba.
Timp.
cresc.
Tub. B.
Vib.
ppp
cresc.
D Più mosso ♩=50
7/8
4/4 poco accel.
Vln. I
Vln. II
Vla.
Vc.
Db.


E
31
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
dim.


F
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
senza sord.
Tubular Bells
Bass Drum
dim.
cresc.


41
G
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
To Vib.
Vibraphone
B. D.
G
Vln. I
Vln. II
Vla.
Vc.
Db.
dim.
IV


H
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
a 2
a2
To Xyl.
Xylophone
pizz.
arco
cresc.

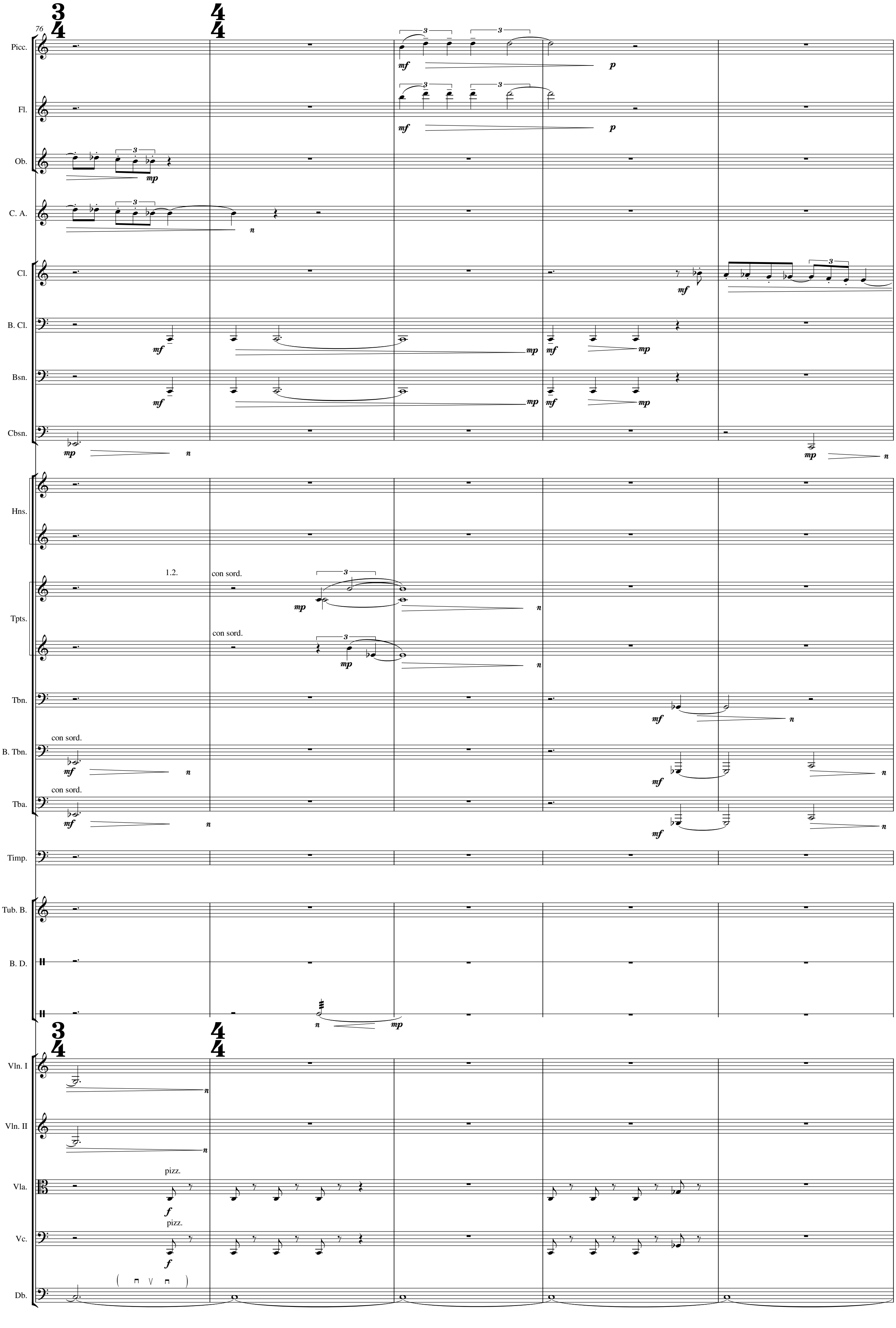

51
I
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Xyl.
Vib.
Vln. I
Vln. II
Vla.
Vc.
Db.
To Tub. B.
Tubular Bells
To B. D.
Bass Drum
cresc.
pizz.
arco


56
J
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
1.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
J
Vln. I
Vln. II
Vla.
Vc.
Db.
mp
mf
n
f
p
ff
fff
dim.


K Allegro ♩=100
Con fuoco
61
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tpt 2.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
K Allegro ♩=100
Con fuoco
Vln. I
Vln. II
Vla.
Vc.
Db.

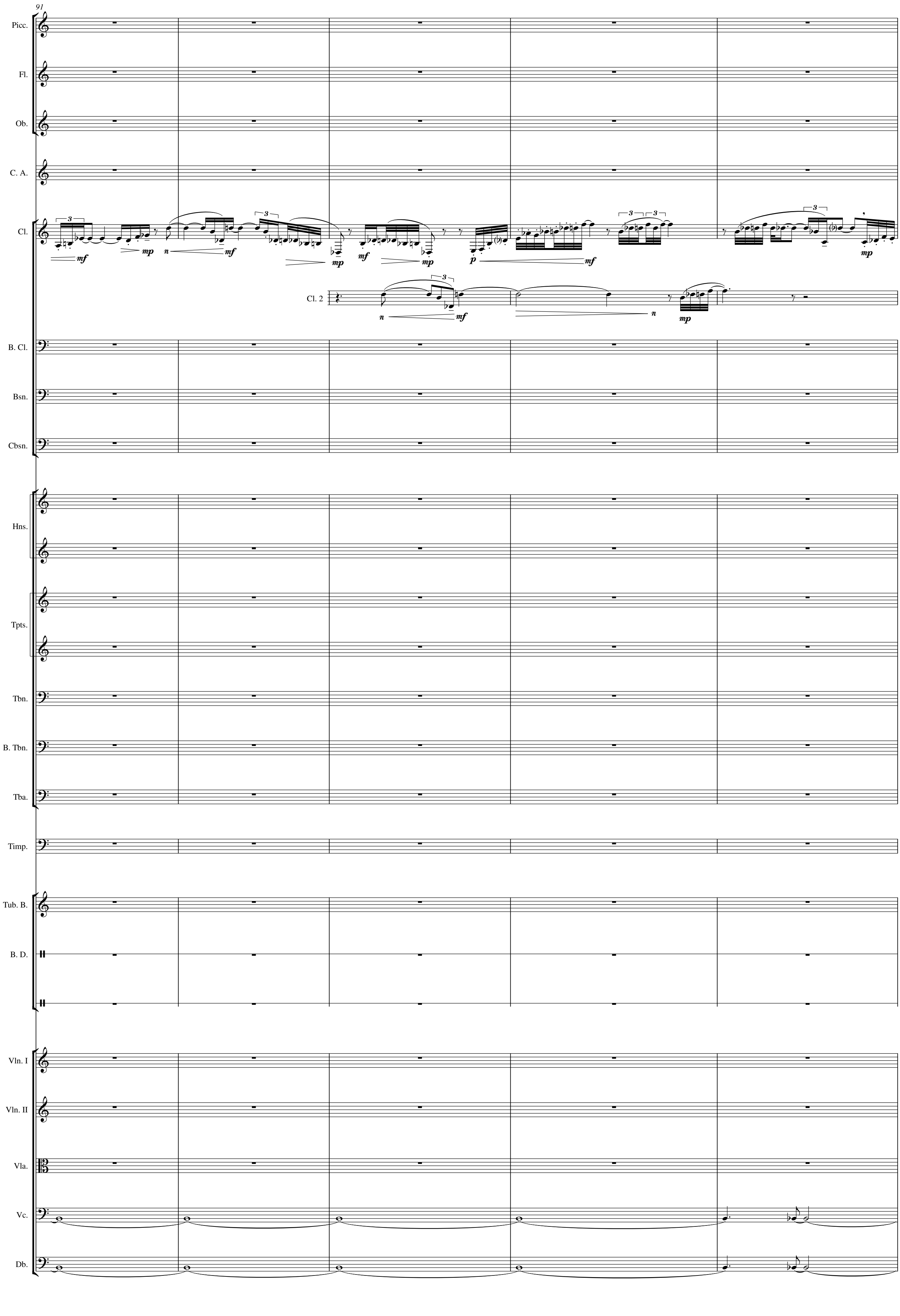

L
66
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
a 2.
cresc.
pizz.
ff
mf
mp
fff
f
p
n

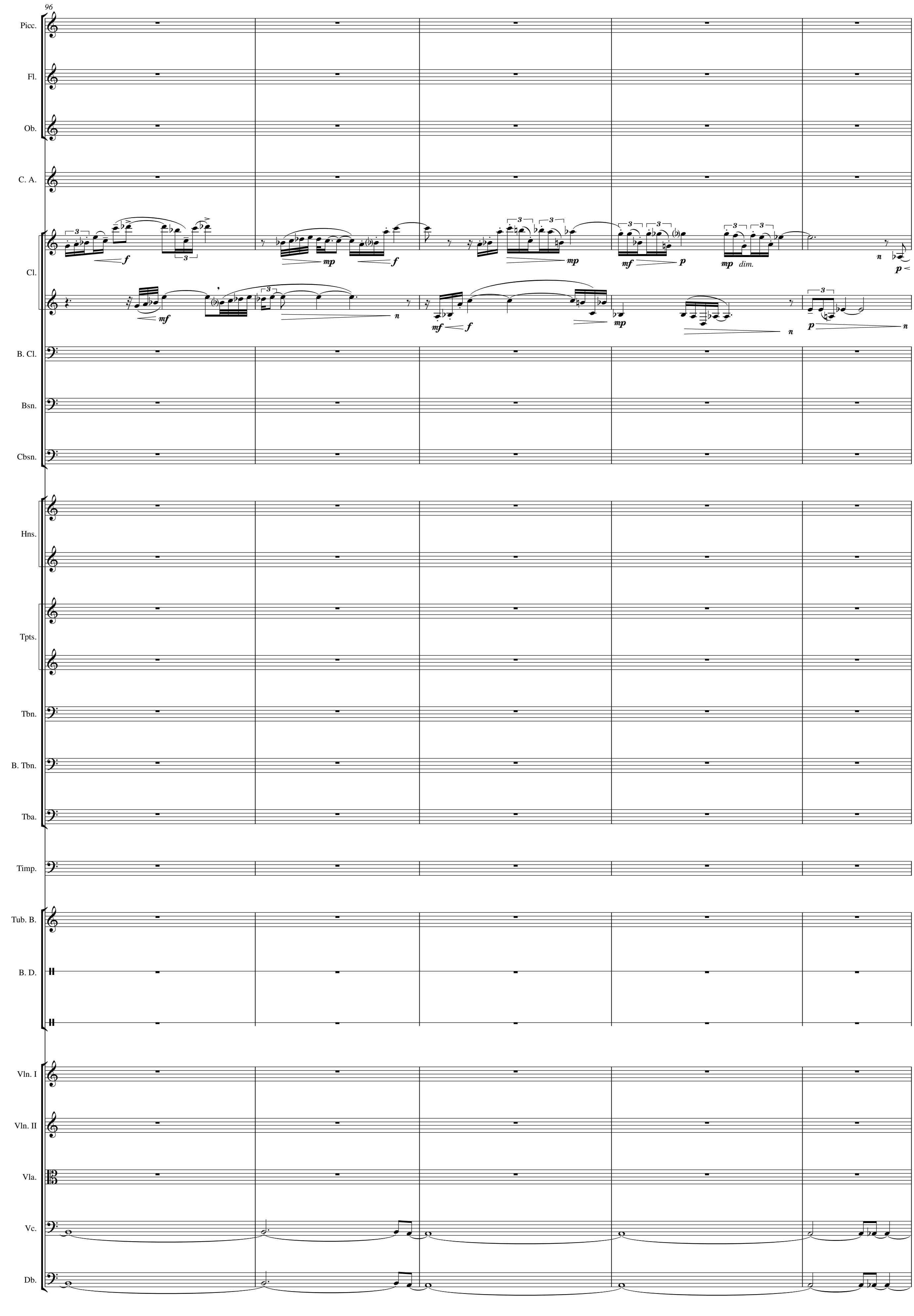

M
71
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
cresc.
arco
3
4


76
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
1.2.
con sord.
con sord.
Tbn.
con sord.
B. Tbn.
con sord.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
pizz.
Vla.
pizz.
Vc.
Db.

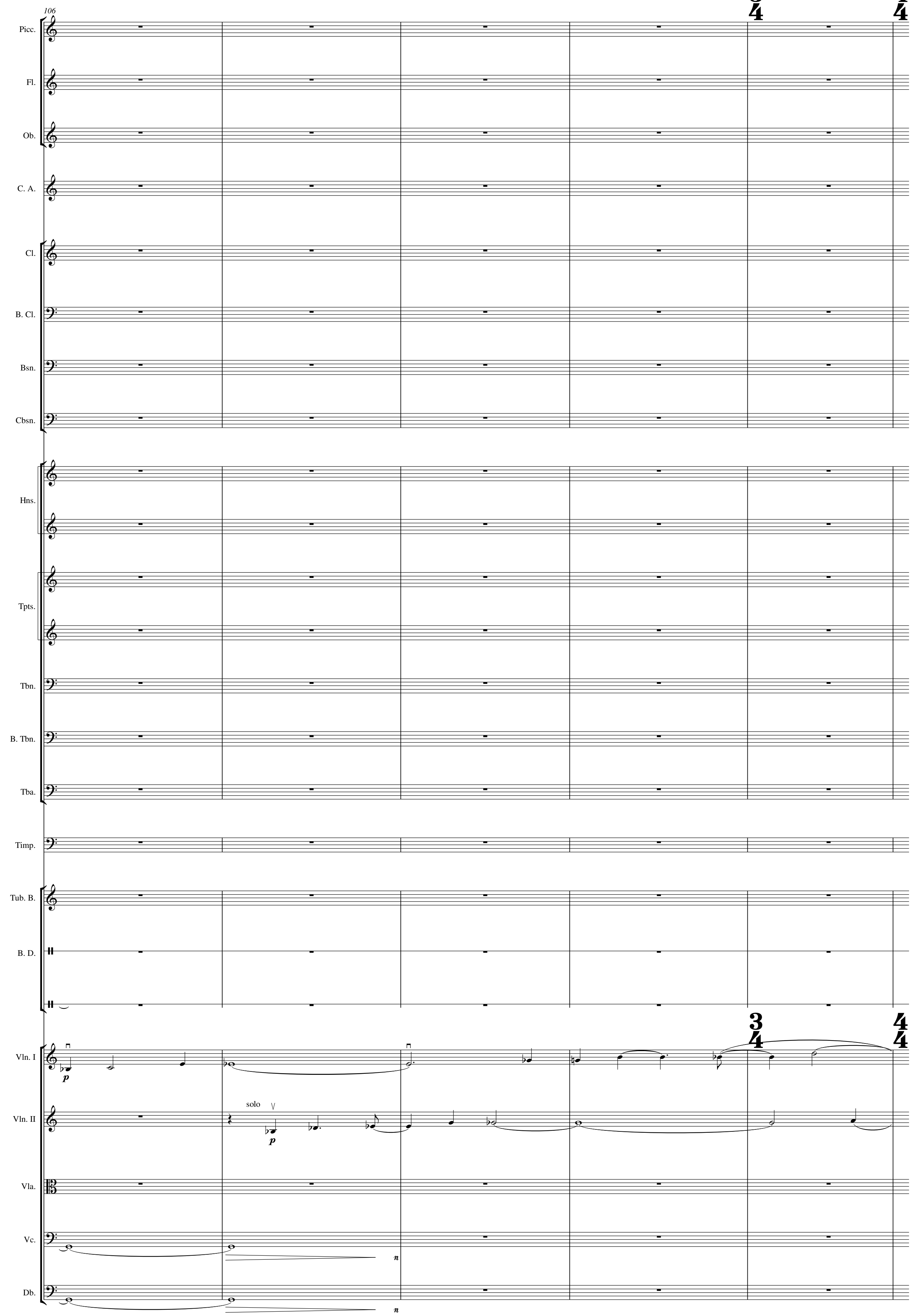

81
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.

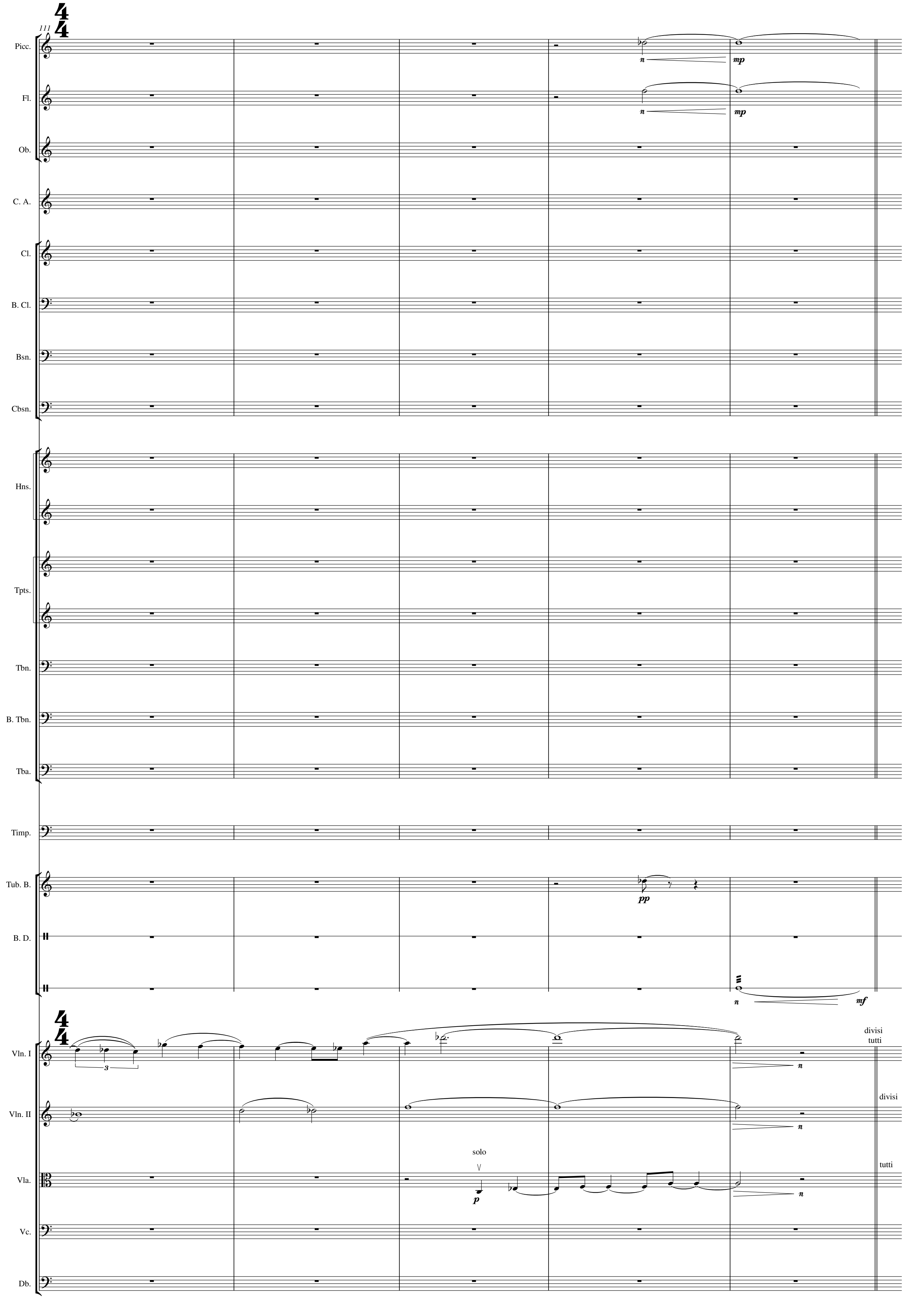

86
N Misterioso ♩=50
colla parte
Picc.
Fl.
Ob.
C. A.
Cl.
1.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
N Misterioso ♩=50
colla parte
Vln. I
Vln. II
Vla.
Vc.
Db.
arco
arco


91
Picc.
Fl.
Ob.
C. A.
Cl.
Cl. 2
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.


96
Picc.
Fl.
Ob.
C. A.
Cl.
f
mp
f
mp
mf
p
mp dim.
n
p
mf
n
mf
f
mp
n
p
n
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.


O
A battuta
101
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
O A battuta
solo
Vln. I
Vln. II
Vla.
Vc.
Db.


106
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
solo
p
n


111
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
solo
divisi
tutti
divisi
tutti

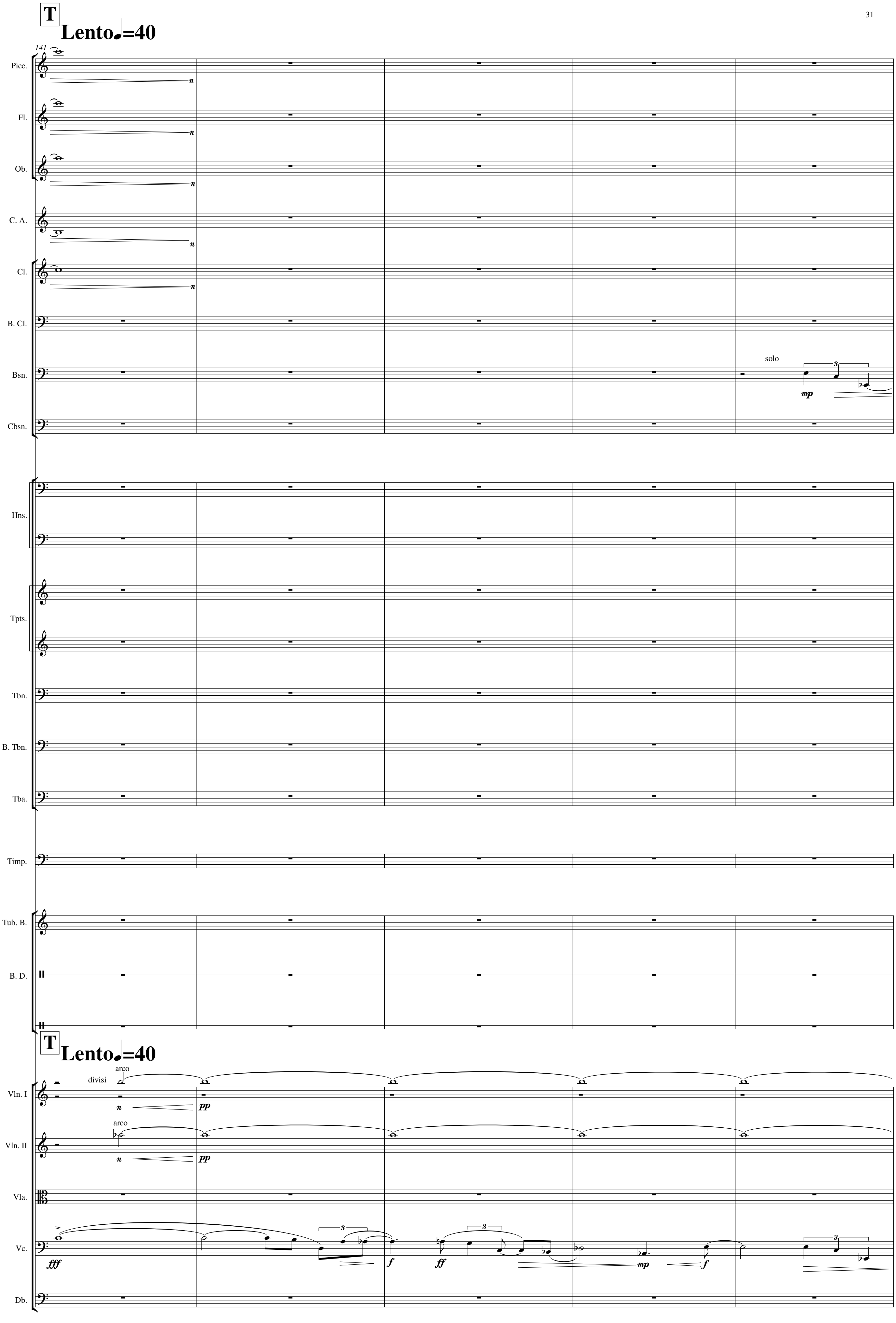
1) The Vlns should be played with a certain amount of rhythmic independence throughout the paused bars, approximating the written rhythms. Each paused bar ends when the players reach their unison note at the end of each bar.

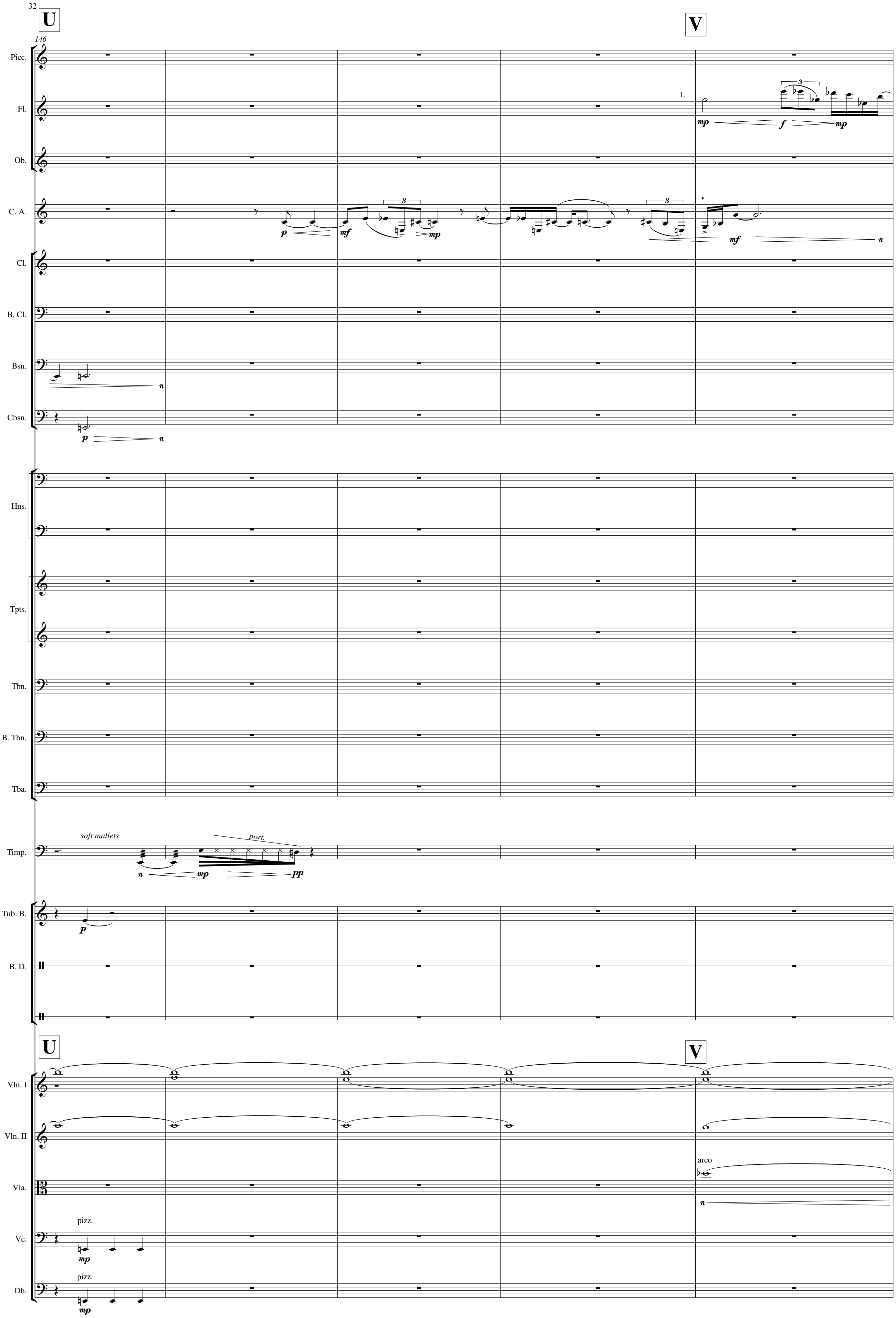

121
Q
Con passione
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
senza sord.
cresc.
tutti
molto espress.

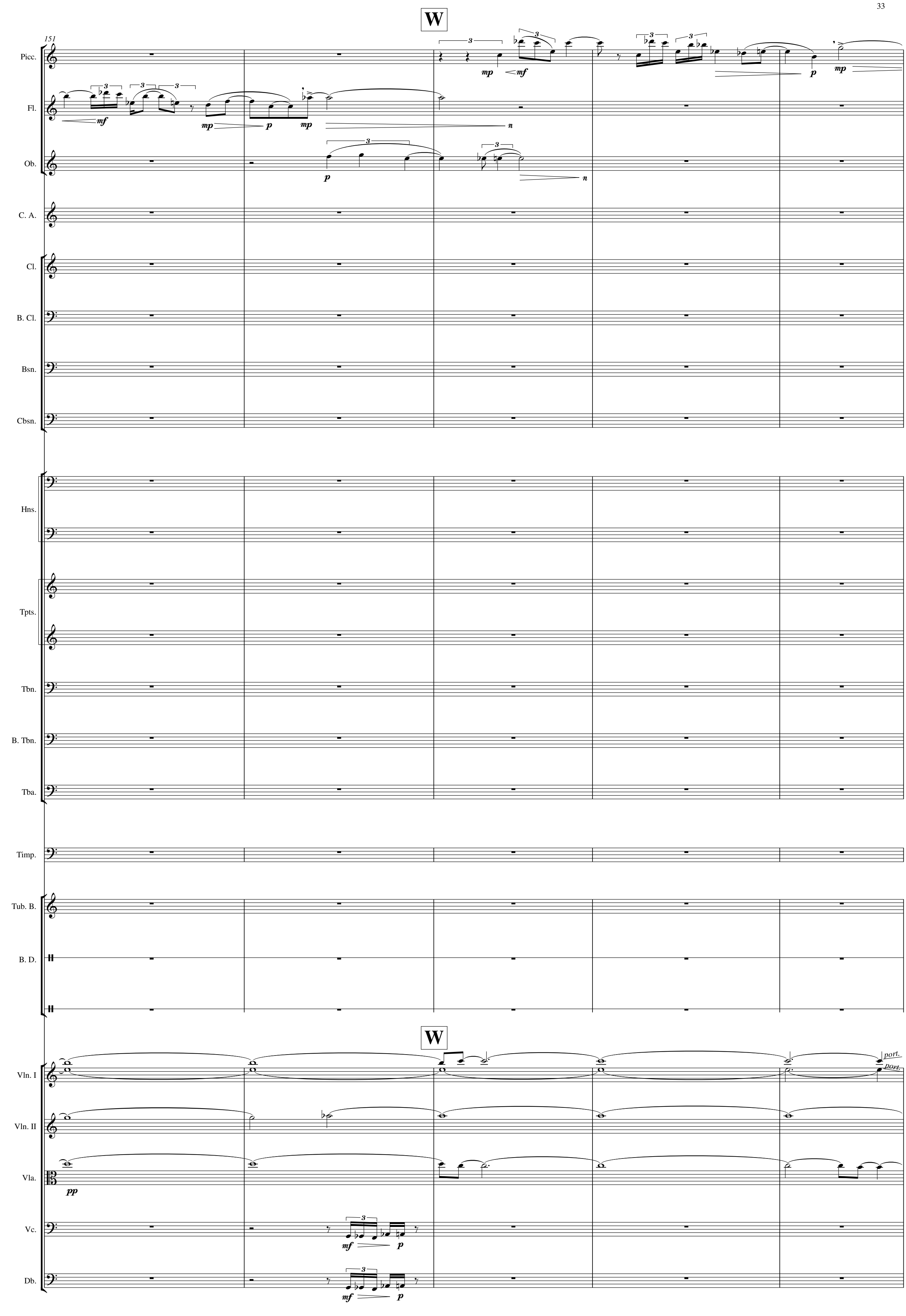

126
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
p mf mp f
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
n mf n f
Vln. I
Vln. II
Vla.
Vc.
Db.

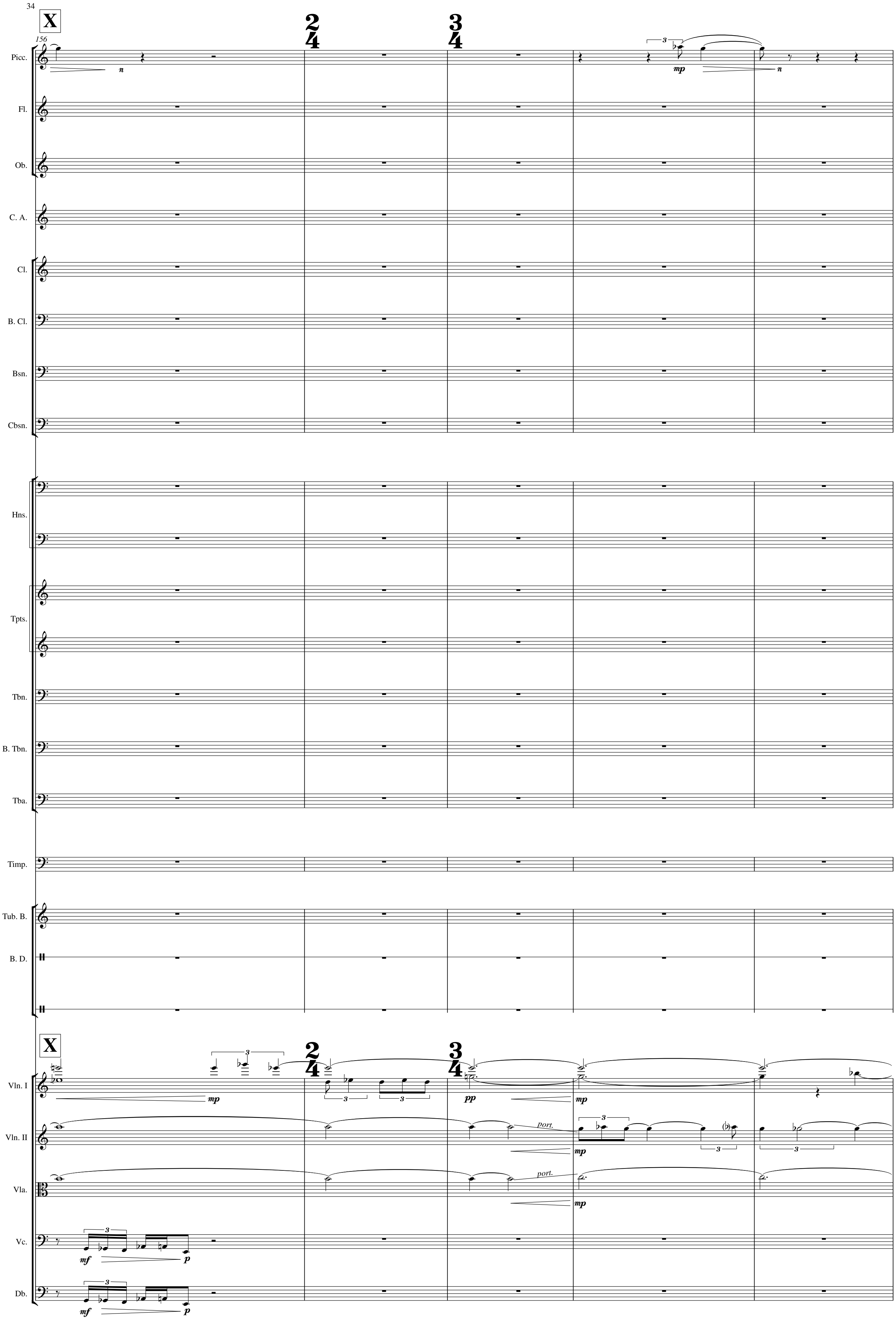

R
131
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
senza sord.
senza sord.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
R
Vln. I
Vln. II
Vla.
Vc.
Db.
dim.

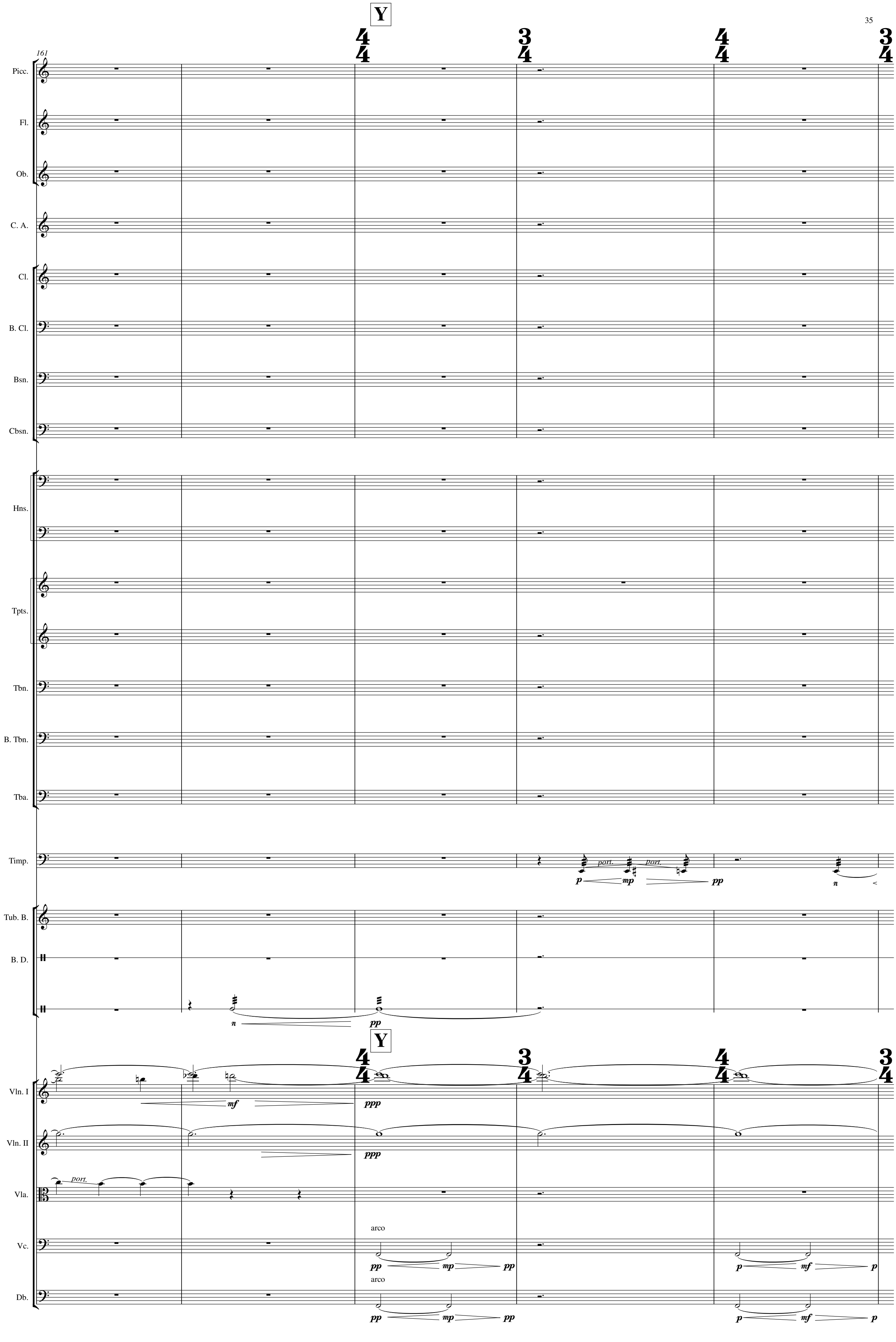

S
poco accel.
136
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
S
poco accel.
pizz.
pizz.
pizz.
Vln. I
Vln. II
Vla.
Vc.
Db.
cresc.


T
Lento ♩=40
141
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
solo
mp
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
T
Lento ♩=40
divisi
arco
Vln. I
pp
arco
Vln. II
pp
Vla.
Vc.
fff
f
ff
mp
f
Db.


U
V
146
Picc.
Fl.
1.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
soft mallets
port.
Tub. B.
B. D.
U
V
Vln. I
Vln. II
arco
Vla.
pizz.
Vc.
pizz.
Db.


W
151
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
W
Vln. I
Vln. II
Vla.
Vc.
Db.
mp
mf
p
mp
n
pp
port.
port.


X
156
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
mp
n
pp
mf
p
port.


Y
161
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
port.
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
Db.
arco


166
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
fp
mf
Hns.
Tpts.
Tbn.
con sord.
pp
n
p
B. Tbn.
Tba.
Timp.
port.
mp
pp
Tub. B.
B. D.
Vln. I
Vln. II
Vla.
Vc.
f
ff
Db.


Z
171
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
mp
3
n
Bsn.
1.
p
Cbsn.
mf
Hns.
Tpts.
Tbn.
a1
B. Tbn.
Tba.
Timp.
Tub. B.
B. D.
Z
Vln. I
Vln. II
Vla.
Vc.
Db.


AA
176
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
n
Bsn.
p
Cbsn.
dim.
ppp
Hns.
Tpts.
Tbn.
p
B. Tbn.
Tba.
Timp.
dim.
Tub. B.
pp
mp
p
B. D.
AA
Vln. I
Vln. II
III
p
Vla.
p
Vc.
dim.
Db.


BB
181
Picc.
Fl.
Ob.
C. A.
Cl.
B. Cl.
Bsn.
Cbsn.
Hns.
Tpts.
Tbn.
B. Tbn.
Tba.
Timp.
ppp
Tub. B.
pp
B. D.
n
pp
BB
unis.
II
p
n
Vln. I
Vln. II
Vla.
Vc.
pp
Db.
n
pp

SLEEPING UNDER MARIANA

for Wind Orchestra

Nicholas J. Denison

2012

Sleeping Under Mariana

for Wind Orchsestra

Score in C: All instruments sound as written except those that transpose at the octave or double octave.
All instruments-one player on a part except where otherwise stated. The use of additional players is left to the judgement and discretion of the Conductor.

<u>Instrumentation:</u>

Piccolo
Flutes 1 & 2 (minimum 2 per part - 1st Fl's doubling Piccolo)
English Horn
Oboe
Bb Clarinets 1, 2 & 3 (minimum of two per part)
Clarinet in Eb
Alto Clarinet
Bass Clarinet
2 Bassoons
2 Alto Saxophones
Tenor Saxophone
Baritone Saxophone

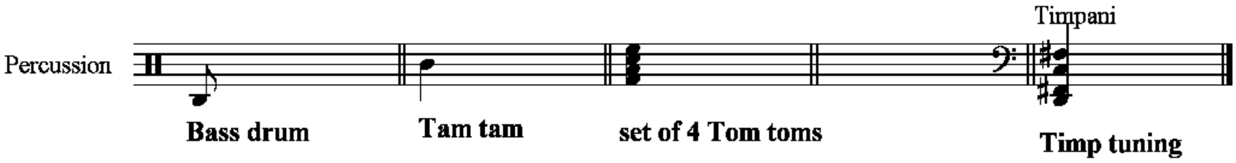
4 Bb Trumpets
4 Horns in F
2 Trombones
Bass trombone
2 Euphoniums **
Tuba (minimum of two)
Timpani

Piano
4 Percussionists (requiring 1 set of Crotales (may be substituted for an additional Glockenspiel where appropriate Crotales are unavaliable), 1 Glockenspiel, 1 Vibraphone, 1 Tam tam, 1 Bass drum and two sets of 4 Tom toms)

String Bass

(** Second player is optional.)

Percussion Guide



SLEEPING UNDER MARIANA

Nicholas J. Denison


A
Adagio
Tranquillo
♩=72
Picc.
Fl.1
Piccolo
Fl. 2
Ob. 1 & 2
unis.
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Perc.
Glock.
S. Bass
dim.


13
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Perc.
Perc.
Glock.
S. Bass
unis.
mute
solo
1.
To Crot.


poco accel.
A tempo
B
Più mosso
♩=108
poco rall.
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Perc.
Perc.
Glock.
S. Bass
unis.
cresc.
dim.


A tempo
Più mosso
poco rall.
♩=108
C
Meno mosso
♩=84
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
unis.
dim.
cresc.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
open
a 2.
Vib.
Perc.
Perc.
Glock.
S. Bass
Crotales


31
D
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
D
Tpt. 1 & 2
Tpt. 3 & 4
open
Hn. 1 & 2
unis.
Hn. 3 & 4
unis.
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
D
Vib.
Crot.
Perc.
Glock.
S. Bass


37
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
unis.
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass

accel.
E
Largo Misterioso
𝅗𝅥=48
Picc.
Picc.
To Fl.
Flute
a 1.
Fl. 2
unis.
Ob. 1 & 2
solo
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
cresc.
Tpt. 1 & 2
mute
Tpt. 3 & 4
solo
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
port.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass


49
Picc.
Fl.
a 2.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
a 1.
a 2.
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
a 1.
Cbsn.
cresc.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
mute
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
cresc.
Euph. 1, 2
Tba.
unis.
cresc.
Timp.
port.
port.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass
port.
port.


F
55
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
unis.
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
port.
cresc.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass


G
61
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
cresc.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
G
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
cresc.
Euph. 1, 2
Tba.
cresc.
Timp.
port.
port.
Pno.
G
Vib.
Crot.
Perc.
Glock.
S. Bass
port.


H
Tempo primo ♩=60
67
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
H
Tempo primo ♩=60
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
unis.
Tba.
Timp.
Pno.
H
Tempo primo ♩=60
Vib.
Crot.
Perc.
Glock.
S. Bass

73
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass
unis.
dim.
cresc.
To Picc.
solo


79
Largo Misterioso 𝅗𝅥=48
I
Picc.
Fl.
Piccolo
Fl. 2
unis.
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
a 1.
Cbsn.
Alto Sax. 1, 2
solo
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
a 2.
open
mute
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
port.
Pno.
Vib.
Crot.
Perc.
Glock.
To Tom-t.
S. Bass


85
J
a 2.
solo
Tom-toms
port.
cresc.
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Crot.
Perc.
Glock.
S. Bass


91
3
4
3
2
4
4
K
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
unis.
solo
a 2.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
mute
open
port.
Timp.
Pno.
Vib.
Crot.
Perc.
Tom-t.
S. Bass
cresc.


97
Picc.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
Tom-t.
Perc.
Tom-t.
S. Bass
unis.
To Fl.
mute
unis.
open
open
open
cresc.
cresc.
port.
port.
Tom-toms


103
L
Picc.
Flute
unis.
Picc.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
mute
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
port.
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
p cresc.
Pno.
Vib.
Tom-t.
Perc.
Tom-t.
S. Bass
cresc.


M
Moderato
Con forza
♩=72
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
unis.
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
cresc.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Vib.
To Tam tam.
Tom-t.
Perc.
Tom-t.
S. Bass
dim.

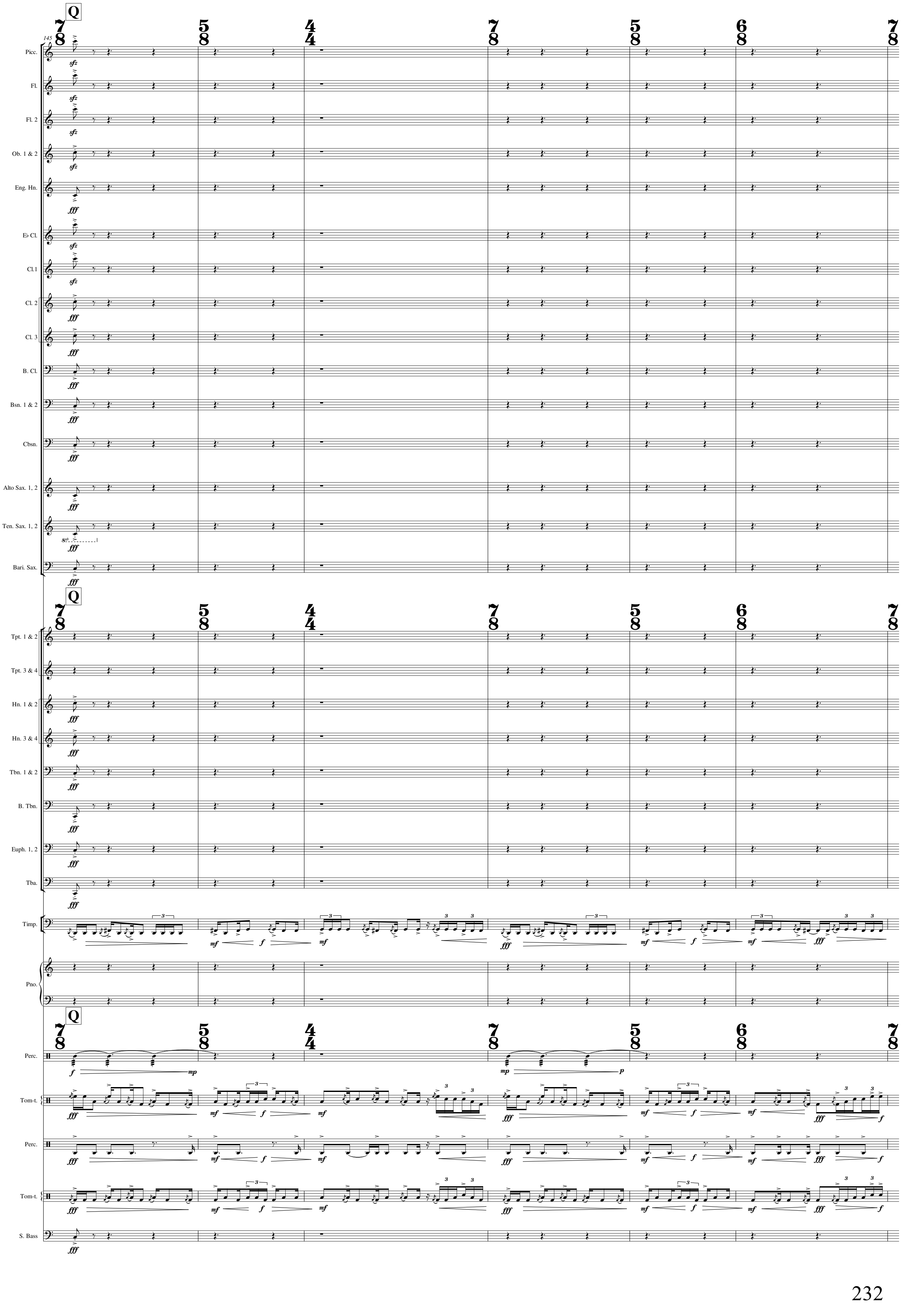

115
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
unis.
Bari. Sax.
open
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
unis.
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Tam tam
Vib.
Tom-t.
Perc.
Tom-t.
S. Bass


121
poco accel.
N
Più mosso
♩=84
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


O
127
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
mute
open
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


P
133
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


139
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
solo
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
cresc.


Q
145
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
sfz
fff
mf
f
mp
p


R
151
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
cresc.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
cresc.
cresc.


S
Con fuoco
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
solo
Cbsn.
cresc.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


163
Picc.
Fl.
unis.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


169
poco accel.
A tempo ♩=84
T Misterioso
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
unis.

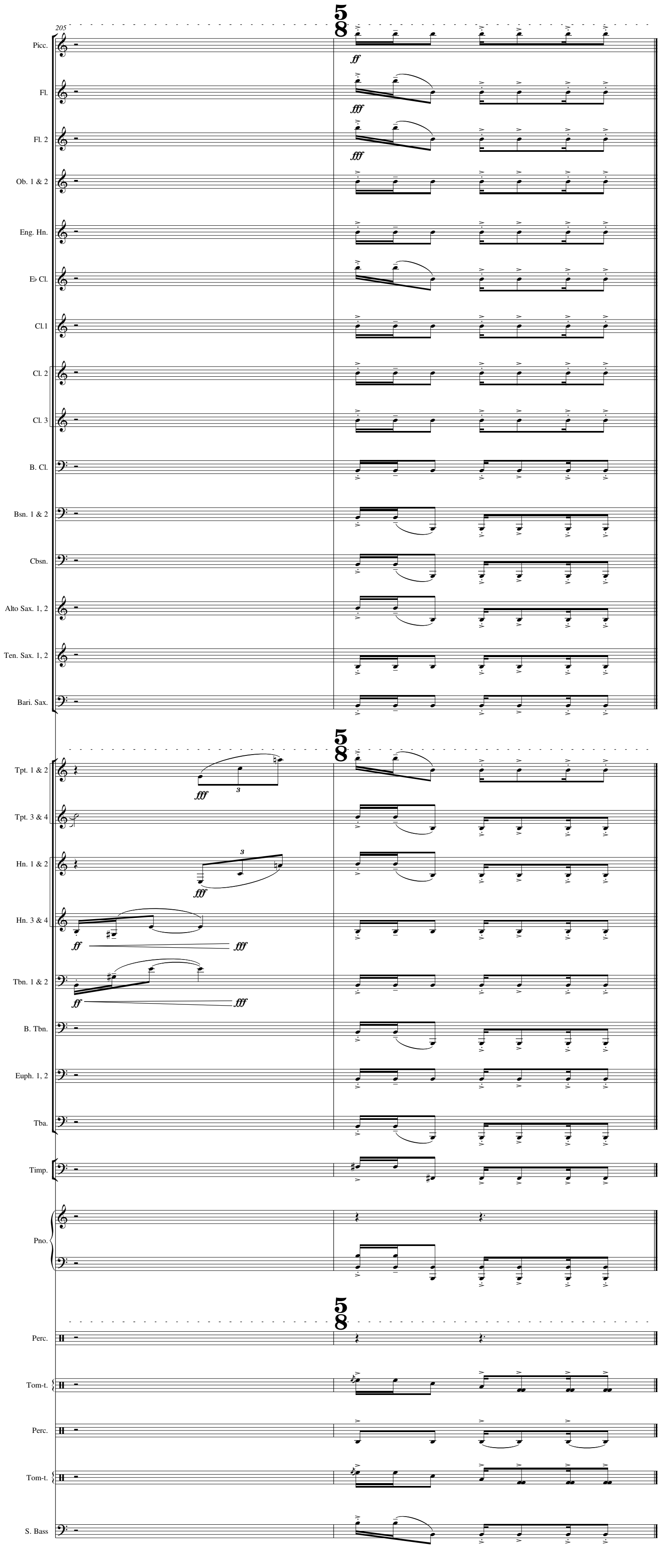

175
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
unis.
(8)


U
Furioso ♩=96
181
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass
unis.
Furioso


187
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


193
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


199
accel.
Picc.
Fl.
Fl. 2
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
Tpt. 3 & 4
Hn. 1 & 2
Hn. 3 & 4
Tbn. 1 & 2
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass


205
5
8
Picc.
ff
Fl.
fff
Fl. 2
fff
Ob. 1 & 2
Eng. Hn.
E♭ Cl.
Cl.1
Cl. 2
Cl. 3
B. Cl.
Bsn. 1 & 2
Cbsn.
Alto Sax. 1, 2
Ten. Sax. 1, 2
Bari. Sax.
Tpt. 1 & 2
fff
3
Tpt. 3 & 4
Hn. 1 & 2
fff
3
Hn. 3 & 4
ff
fff
Tbn. 1 & 2
ff
fff
B. Tbn.
Euph. 1, 2
Tba.
Timp.
Pno.
Perc.
Tom-t.
Perc.
Tom-t.
S. Bass

Nicholas James Denison

RONDO

for clarinet trio

Instrumental requirements:

Clarinet 1 in B flat
Clarinet 2 in B flat
Clarinet 3 in B flat

Approximate duration : 7 - 8 mins

Rondo

Nicholas J Denison


poco rit.
A tempo
12
(1)
(2)
(3)
dim.
mp
16
Meno mosso ♩=115
f
3
cresc.
19
accel.
tr
(♯)
Tempo primo ♩ = 130


22
(1)
(2)
(3)
f
mf
p
mp
25
Meno mosso
molto rit.
ff
dim.
tr
mp
28
Tempo primo
f


32
(1)
(2)
(3)
(♮)
tr
poco rit.
A tempo
ff
mf
mp
f
p
36
poco rit.
A tempo
ff
f
39
rit.
molto rit.
dim.
p


A tempo
42
(1)
(2)
(3)
44
(1)
(2)
(3)
46
(1)
(2)
(3)


49
(1)
(2)
(3)
mf
ff
f
mf
51
p
mp
p
mp
p
mf
p
53
mp
mf
mp cresc.
f
cresc.
ff


55
(1)
(2)
(3)
rit.
Meno mosso ♩= 100
58
60


62
(1)
(2)
(3)
mp
mf
64
66
ff
f
p


68
accel.
(1)
(2)
(3)
mp
mf
p
mp cresc.
mf
p
cresc.
70
Tempo primo ♩ = 130
f
f
ff
f
73
tr
ff
f
ff
f
ff
f


77
(1)
(2)
(3)
81
poco rit.
dim.
mp
84
A tempo
f
mp

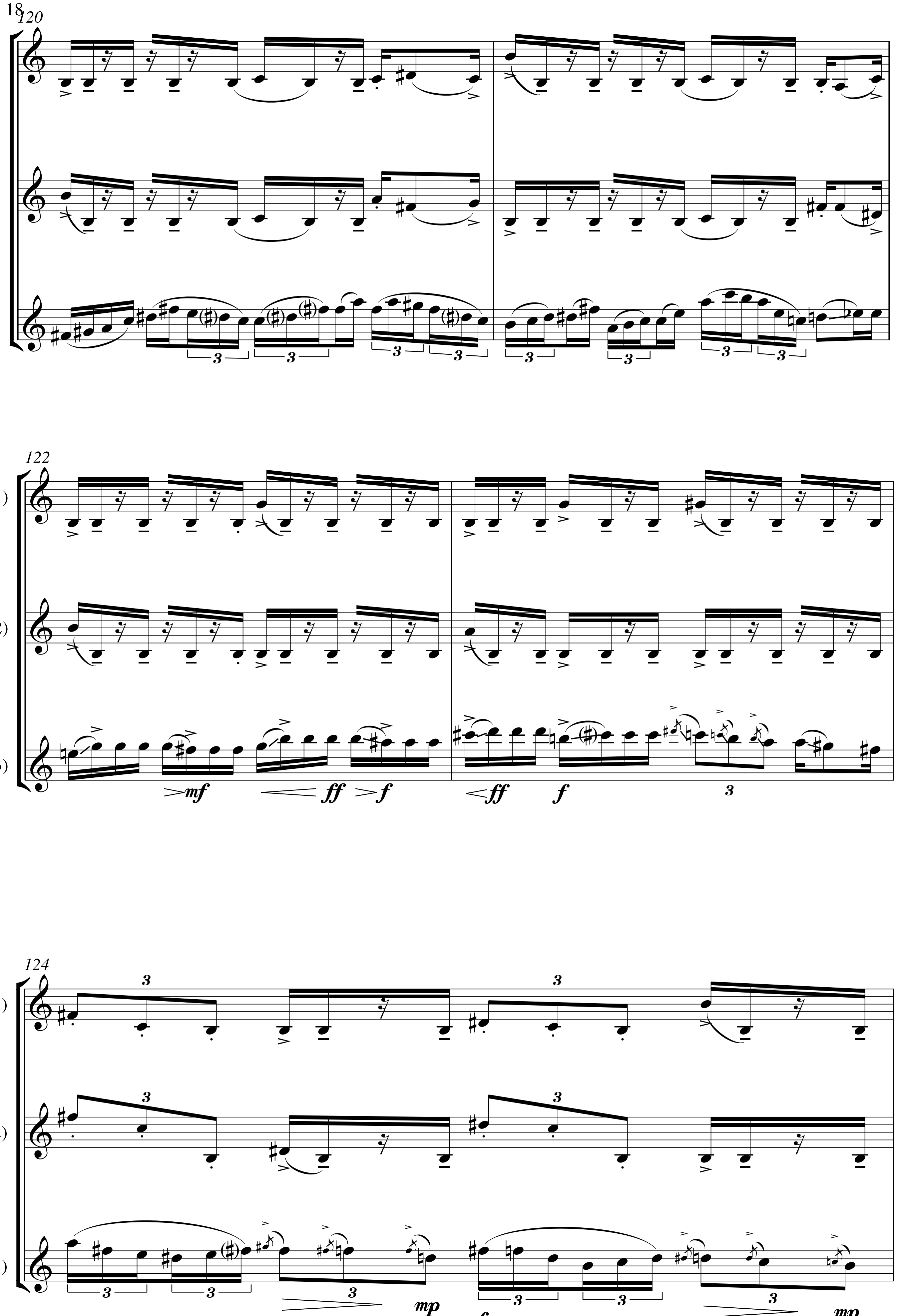

Meno mosso
=115
88
(1)
(2)
(3)
cresc.
cresc.
cresc.
90
accel.
Tempo primo
tr
f
mp
f
93
Meno mosso
mf
p
mp
ff


molto rit.
dim.
mp
♩=90
mf
f
3


102
(1)
(2)
(3)
poco accel.
104
mf
ff
f
Meno mosso ♪=150
106
mf


Più mosso ♩=90
108
(1)
mp
(2)
f
(3)
mp
110
(1)
(2)
(3)
112
(1)
(2)
(3)


114
(1)
(2)
(3)
mf cresc.
f
ff
116
Meno mosso ♪=150
mf
118
Più mosso ♩.=90
mp
f


120
(1)
(2)
(3)
3
122
mf
ff
f
124
mp


125
(1)
(2)
(3)
126
Tempo primo ♩ = 130
129


132
(1)
(2)
(3)
135
138
poco rit.
A tempo
dim.
mp

Meno mosso ♩=115
142
(1)
(2)
(3)
f
mp
cresc.
145
accel.
Tempo primo
147
mf
p


151
Meno mosso
molto rit.
(1)
(2)
(3)
ff
dim.
tr
153
Tempo primo
(tr)
mp
f
156
3


poco rit.
A tempo
159
(1)
(2)
(3)
mf
mp
p
f
162
poco rit.
ff
164
A tempo


167
(1)
(2)
(3)
f
mp
mf
169
171
p


173
(1)
(2)
(3)
mf
f
ff
175
p
mp
177
fff
mp cresc.

Finding the Path that Leads the Way Home

For Clarinet trio

Nicholas Denison

2011

Composed for the Eclectica Trio

Instrumental requirements:

Clarinet 1 : Clarinet in A
Clarinet 2 : Clarinet in A
Clarinet 3 : Clarinet in A

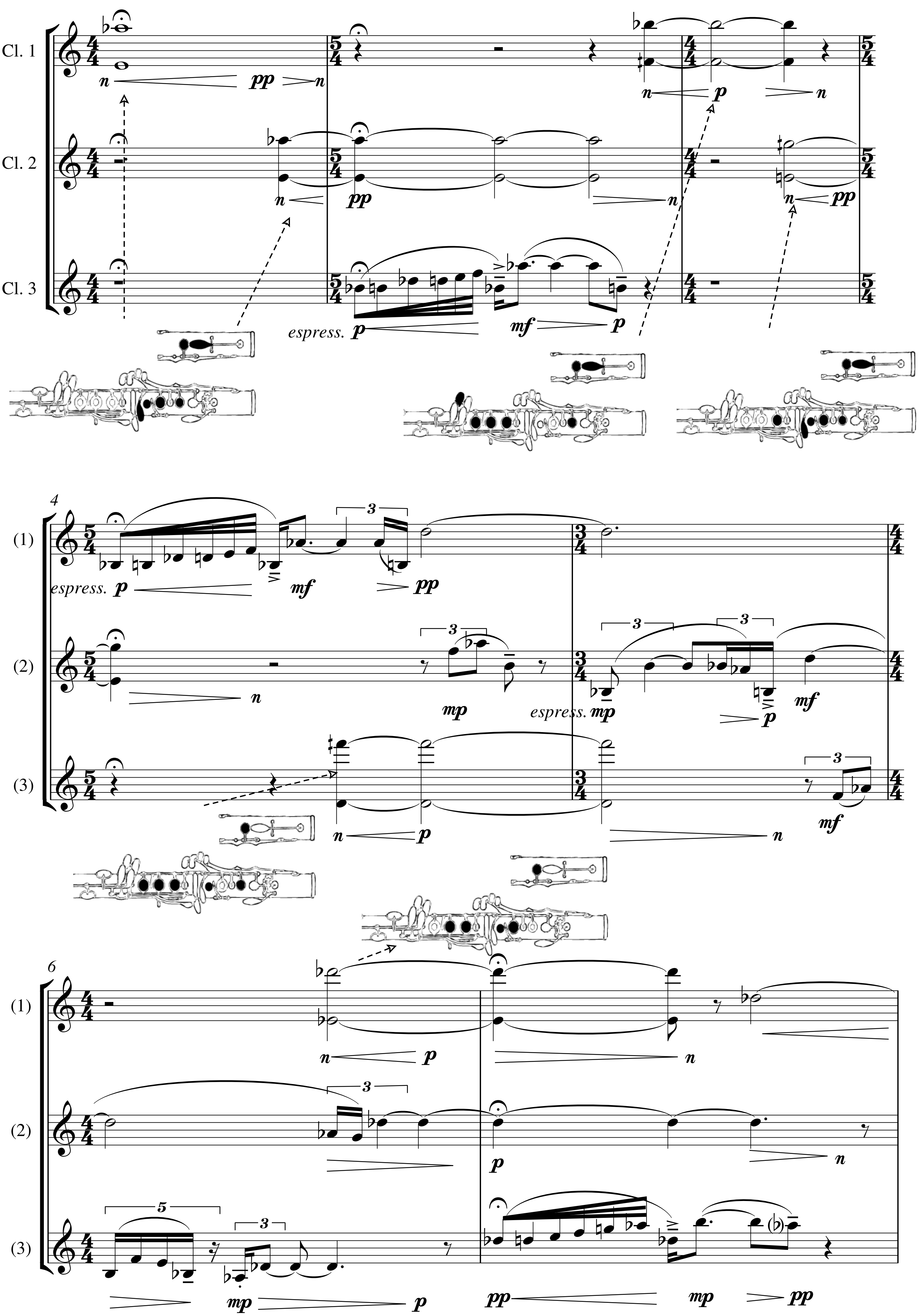
Duration c. 6 - 7 mins

II

For the Eclectica Trio

Nicholas J Denison

Lento Lacrimoso ♩=40



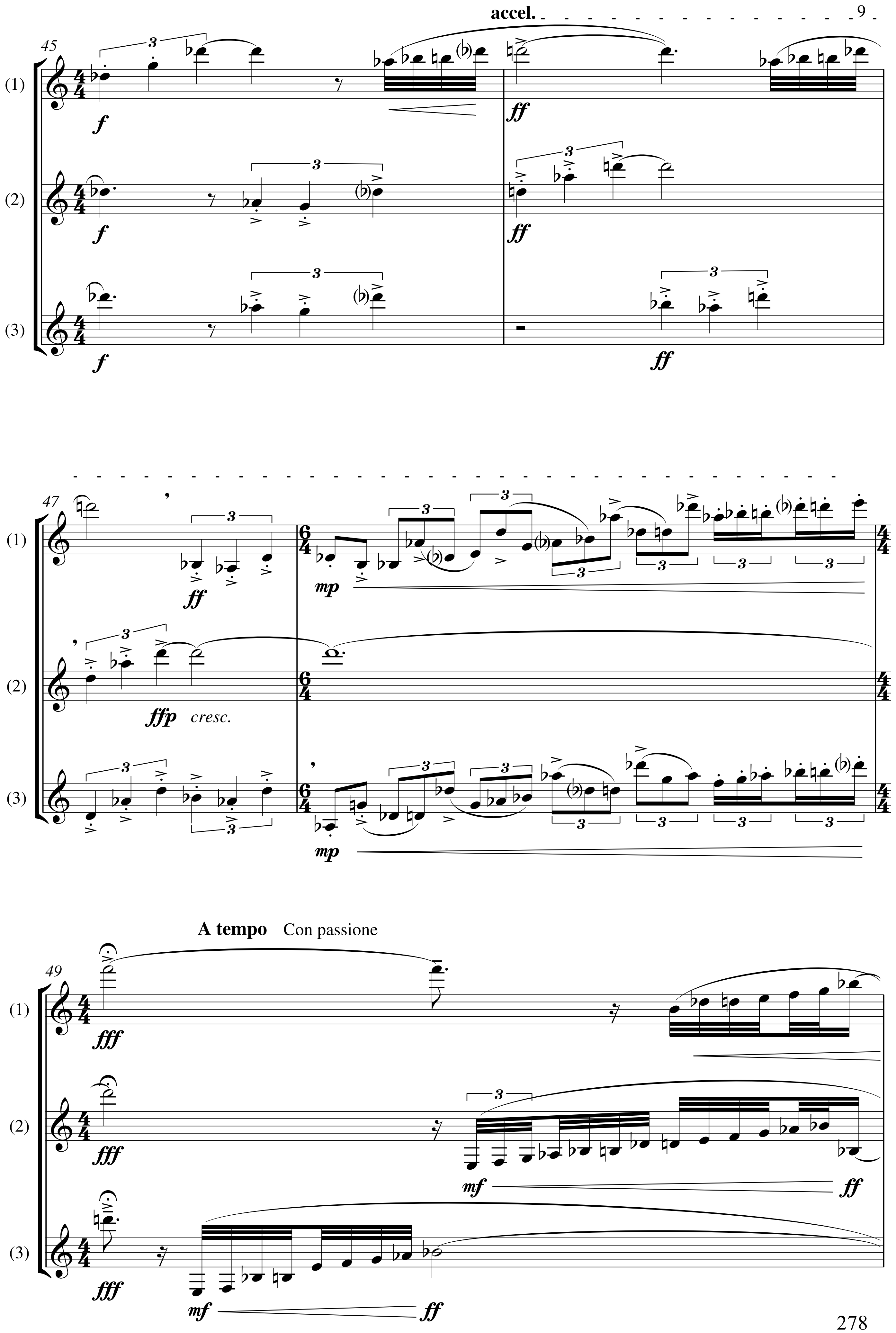

(1)
(2)
(3)
8
10
13
p
n
pp
mf
mp


Larghetto Decisivo ♩=60
(1)
(2)
(3)
poco rall.
A tempo
cresc.


rall.
Tempo primo Lacrimoso
25
(1)
(2)
(3)
cresc.
cresc.
27
29
accel.
Larghetto Decisivo
♩=60


31
(1)
(2)
(3)
34
Con moto
(1)
(2)
(3)
37
(1)
(2)
(3)


(1)
(2)
(3)


accel.
45
(1)
(2)
(3)
f
ff
47
ffp
cresc.
mp
49
A tempo
Con passione
fff
mf
ff


50
(1)
(2)
(3)
ff
mf
mp
f
mf < f
52
molto rit.
p
n
dim.
54
Tempo primo Lacrimoso
=40
pp
n < p
mp > pp


58
(1)
(2)
(3)
60
63
dim.


66
(1)
(2)
(3)
69
(1)
(2)
(3)

DARVAZA

Concerto

for Percussion and Wind Orchestra

Nicholas Denison

2013

Concerto for Percussion and Wind Orchestra

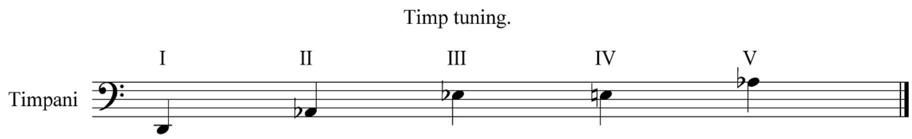
Score in C

Instrumentation:

Piccolo
1st and 2nd Flutes (2 per part)
2 Oboes
3 Bb Clarinets (minimum of two per part)
Clarinet in Eb
Alto Clarinet in Eb
Bass Clarinet
2 Bassoons
Contrabassoon
2 Alto Saxophones
Tenor Saxophone
Baritone Saxophone

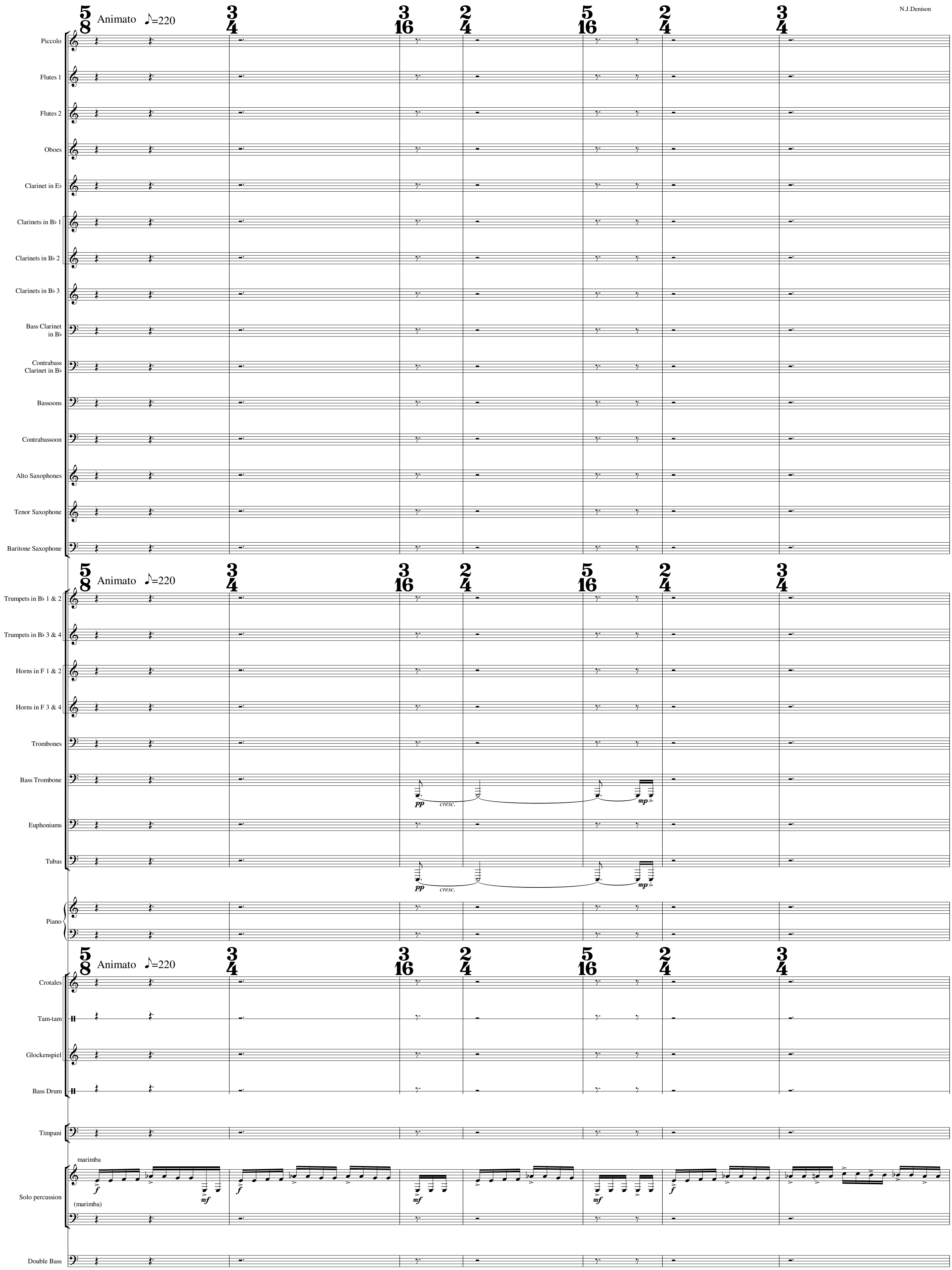
4 Bb Trumpets
4 Horns in F
2 Trombones
Bass trombone
Euphonium
Tuba (minimum of two)

Piano
4 Percussionists (requiring 1 set of Crotales ,1 Glockenspiel, 1 Xylophone, 1 Vibraphone, 1 Tam tam, 1 Bass drum and one set of 4 Tom toms)
Timpani
String bass



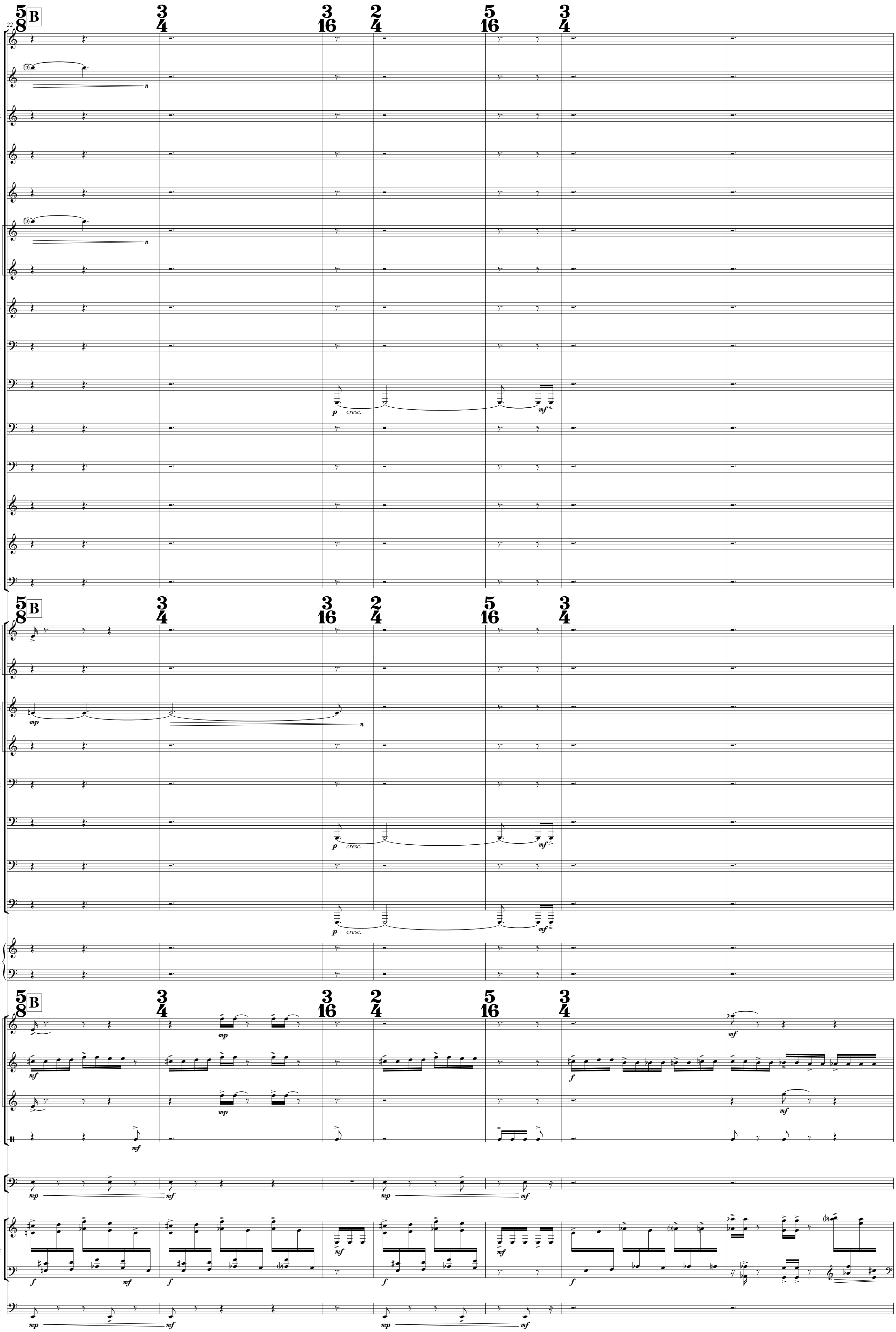
I.

N.J.Denison


Animato ♪=220
Piccolo
Flutes 1
Flutes 2
Oboes
Clarinet in E♭
Clarinets in B♭ 1
Clarinets in B♭ 2
Clarinets in B♭ 3
Bass Clarinet in B♭
Contrabass Clarinet in B♭
Bassoons
Contrabassoon
Alto Saxophones
Tenor Saxophone
Baritone Saxophone
Animato ♪=220
Trumpets in B♭ 1 & 2
Trumpets in B♭ 3 & 4
Horns in F 1 & 2
Horns in F 3 & 4
Trombones
Bass Trombone
pp
cresc.
mp
Euphoniums
Tubas
pp
cresc.
mp
Piano
Animato ♪=220
Crotales
Tam-tam
Glockenspiel
Bass Drum
Timpani
marimba
f
mf
f
mf
mf
f
Solo percussion
(marimba)
Double Bass


8
A
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
T.-t.
Glock.
B. D.
Timp.
Solo perc
Db.
mp
p
cresc.
mf
n


Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
T.-t.
Glock.
B. D.
Timp.
Solo perc
Db.
a 2
To Xyl.
Xylophone
pizz.


B
22
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
p cresc.
mf
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
mp
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
p cresc.
mf
Euph.
Tba.
p cresc.
mf
Pno.
Crot.
mp
mf
Xyl.
mf
f
Glock.
mp
mf
B. D.
mf
Timp.
mp
mf
Solo perc
f
mf
Db.
mp
mf


29
C
Picc.
Fl. 1
unis.
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
cresc.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
8vb
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc
Db.
arco
pizz.


36
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc
Db.
dim.
con sord.
a 1
a 2
To Vib.
(L.h loco)
arco

43
D
E
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
a 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
To T.-t.
Tam-tam
Timp.
Solo perc
Db.
pizz.
arco
mf dim.
mp dim.


50
F
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
Timp.
Solo perc
Db.
a 2.
cresc.
To B. D.
Bass Drum
5 woodblocks
2 bongos
8va


57
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc.
Db.
(con sord.)
senza sord.
a 2.
dim.
cresc.


G
64
Picc.
Fl. 1
Fl. 2
a 2.
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc.
Db.
dim.
cresc.


H
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
a 2.
Alto Sax.
Ten. Sax.
Bari. Sax.
(con sord.)
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
mp cresc.
Crot.
Xyl.
Glock.
B. D.
Timp.
To Mar.
Marimba
Solo perc.
Db.


78
I
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
1.
Ten. Sax.
Bari. Sax.
cresc.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
senza sord.
a 2.
Pno.
Crot.
Xyl.
Glock.
B. D.
To T.-t.
Tam-tam
Timp.
Solo perc
To Perc.
Db.
arco
pizz.


poco accel.
J Più mosso ♩=120
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
To B. D.
Bass Drum
Timp.
Solo perc
L.h drums, R.h marimba bass.
Percussion
Db.
dim.


92
K
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc
Db.


99
L
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
To T.-t.
Timp.
Solo perc
Db.


106
M
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Timp.
Solo perc
Db.


113
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
B. D.
Tam-tam
Timp.
Solo perc
Db.
cresc.


N
120
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
Timp.
Solo perc
Db.


Più mosso misterioso ♩.=105
O
(a little slower than ♩=♩.)
127
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
Timp.
Solo perc
Db.
dim.
cresc.
a 2
(2 & 3 con sord.)
1. (open)
arco
Tom-toms
To Vib.
Vibraphone
Tam-tam
To B. D.
Bass Drum


134
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Tom-t.
Vib.
B. D.
Timp.
Solo perc
Db.
1.
a 2.
con sord.
(2 & 3)
arco
To T.-t.
Tam-tam


poco rit. . . . .
P A tempo ♩=120
141
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
con sord.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
T.-t.
Vib.
B. D.
To Xyl.
To Tom-t.
To T.-t.
Tam-tam
To Glock.
Xylophone
Glockenspiel
Timp.
Solo perc
arco
Db.

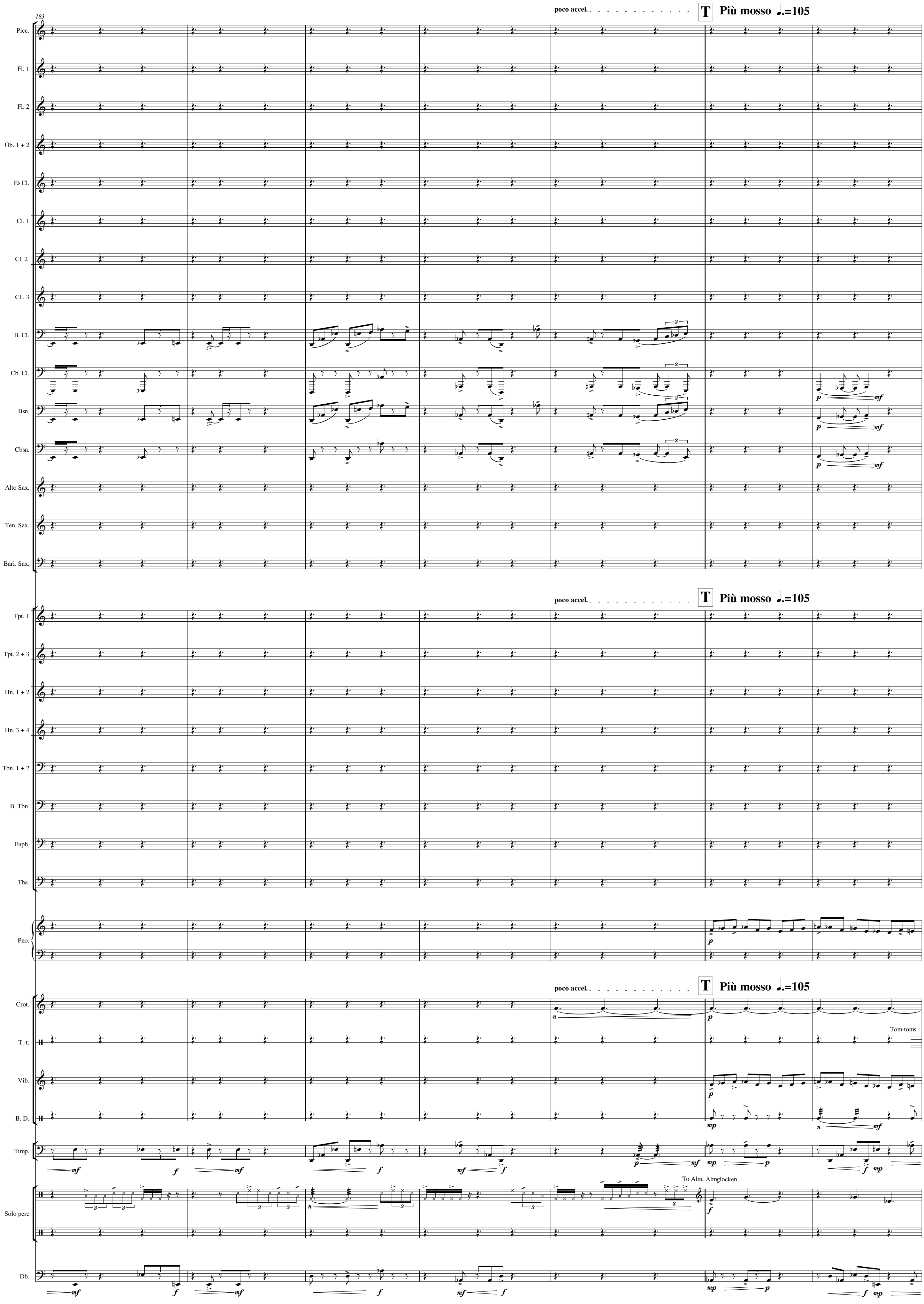

148
Q
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
To T.-t.
Timp.
Solo perc
Db.

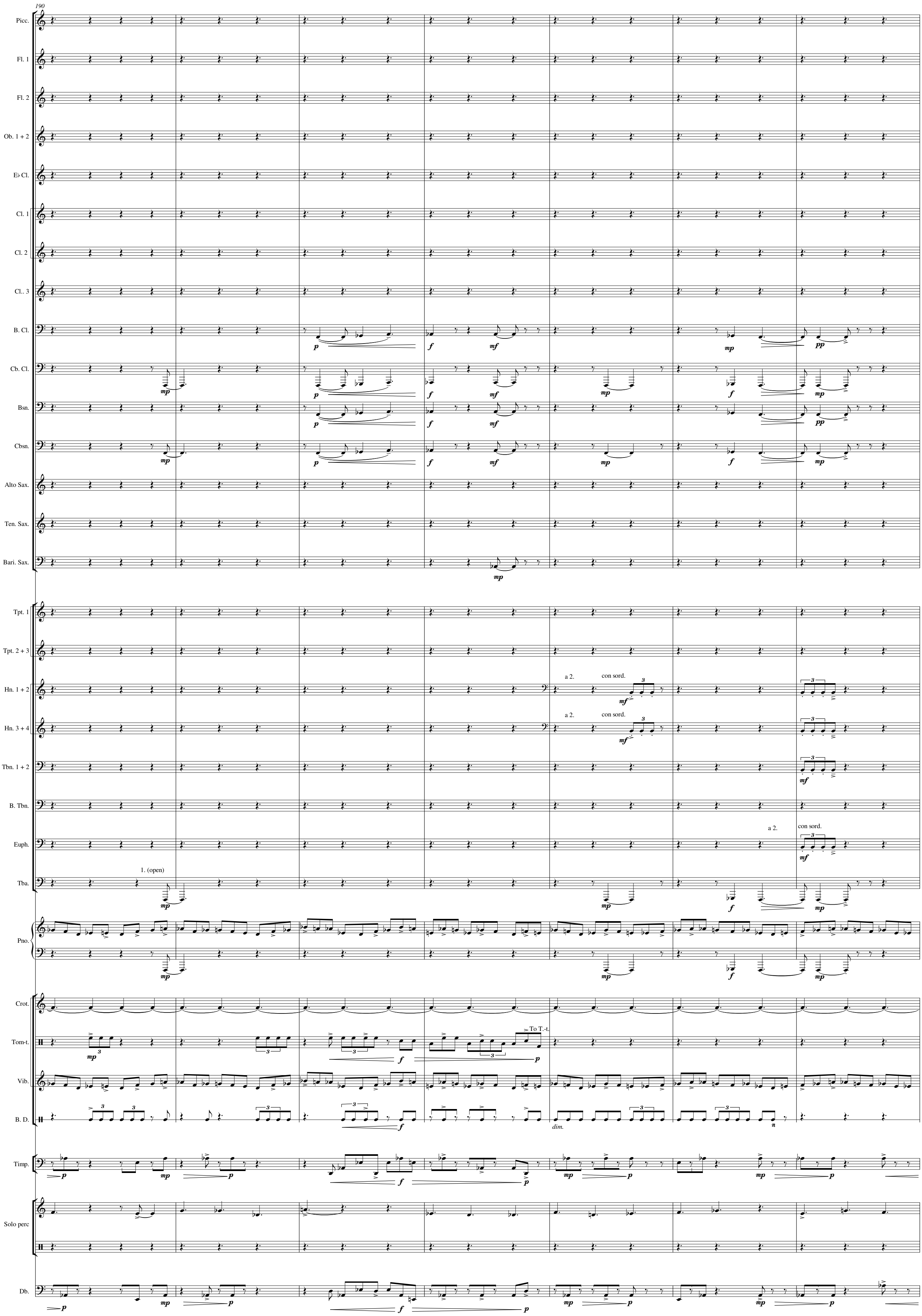

155
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
Timp.
Solo perc
Db.

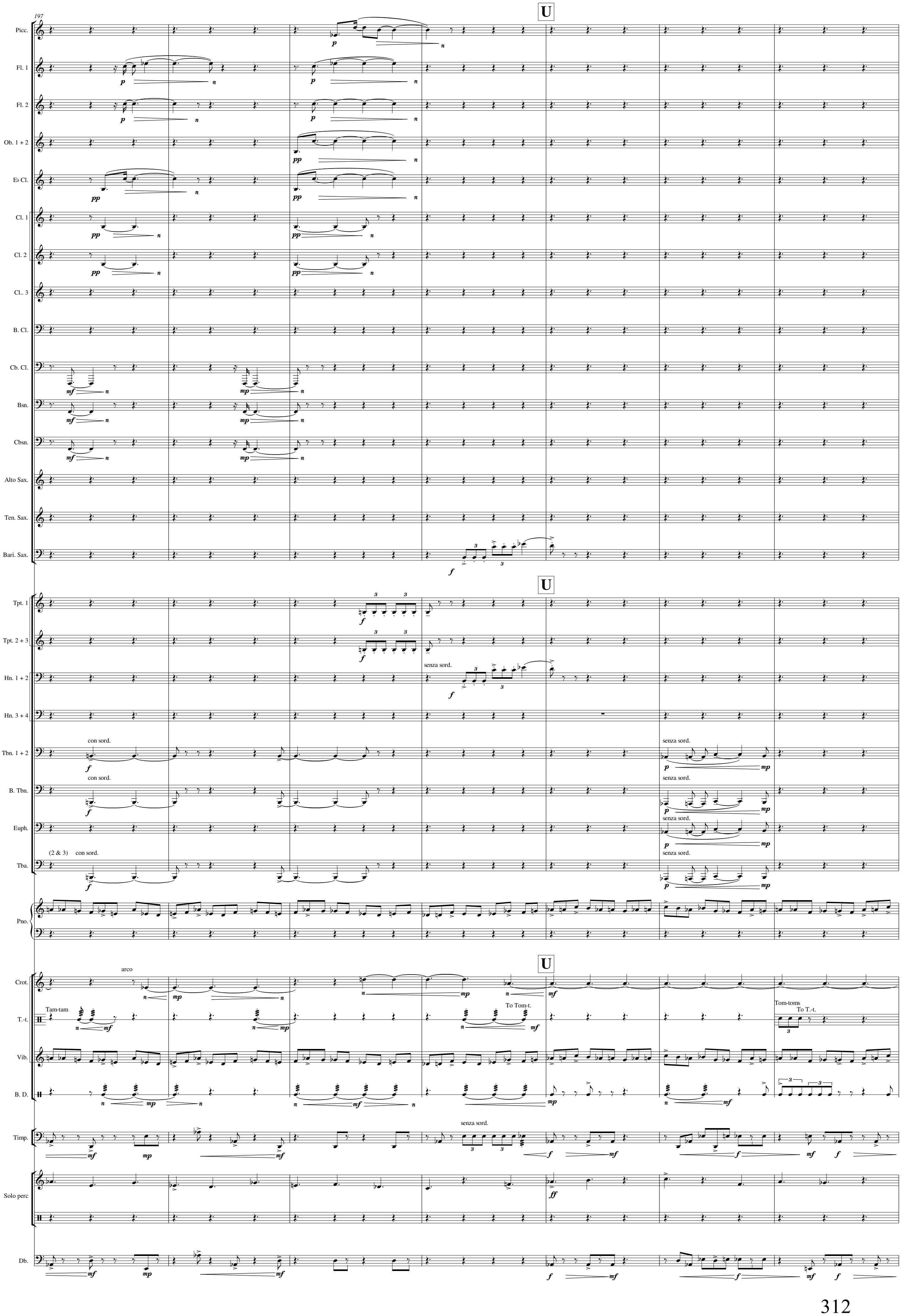

162
R
Più mosso misterisio ♩.=105
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
Xyl.
Glock.
T.-t.
Timp.
Solo perc
Db.
dim.
cresc.
a 2
(2 & 3 con sord.)
arco
To Tom-t.
Tom-toms
To Vib.
Vibraphone
Tam-tam
To B. D.
Bass Drum
To Alm.
Almglocken


169
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
a 1 (open)
Tba.
Pno.
Crot.
Tom-t.
To T.-t.
Tam-tam
Vib.
B. D.
dim.
Timp.
Solo perc
Db.


176
poco rit.
S
Meno mosso ♩.=80
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
a 1
cresc.
con sord.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
a 2
senza sord.
(2 & 3)
unis.
Pno.
arco
Crot.
T.-t.
To Tom-t.
Vib.
B. D.
Timp.
To Perc.
Percussion
Solo perc
Db.
pizz.


poco accel.
T Più mosso ♩.=105
183
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Crot.
T.-t.
Tom-toms
Vib.
B. D.
Timp.
To Alm. Almglocken
Solo perc
Db.


190
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
a 2.
con sord.
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
1. (open)
Pno.
Crot.
Tom-t.
To T.-t.
Vib.
B. D.
dim.
Timp.
Solo perc
Db.

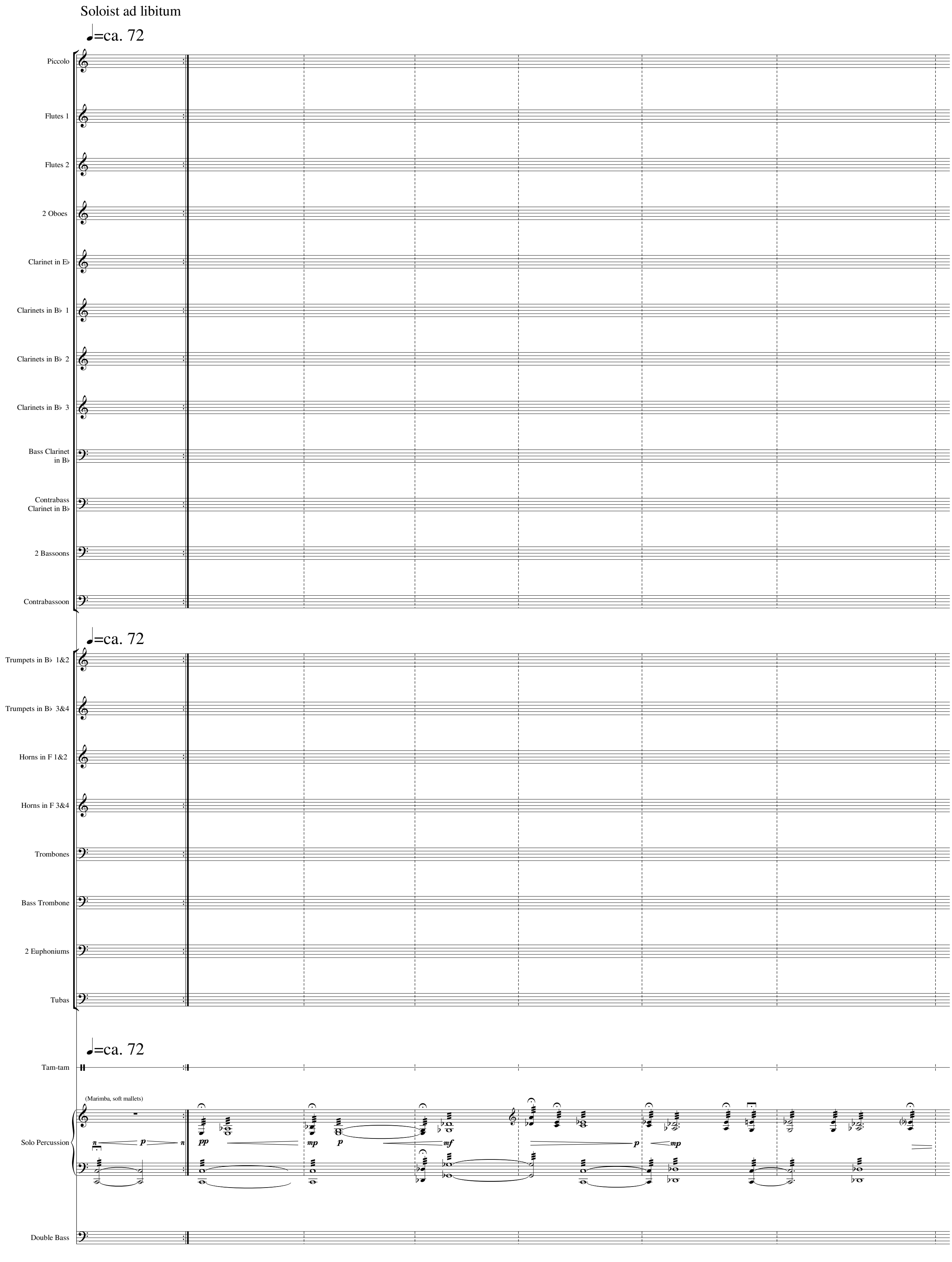

197
U
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
senza sord.
Hn. 3 + 4
Tbn. 1 + 2
con sord.
B. Tbn.
Euph.
Tba.
(2 & 3)
Pno.
Crot.
arco
T.-t.
Tam-tam
To Tom-t.
Tom-toms
To T.-t.
Vib.
B. D.
Timp.
Solo perc
Db.

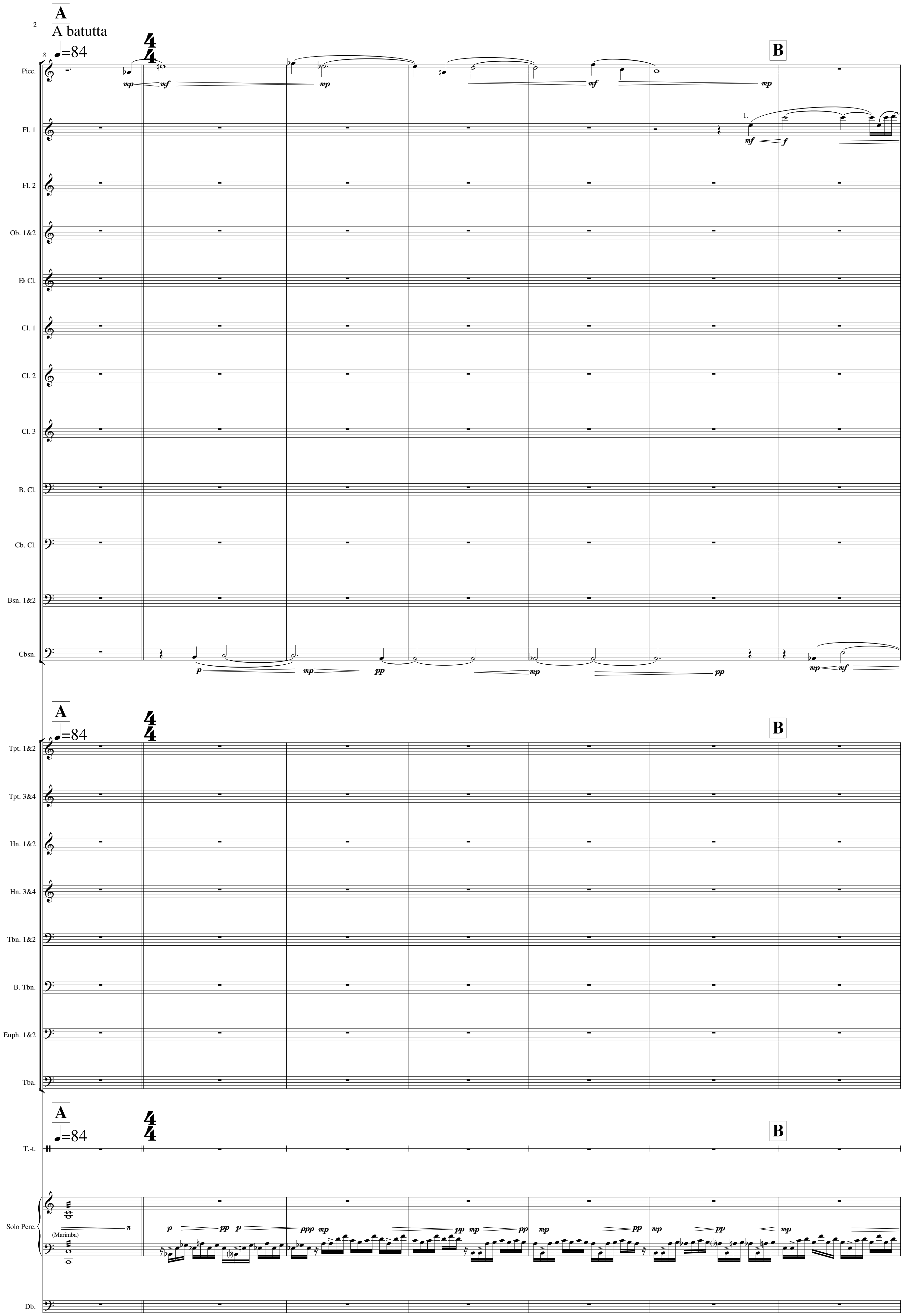

204
poco rit.
V Meno mosso ♩.=80
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
senza sord.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
a 1 (open)
Pno.
Crot.
Tom-t.
To T.-t.
Vib.
B. D.
Timp.
To Perc.
Percussion
Solo perc
arco
Db.

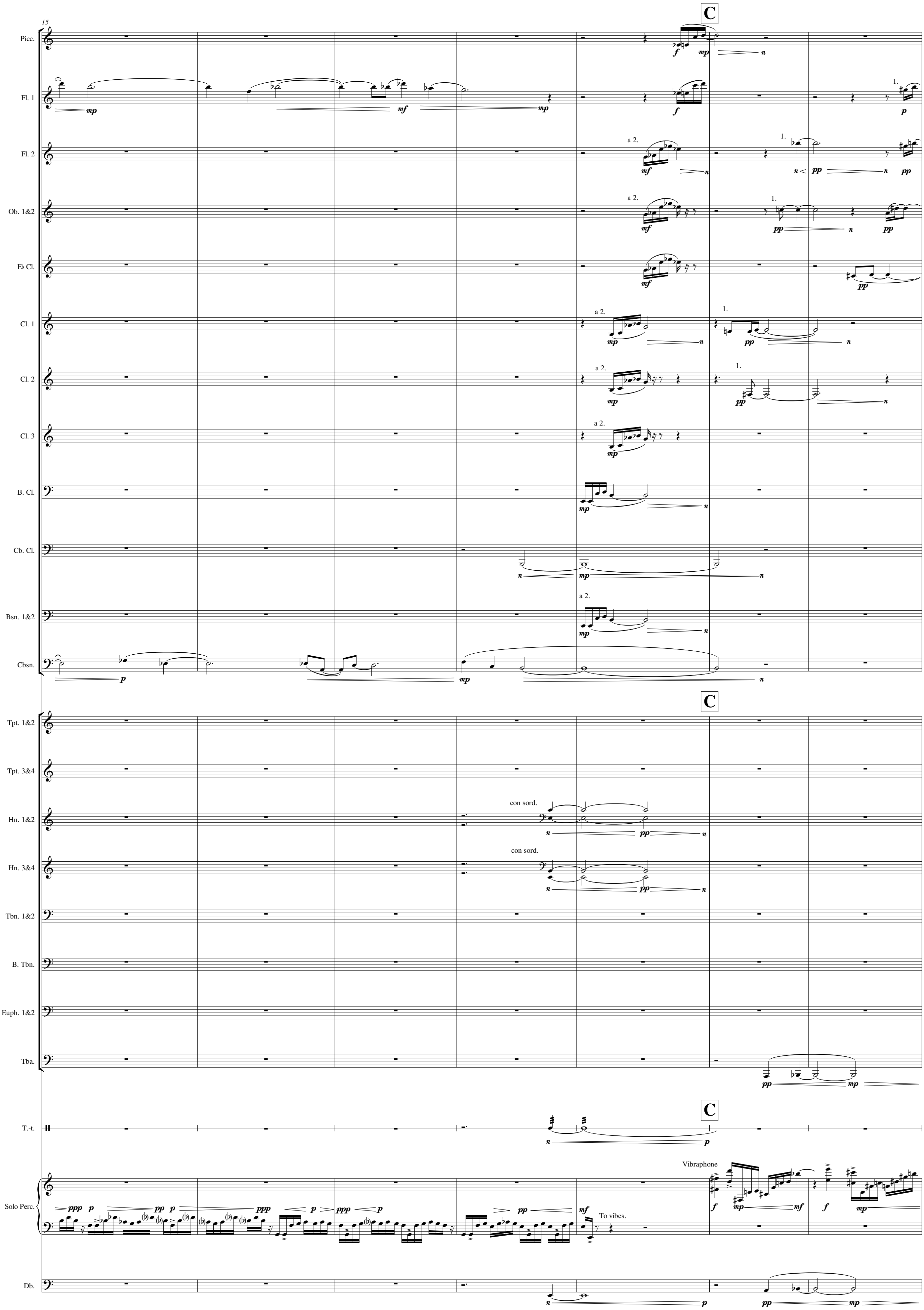

211
W
X
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
con sord.
Tbn. 1 + 2
con sord.
B. Tbn.
Euph.
(2 & 3)
con sord.
Tba.
Pno.
Crot.
Tam-tam
Tom-t.
Vib.
B. D.
Timp.
Solo perc
Db.

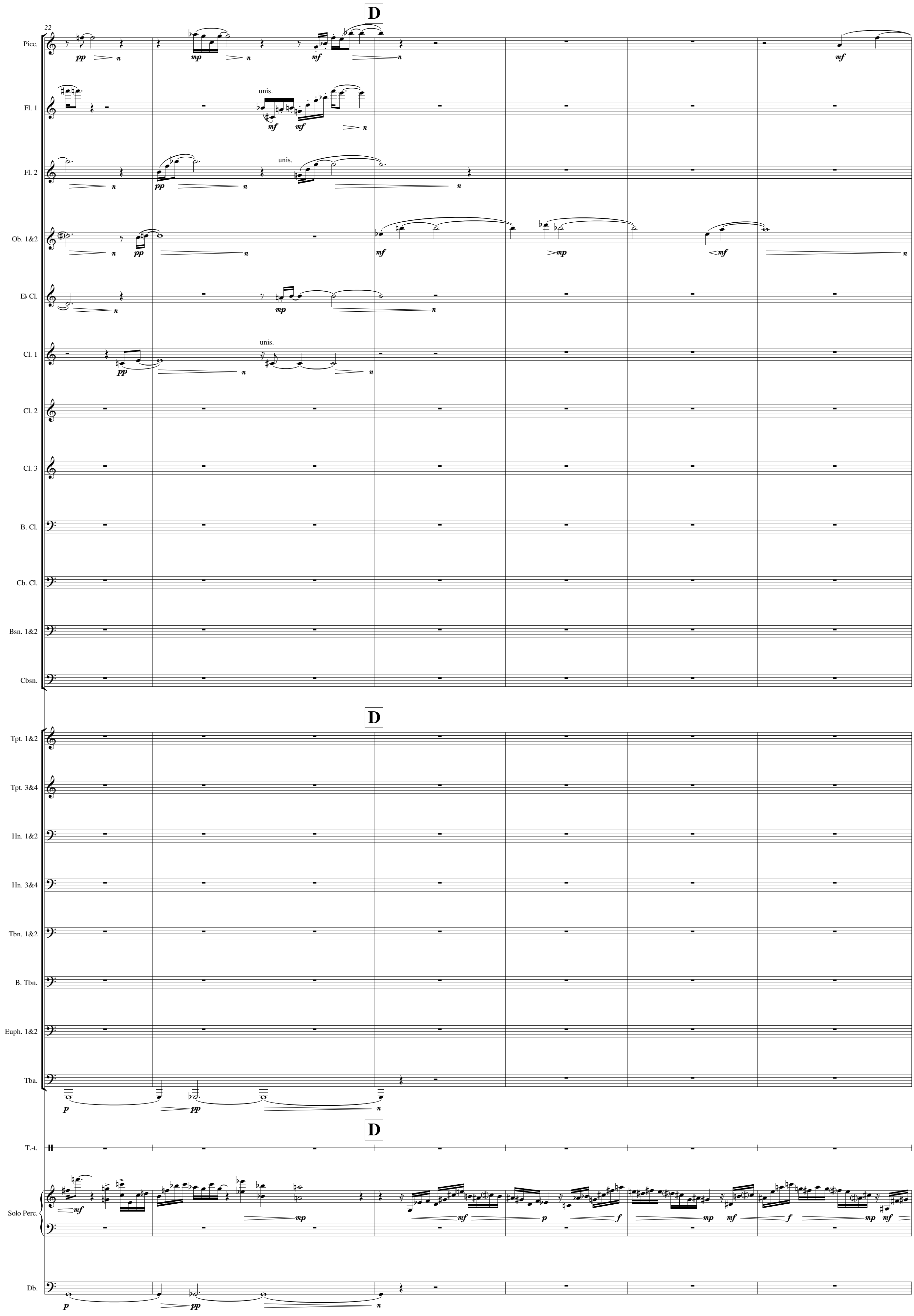

218
Y
Picc.
Fl. 1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Y
Tpt. 1
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
senza sord.
unis.
Pno.
Y
Crot.
T.-t.
To Tom-t.
Tom-toms
Vib.
B. D.
Timp.
Solo perc
mf cresc.
To Mar.
Db.
fff

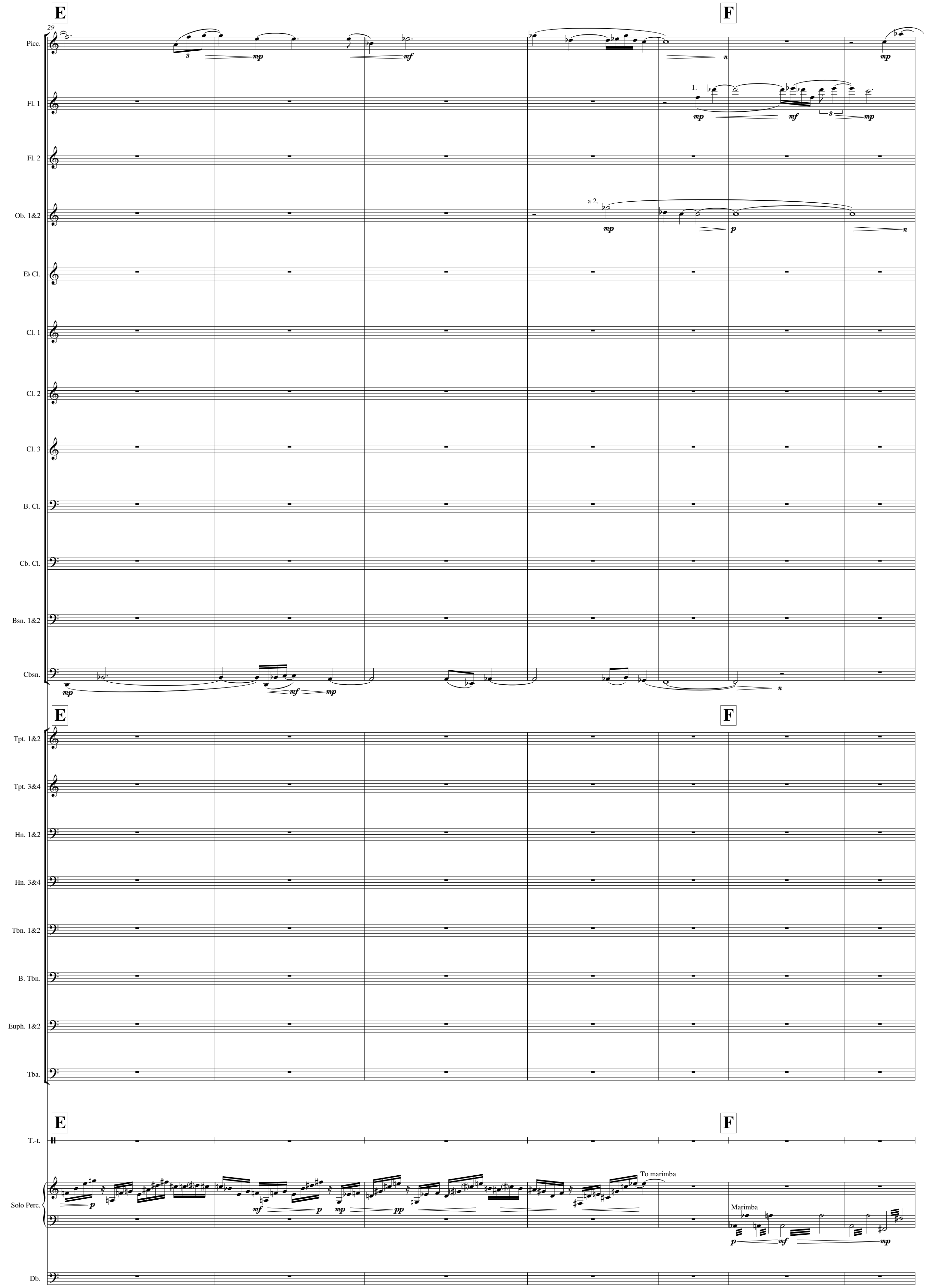
II


Soloist ad libitum
♩=ca. 72
Piccolo
Flutes 1
Flutes 2
2 Oboes
Clarinet in E♭
Clarinets in B♭ 1
Clarinets in B♭ 2
Clarinets in B♭ 3
Bass Clarinet in B♭
Contrabass Clarinet in B♭
2 Bassoons
Contrabassoon
♩=ca. 72
Trumpets in B♭ 1&2
Trumpets in B♭ 3&4
Horns in F 1&2
Horns in F 3&4
Trombones
Bass Trombone
2 Euphoniums
Tubas
♩=ca. 72
Tam-tam
(Marimba, soft mallets)
Solo Percussion
Double Bass


A
A batutta
♩=84
B
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
(Marimba)
Db.

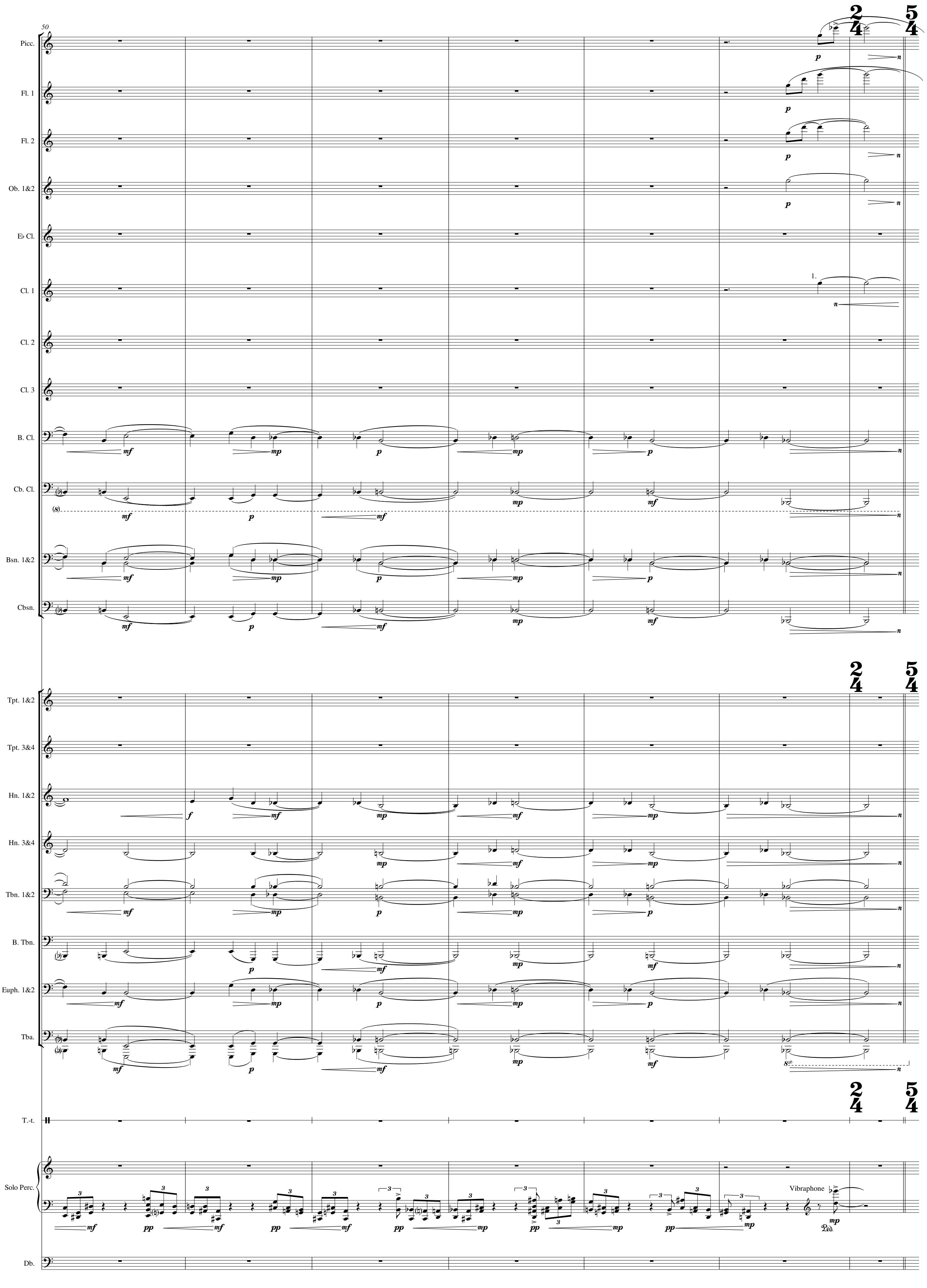

15
C
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
a 2.
1.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
con sord.
T.-t.
Vibraphone
Solo Perc.
To vibes.
Db.

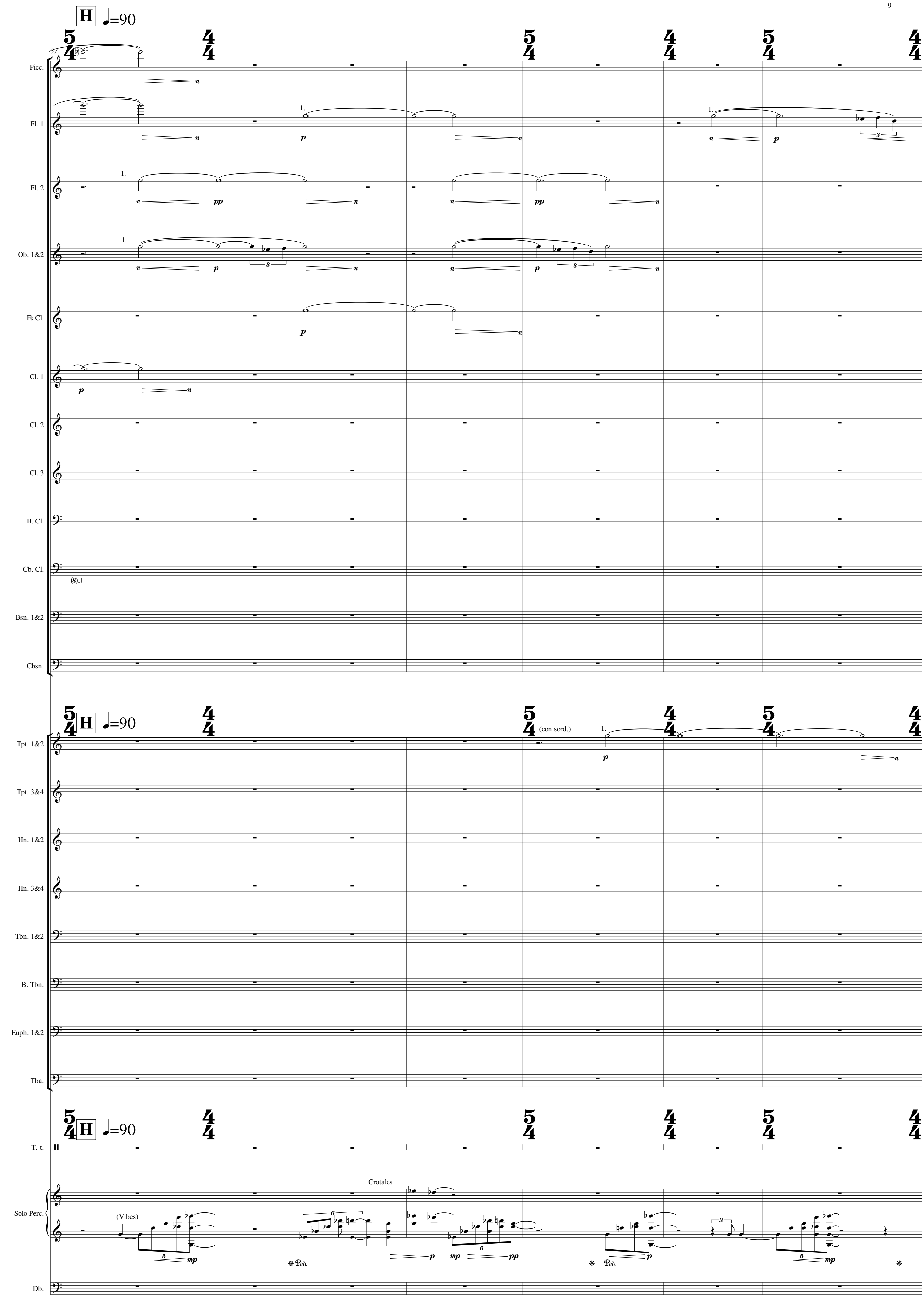

22
D
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.
unis.
pp
mp
mf
p
f
n

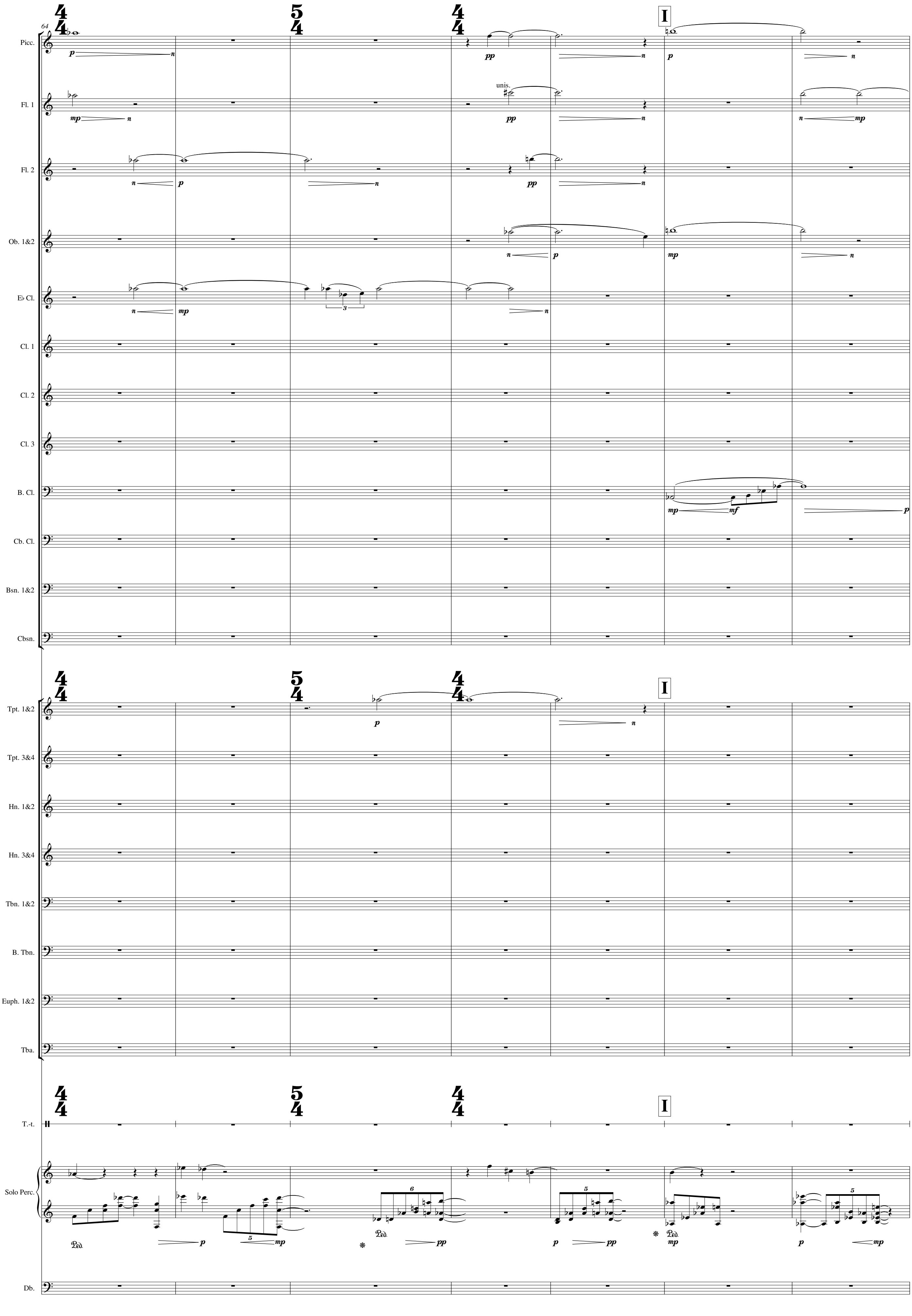

E
F
29
Picc.
Fl. 1
1.
Fl. 2
Ob. 1&2
a 2.
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
To marimba
Marimba
Db.

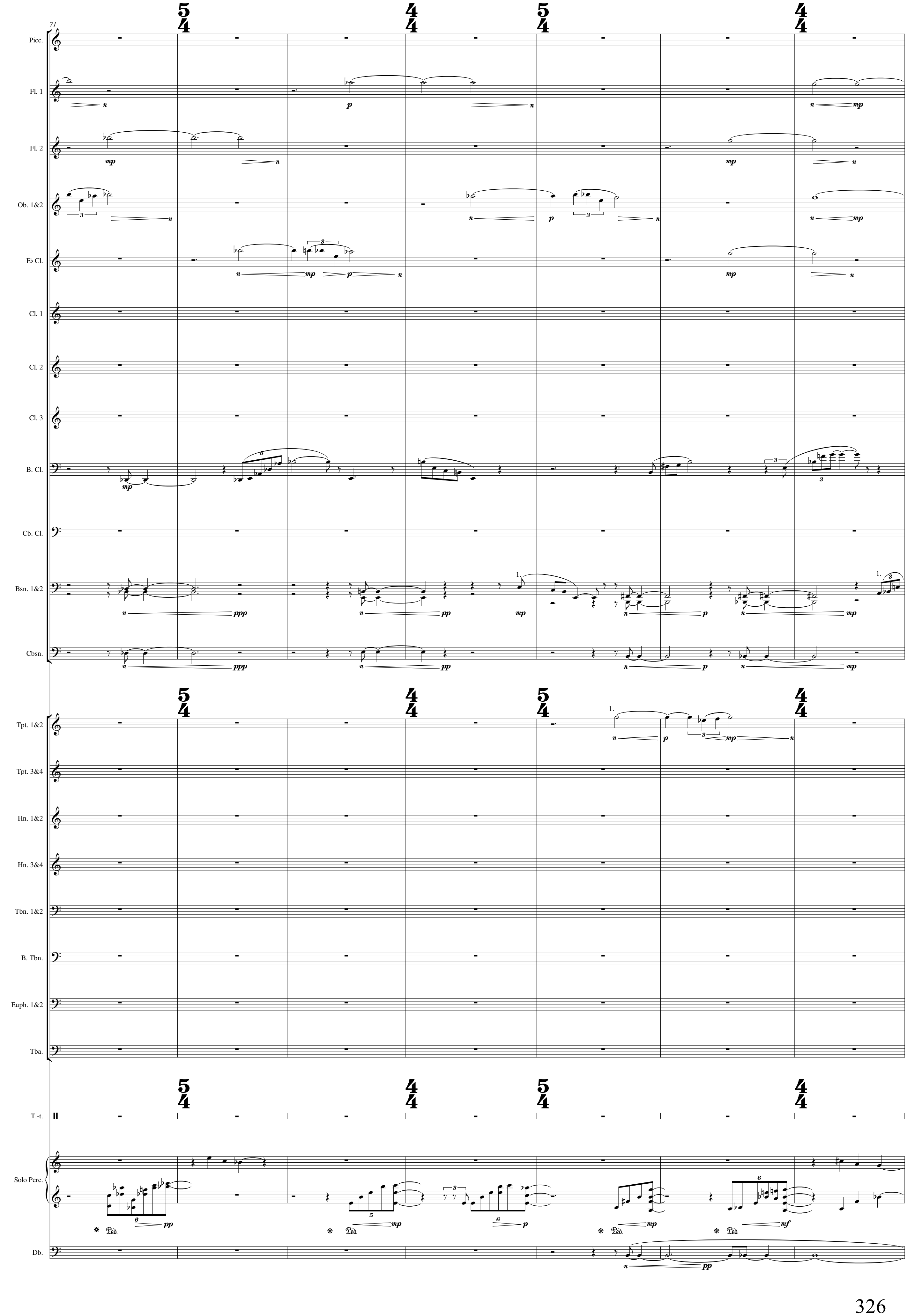

36
Picc.
Fl. 1
unis.
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
To vibes
Db.

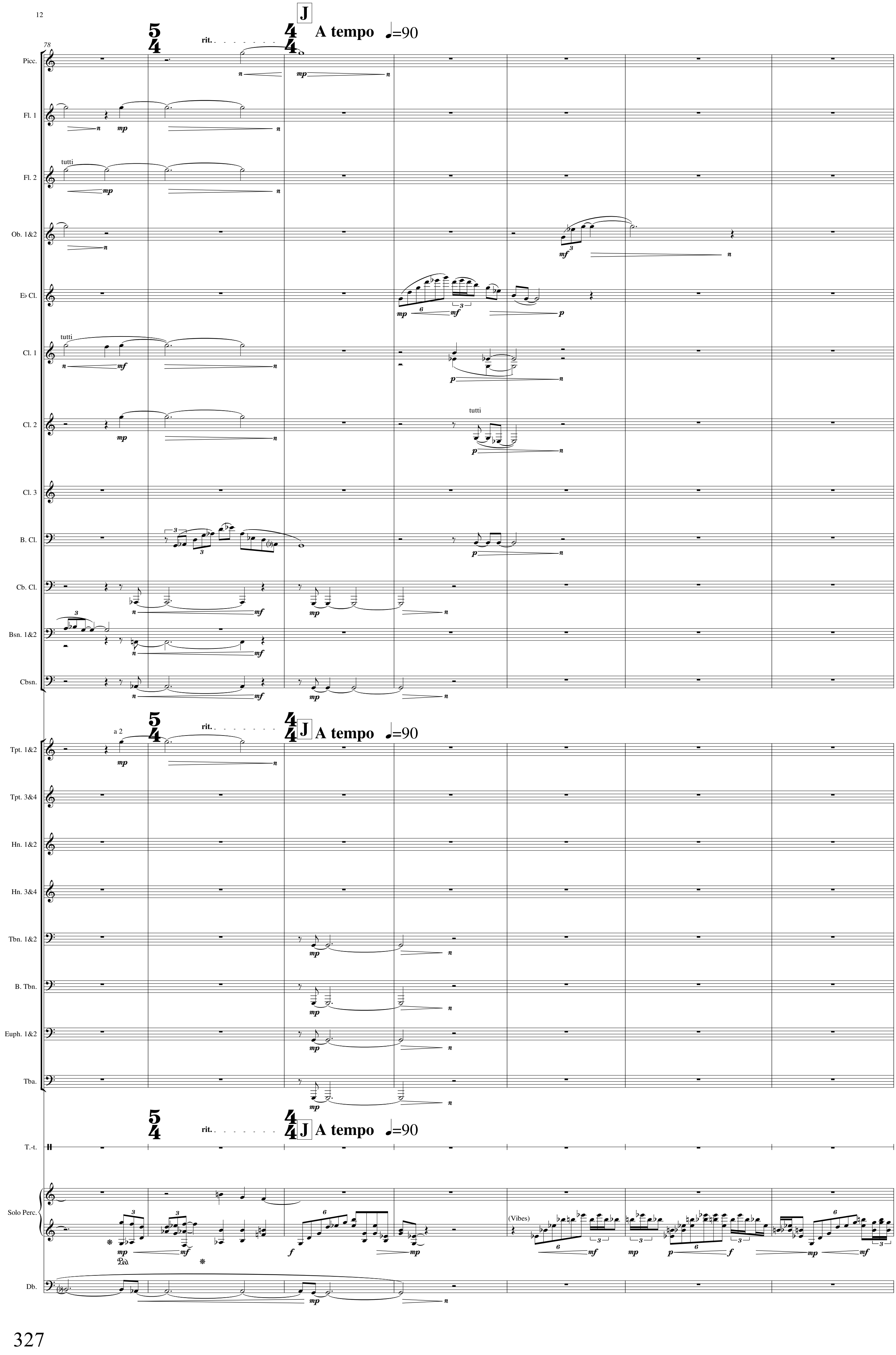

poco rit.
molto rit.
G ♩=72
43
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.
con sord.
a 2.
senza sord.
cresc.
(Vibes)
To marimba
Marimba
8vb

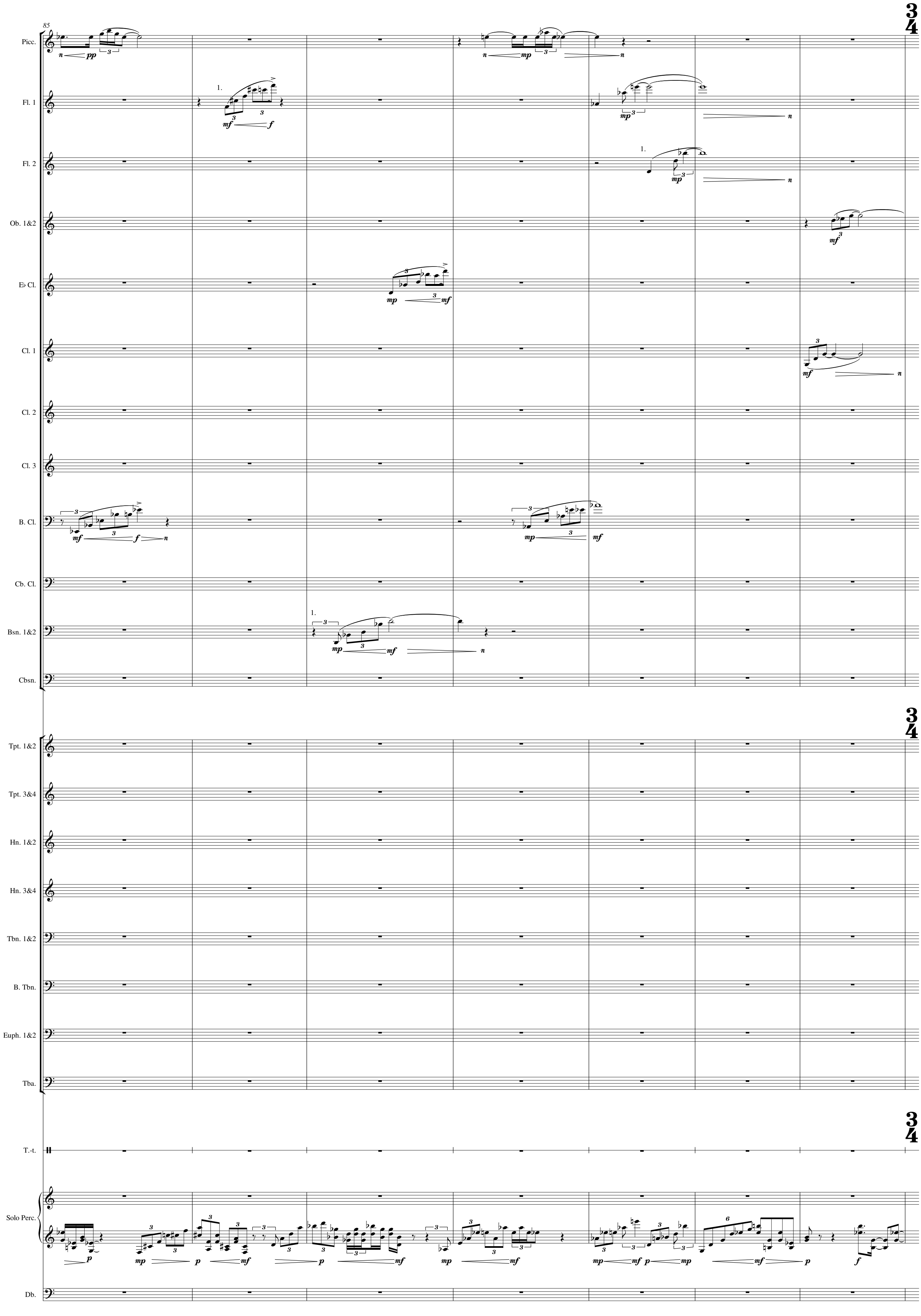

50
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Vibraphone
Db.

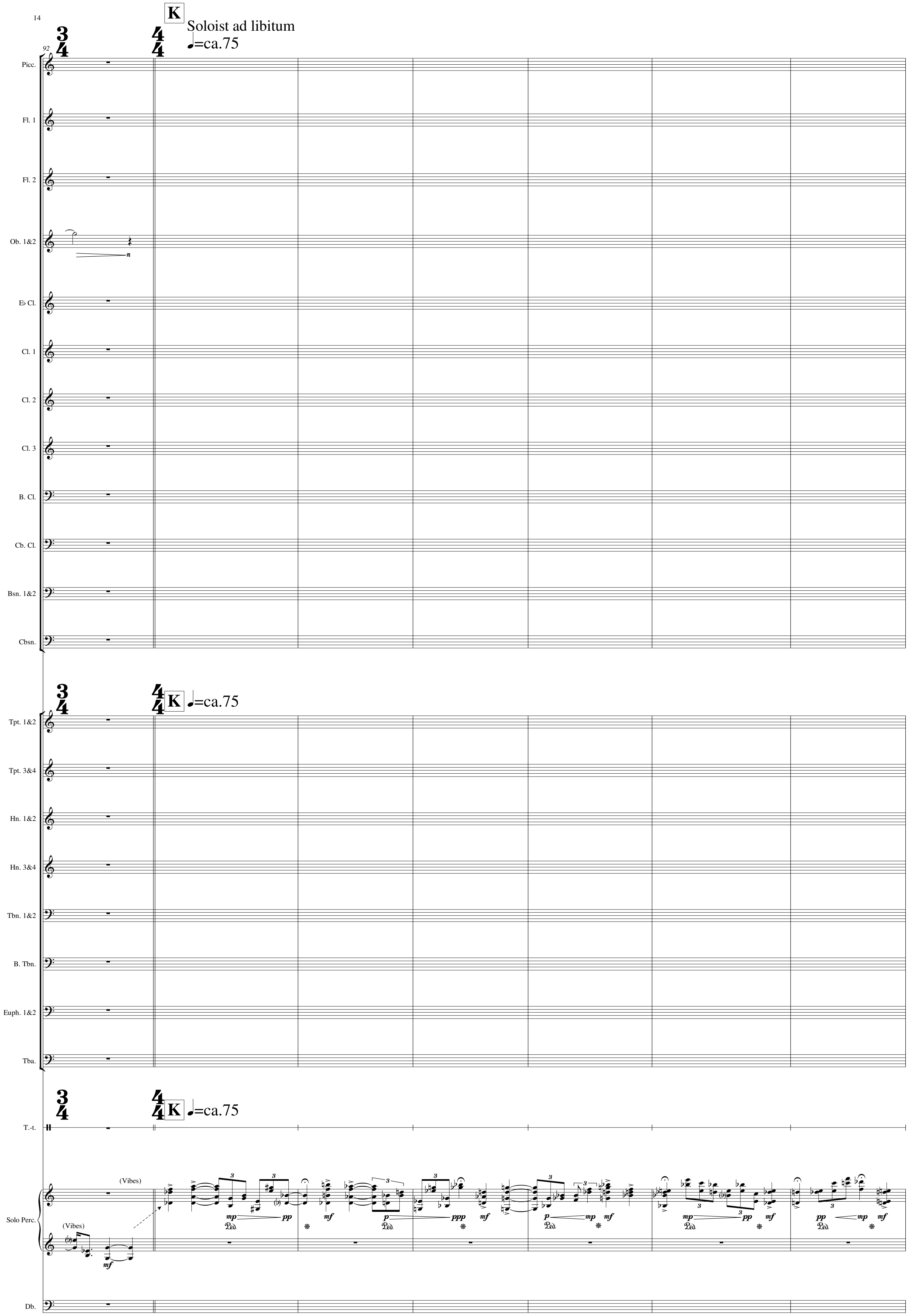

H
♩=90
57
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
(con sord.)
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Crotales
(Vibes)
Solo Perc.
Db.

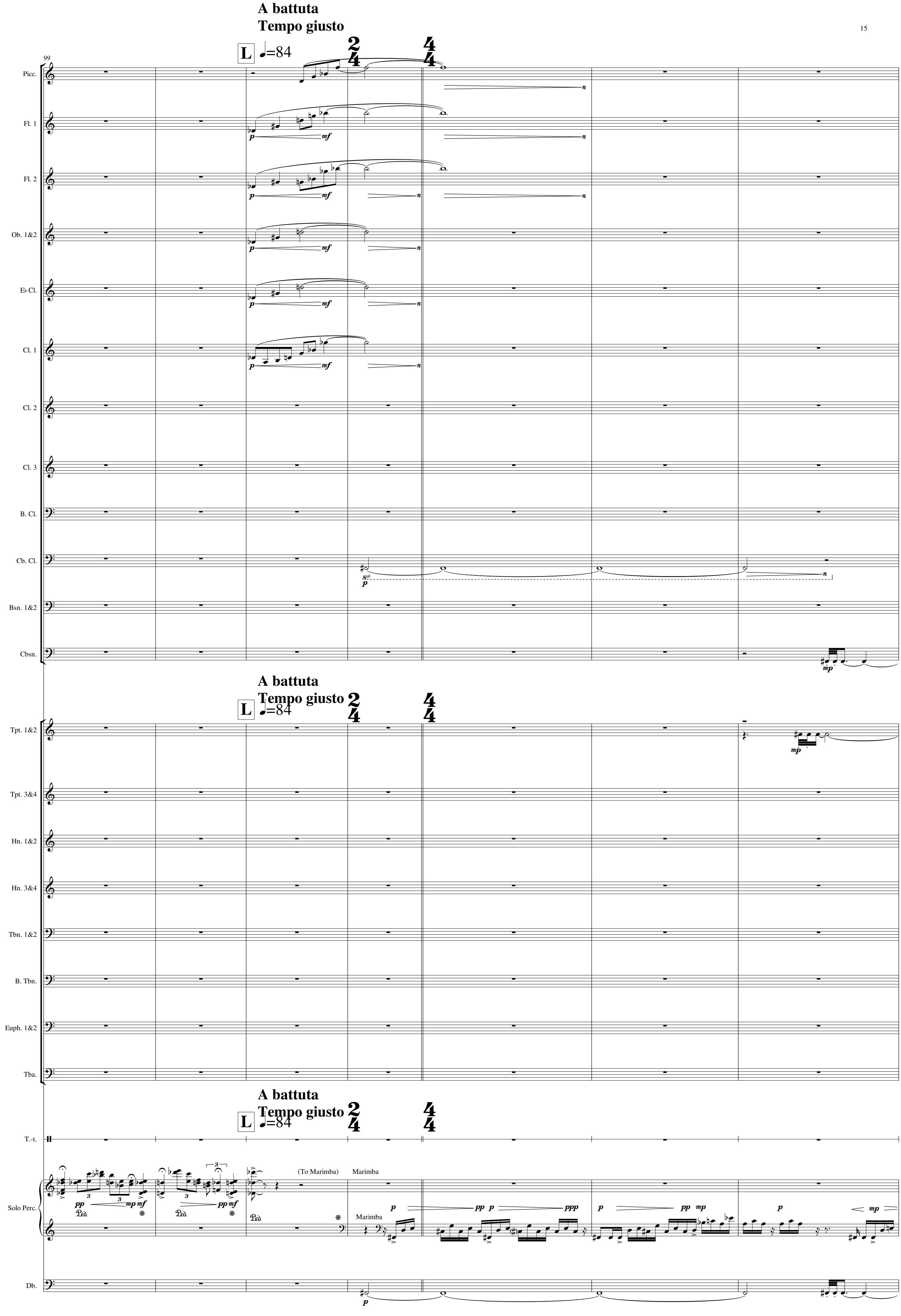

I
Picc.
Fl. 1
unis.
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.


71
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.

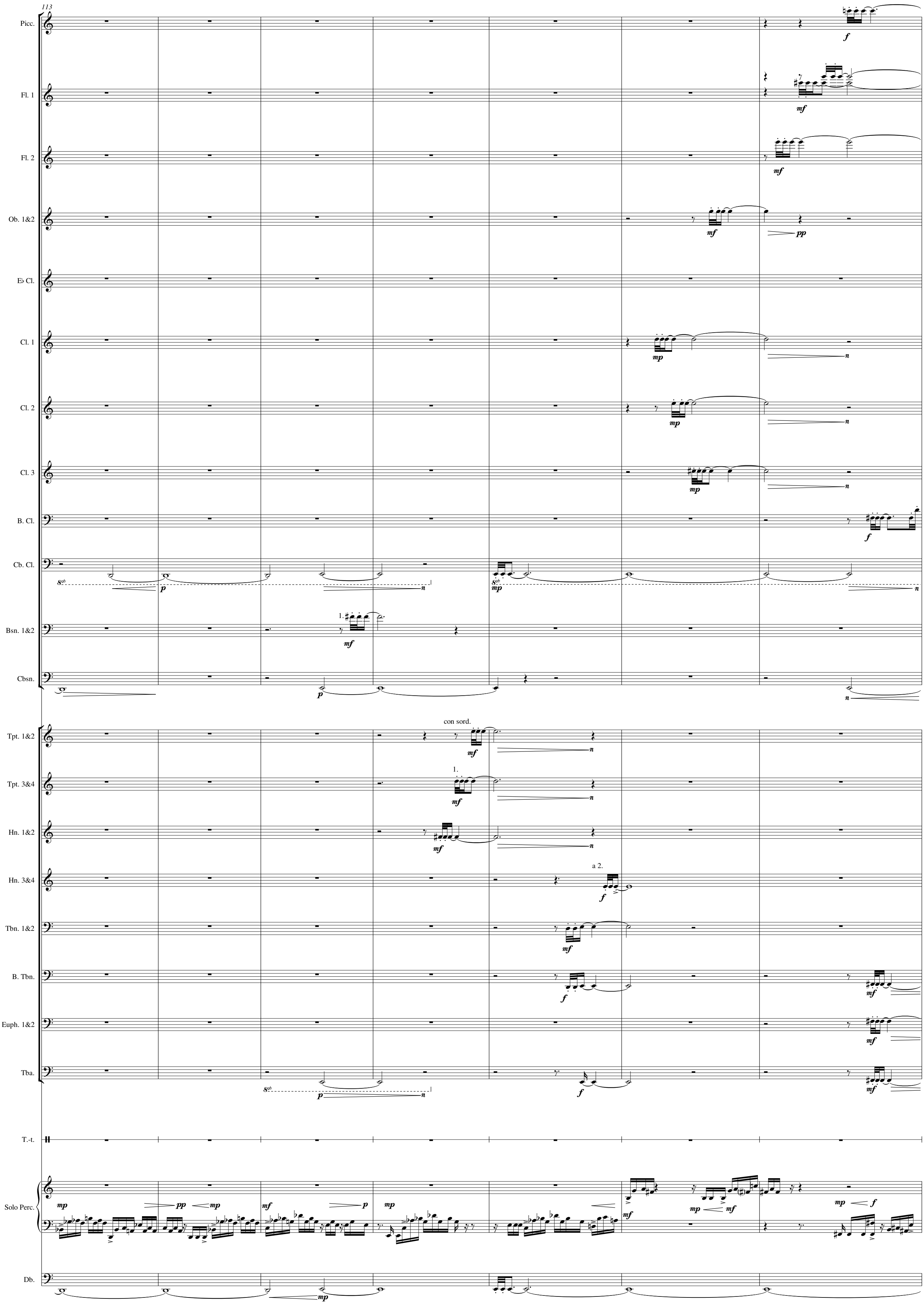

J
A tempo ♩=90
rit.
78
Picc.
Fl. 1
Fl. 2
tutti
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
a 2
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
(Vibes)
Db.

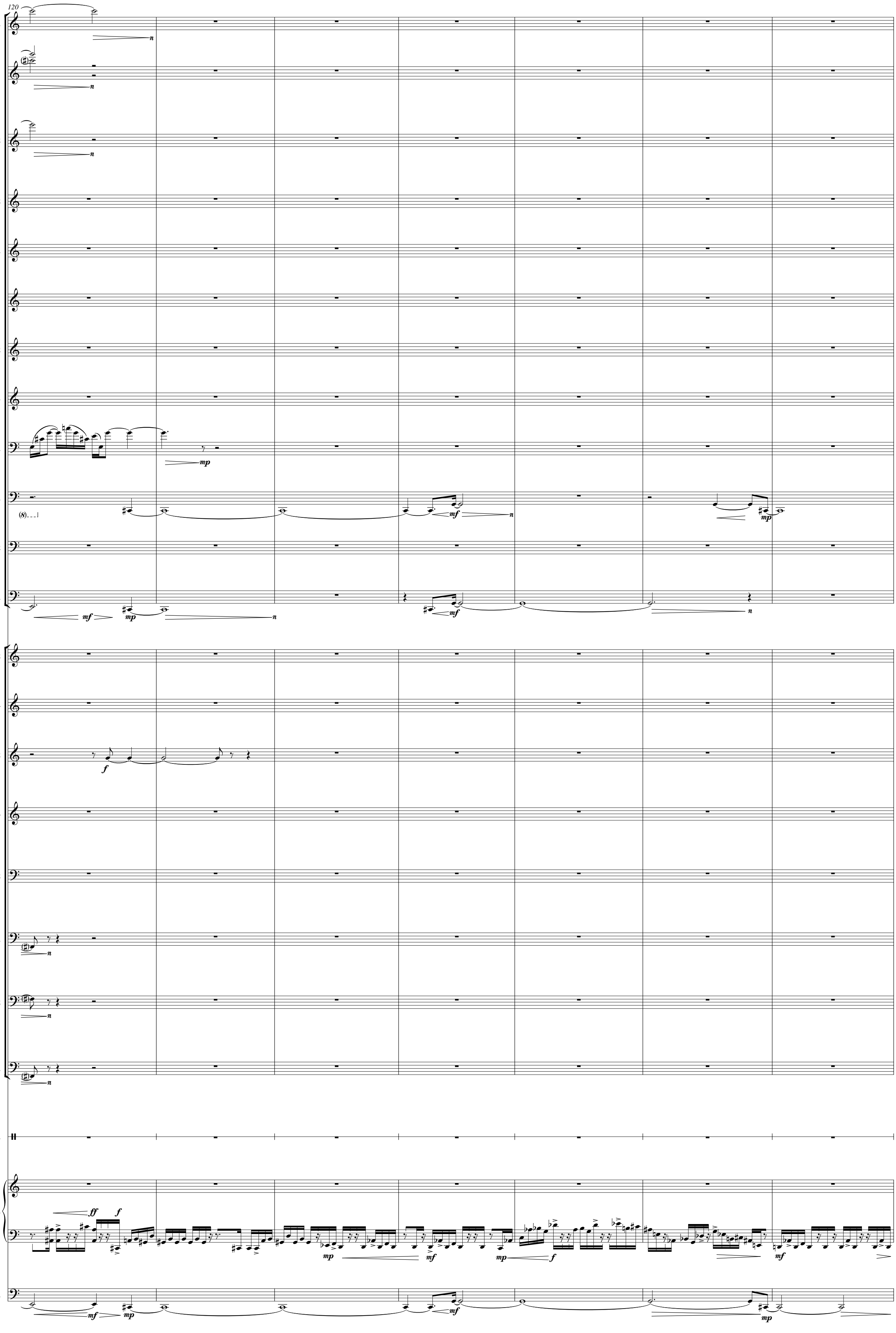

85
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.

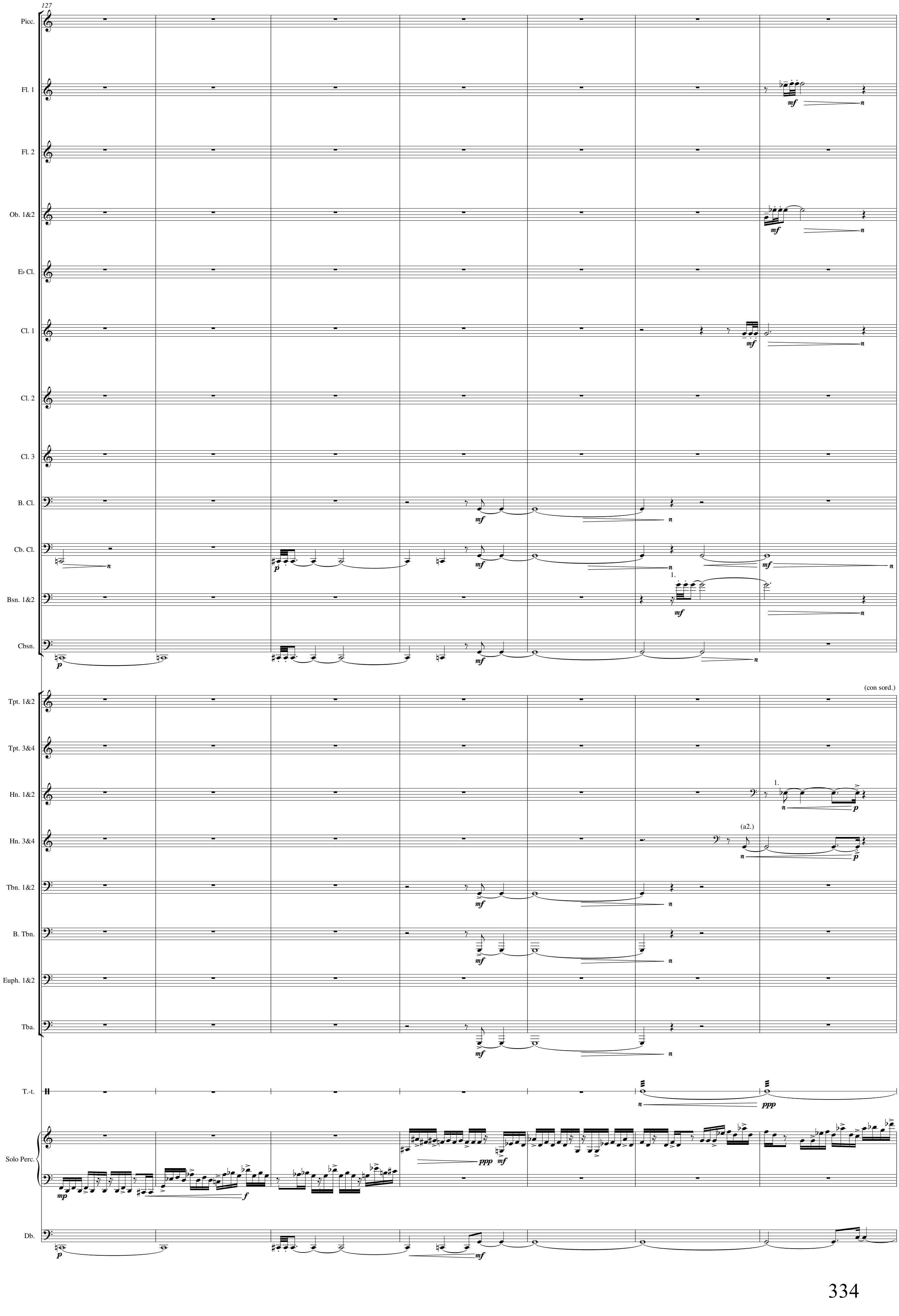

K
Soloist ad libitum
♩=ca.75
92
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
(Vibes)
Solo Perc.
Db.


A battuta
Tempo giusto
L
99
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
A battuta
Tempo giusto
L
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
A battuta
Tempo giusto
L
T.-t.
(To Marimba)
Marimba
Marimba
Solo Perc.
Db.

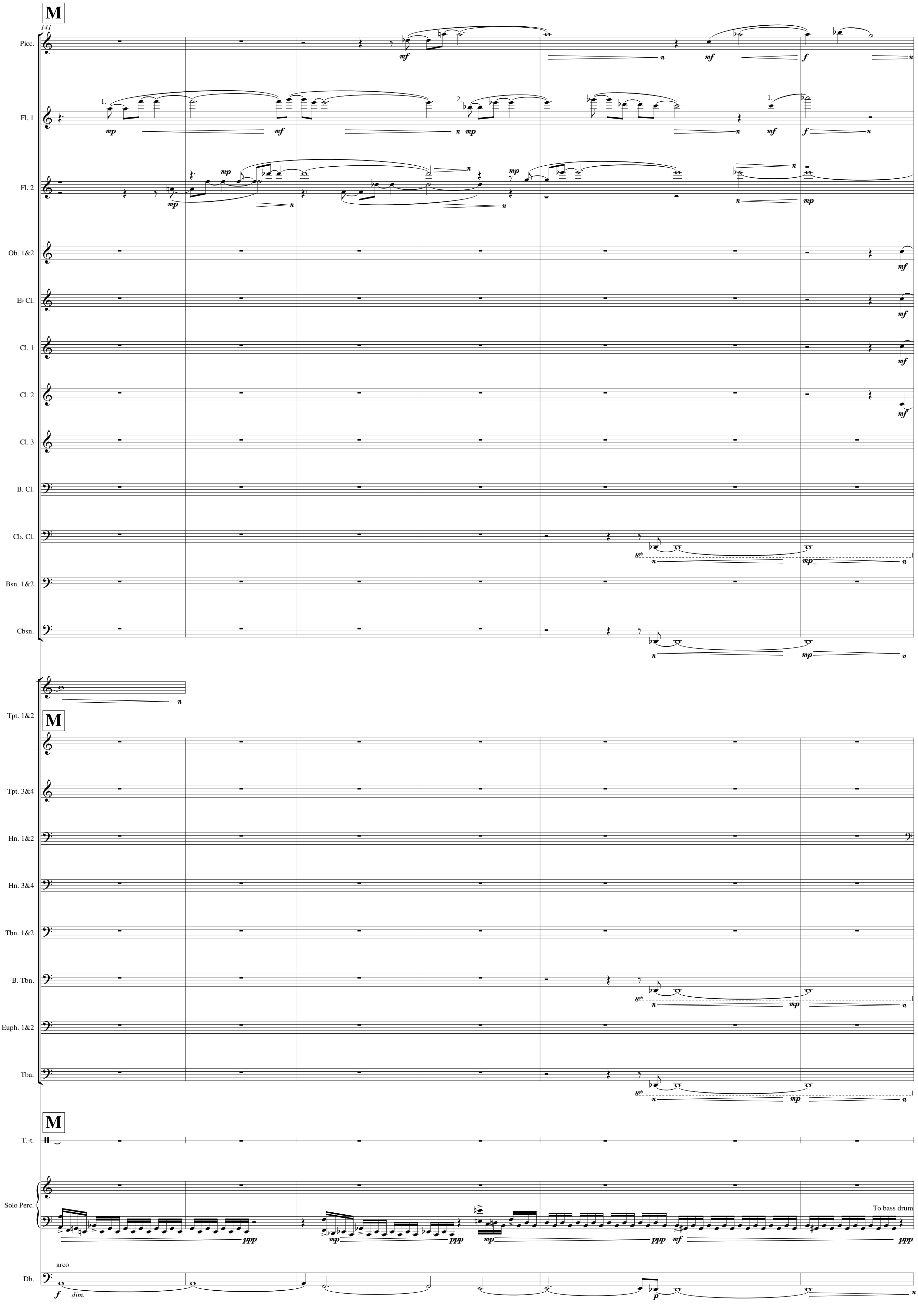

106
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
(1. senza sord.)
Tpt. 3&4
Hn. 1&2
1.
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.
pizz.
arco


113
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
con sord.
Tpt. 3&4
Hn. 1&2
Hn. 3&4
a 2.
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.

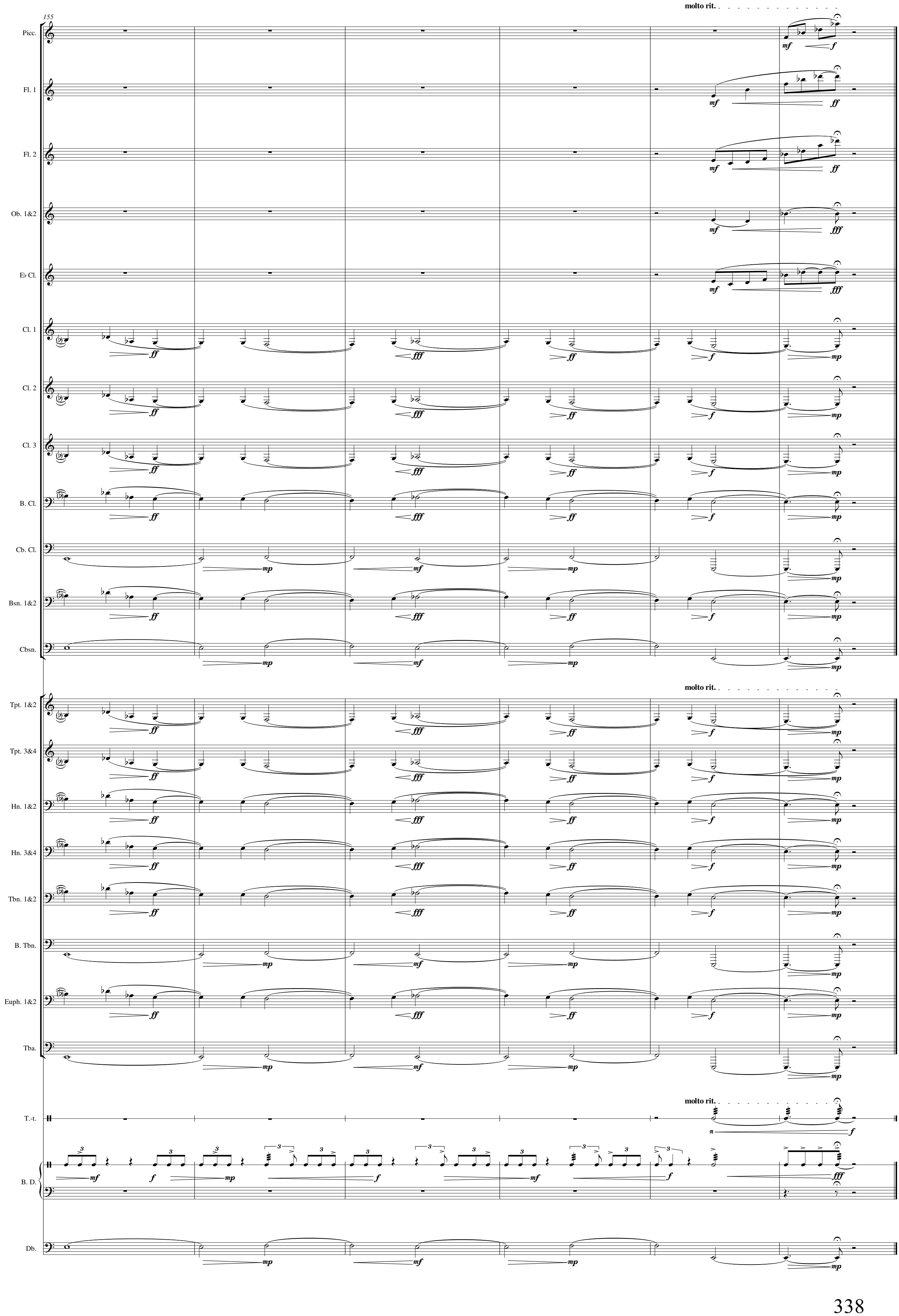

120
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.


127
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
(con sord.)
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
(a2.)
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
T.-t.
Solo Perc.
Db.


134
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
a2.
Cbsn.
mf cresc.
Tpt. 1&2
senza sord.
Tpt. 3&4
(con sord.)
senza sord.
Hn. 1&2
a2.
Hn. 3&4
Tbn. 1&2
f cresc.
B. Tbn.
f cresc.
Euph. 1&2
Tba.
f cresc.
T.-t.
cresc.
Solo Perc.
Db.
f cresc.
pizz.


M
141
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
Tpt. 1&2
M
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
M
T.-t.
Solo Perc.
To bass drum
Db.
arco
dim.


rit.
A tempo ♩ = 84
N
148
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
a2.
a 2.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
1.
T.-t.
Bass Drum
Solo Perc.
Db.


molto rit.
155
Picc.
Fl. 1
Fl. 2
Ob. 1&2
E♭ Cl.
Cl. 1
Cl. 2
Cl. 3
B. Cl.
Cb. Cl.
Bsn. 1&2
Cbsn.
molto rit.
Tpt. 1&2
Tpt. 3&4
Hn. 1&2
Hn. 3&4
Tbn. 1&2
B. Tbn.
Euph. 1&2
Tba.
molto rit.
T.-t.
B. D.
Db.

III

Nicholas Denison


7
Picc.
Fl.1
(Fl 1b)
Fl. 2
(Fl 2b)
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
a 1
con sord.
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
Solo perc
Db.

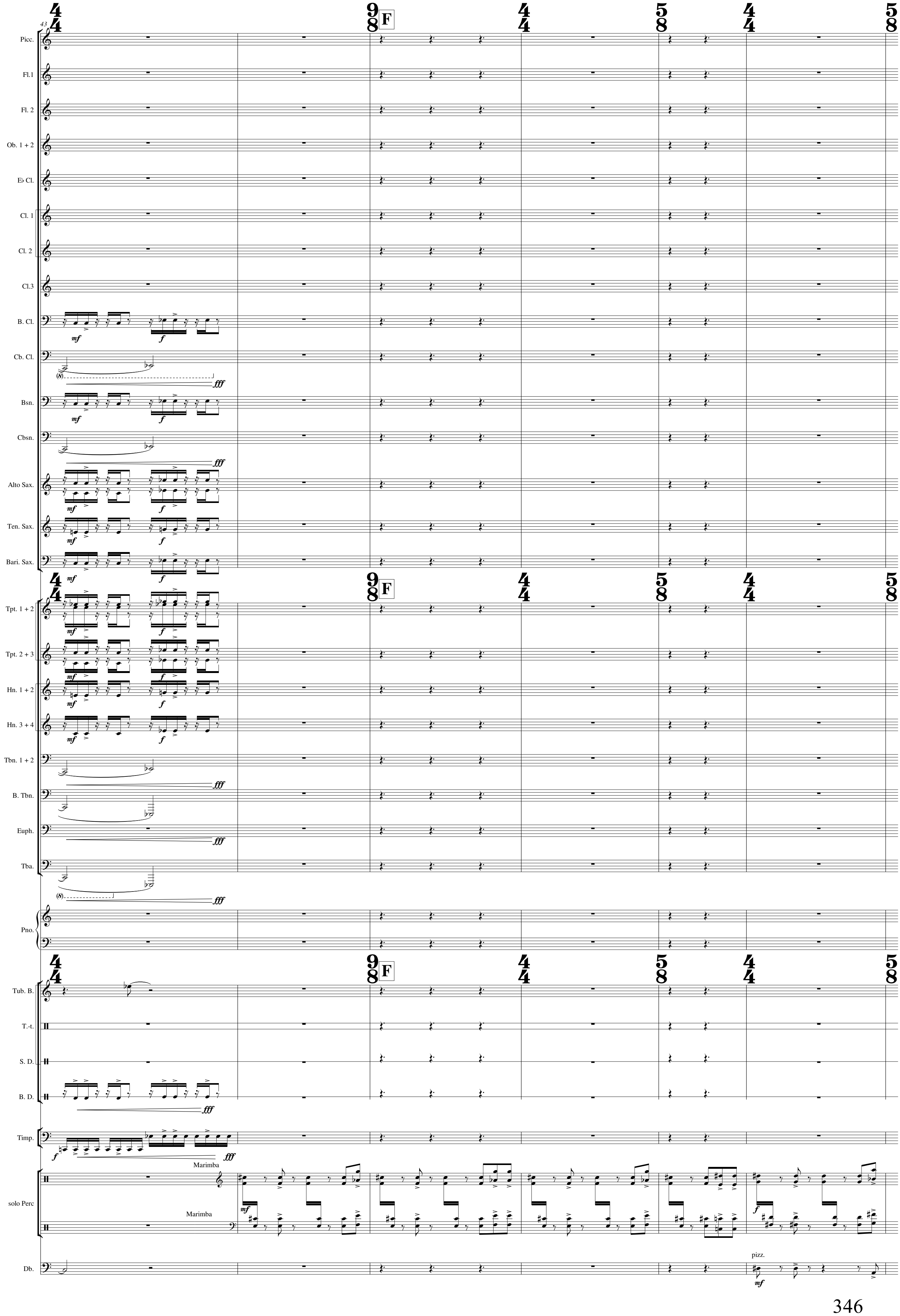

B
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
Percussion
Solo perc
nat.
Db.


19
poco accel.
C
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo Perc.
Db.
cresc.
(t.toms)

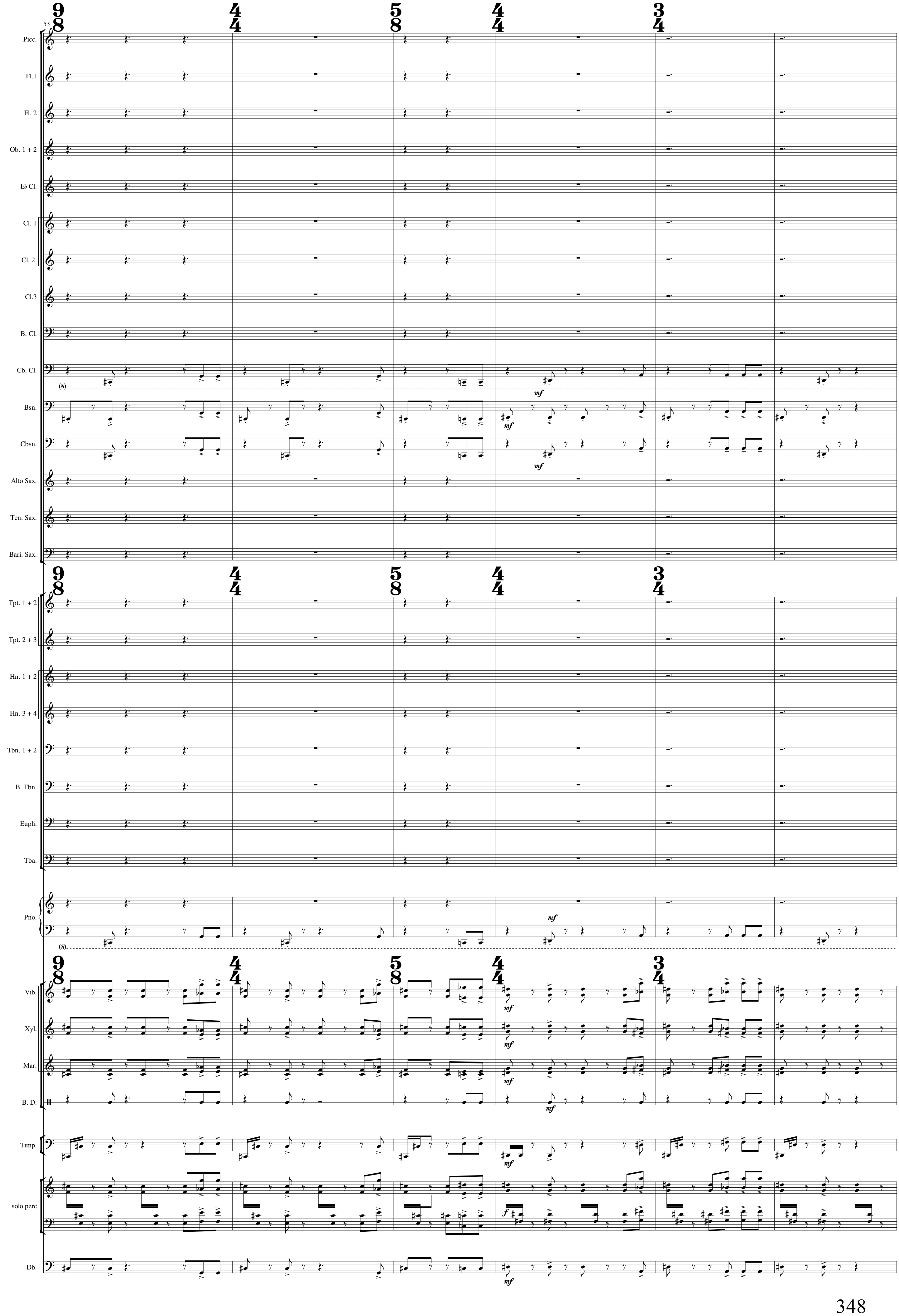

D
♩=100
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
unis.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
senza sord.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo Perc.
Db.
To Xyl.
(dampen)
To Mar.


31
E
Picc.
Fl.
Fl. 1 + 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo Perc.
Db.


Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo Perc
Db.
To Mar.


43
F
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo Perc
Marimba
Marimba
Db.
pizz.

49
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.
G
Vibraphone
Xylophone
Marimba



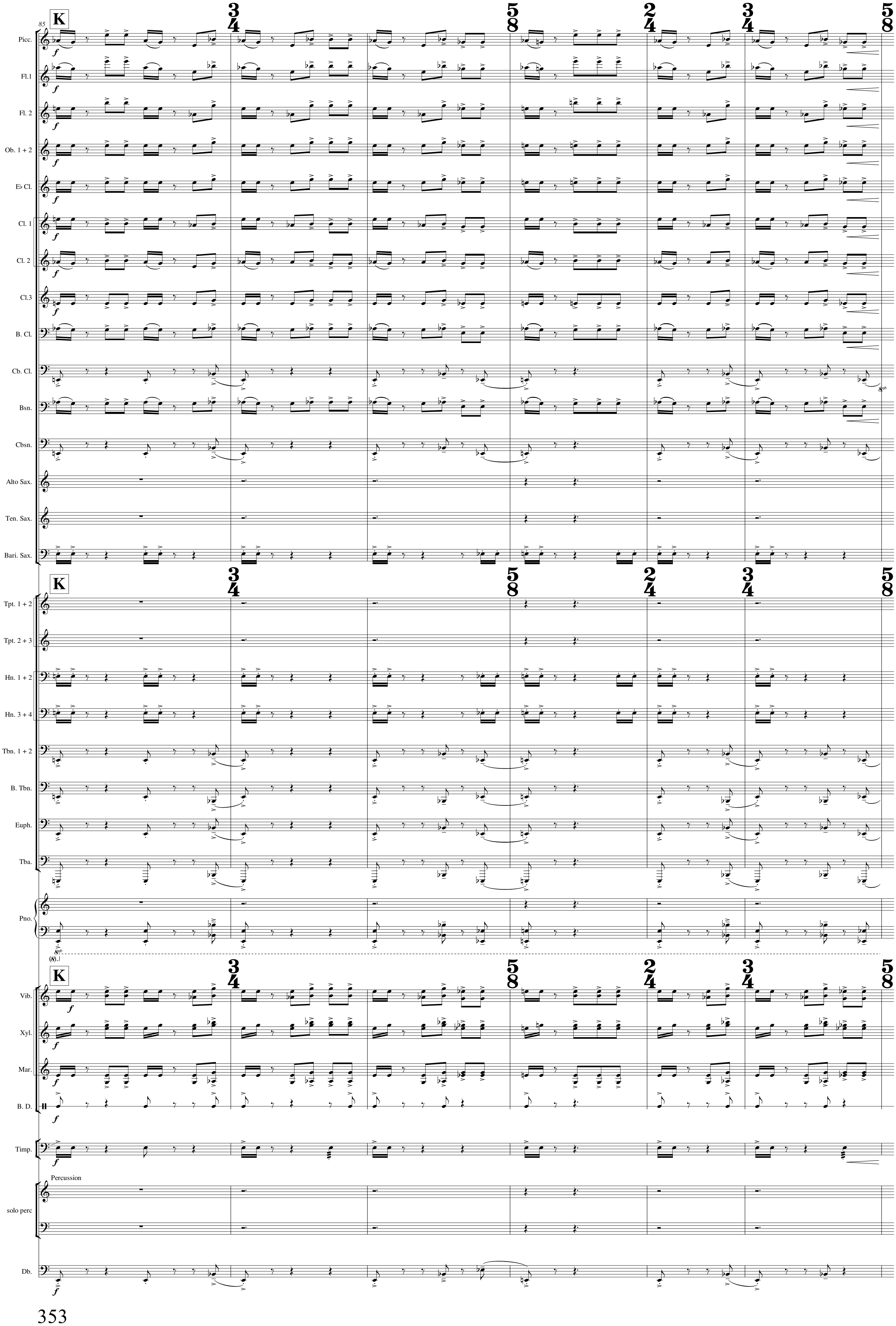
55
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
mf
f
(8)


61
H
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


67
I
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


73
J
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
cresc.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


79
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
part.
solo perc
arco
Db.


K
85
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
Percussion
solo perc
Db.


91
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


97
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


103
L
♩.=88
♩=100
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
Marimba
solo perc
Db.

109
♩.=88
♩=100
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
dim.


115
♩.=88
♩=100
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
dim.
cresc.


121
M
♩.=88
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
pizz.


127
N
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Crotales
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.


133
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Crot.
Mar.
B. D.
Timp.
solo perc
Db.
arco


139
O
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Crot.
To Xyl.
Mar.
B. D.
Timp.
solo perc
Db.

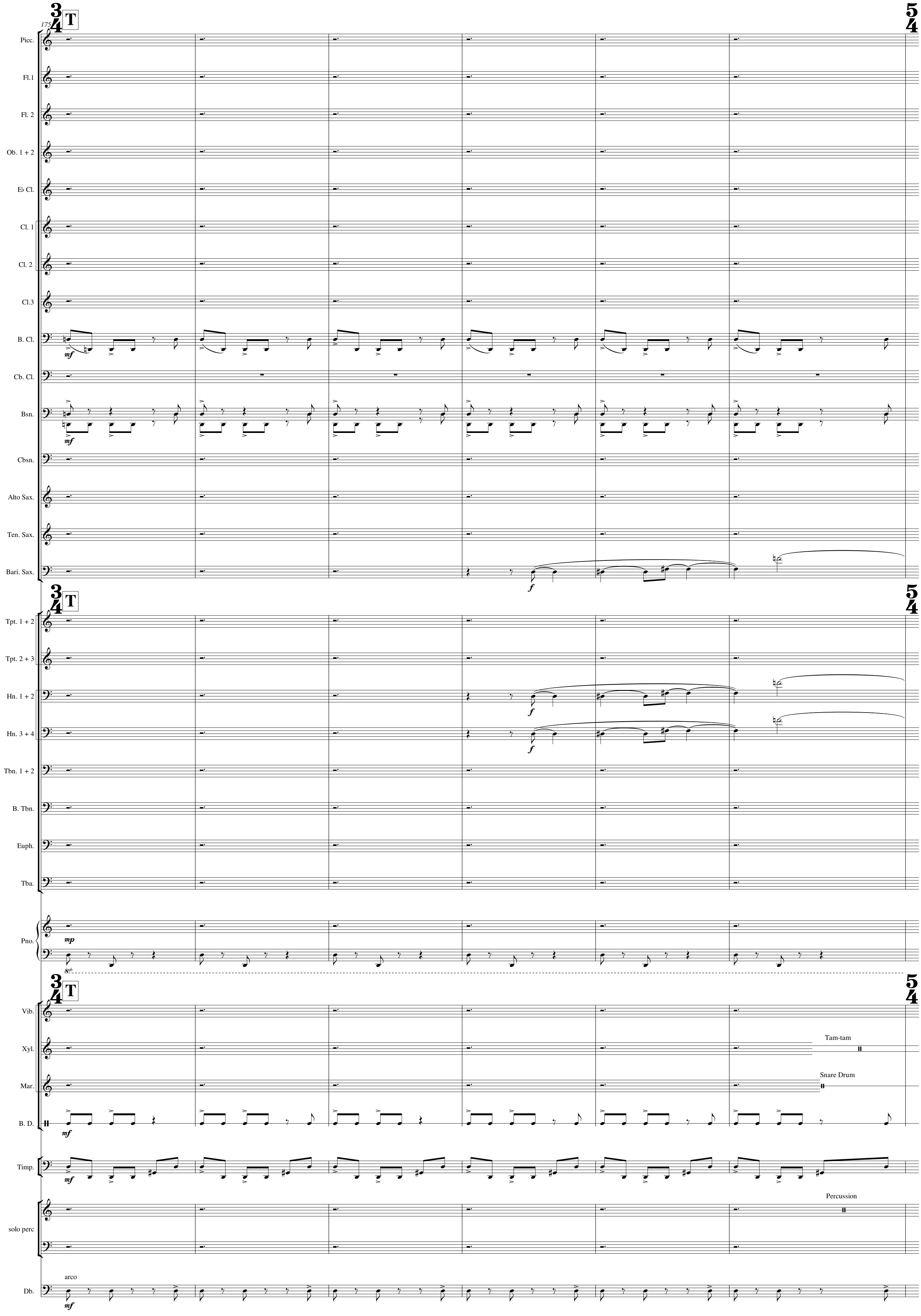

145
P
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Crot.
Mar.
B. D.
Timp.
solo perc
Db.
mp
cresc.
p
f

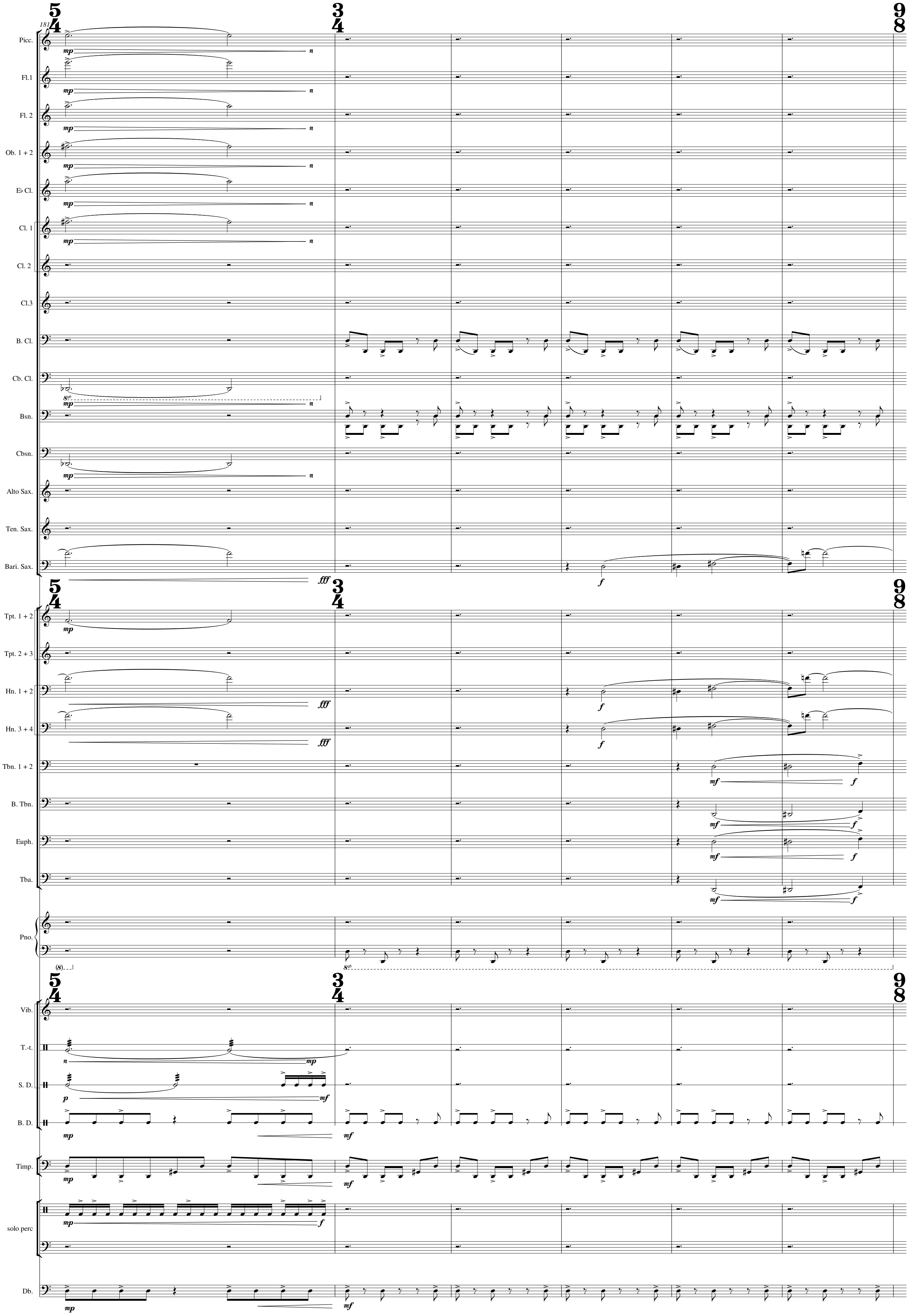

151
Q
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xylophone
Crot.
Mar.
B. D.
Timp.
solo perc
Db.
cresc.


157
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
mp
mf
ff


R
163
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
cresc.
pizz.


169
S
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
Xyl.
Mar.
B. D.
Timp.
solo perc
Db.
cresc.
unis.
arco
To T.-t.
To Perc.


T
175
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
mf
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
f
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
mp
8vb
Vib.
Xyl.
Tam-tam
Mar.
Snare Drum
B. D.
Timp.
Percussion
solo perc
arco
Db.


181
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.


187
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.
a 2.


193
molto rit.
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
a 2.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Vib.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.
cresc.


199
Cadenza
U
=105
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tubular Bells
Tam-tam
Vib.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.


205
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.
a2
unis.


V
211
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.


217
W
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
Snare Drum
S. D.
B. D.
Timp.
solo perc
Db.


223
Picc.
Fl.1
Fl. 2
Ob. 1 + 2
E♭ Cl.
Cl. 1
Cl. 2
Cl.3
B. Cl.
Cb. Cl.
Bsn.
Cbsn.
Alto Sax.
Ten. Sax.
Bari. Sax.
Tpt. 1 + 2
Tpt. 2 + 3
Hn. 1 + 2
Hn. 3 + 4
Tbn. 1 + 2
B. Tbn.
Euph.
Tba.
Pno.
Tub. B.
T.-t.
S. D.
B. D.
Timp.
solo perc
Db.
a 2
(let ring)
(let ring momentarily then muffle gently)
8vb

(APPENDIX A)

Nicholas J Denison

What This Valley Will Be Like

for baritone voice, flute, B flat trumpet, violin and piano

Vocal material respectfully based upon a text taken from the diary of Anzac Ellis Luciano Silas

Full Score

2014

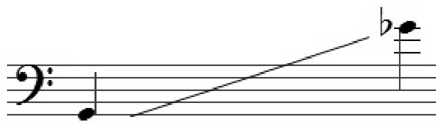
What This Valley Will Be Like

Composed as a submission for the ABC "Gallipoli Songs" competition, 2014

Duration: 9' 50"

Instrumentation:

Flute
B flat Trumpet (requiring straight mute)
Violin
Solo Baritone voice
Piano

required vocal range: 

Text

I wonder what this valley will be like when there is no longer noise of firing, no longer the hurried tread of combating forces - when the raw earth of the trenches is o'erspread with verdant grass. Perhaps here and there equipment of War will be lying with fresh spring sprouts of grass threading through interstices - underneath the sad little mounds resting sons of a great nation - in the clear sky overhead, instead of bursting shrapnel, little fleecy clouds...

Ellis Luciano Silas, April 28, 1915 (sourced from the Mitchell Library Collection, NSW, AUS)

Score in C: All instruments sound as written.
All instruments-one player on a part.

score in C

Nicholas J. Denison

What This Valley Will Be Like


11
A
Fl.
Tpt.
Vln.
Bar.
I won - der what this va-
Pno.
15
lley will be like
(loco)
8vb
Ped.


18
Fl.
Tpt.
Vln.
Bar.
Pno.
cresc.
8vb
Ped.
B
22
will be like
B
8vb


25
poco accel.
Fl.
Tpt.
Vln.
Bar.
poco accel.
Pno.
C A tempo ♩=50
27
Fl.
Tpt.
Vln.
Bar.
I wo - n - der
C A tempo ♩=50
Pno.

D
Fl.
Tpt.
Vln.
Bar.
Pno.
dim.
con sord.
cresc.
when there is no
(loco)


35
E
Fl.
Tpt.
Vln.
Bar.
lon - ger noise of fi - r - ing
Pno.
dim.
37
Fl.
Tpt.
Vln.
Bar.
Pno.
dim.


F
39
Fl.
Tpt.
senza sord.
Vln.
Bar.
F
Pno.
8vb
G
41
Fl.
Tpt.
Vln.
Bar.
no lo - n - ger the hu-rried tread of com-ba-ting for - ces
G
Pno.
8vb


44
Fl.
Tpt.
Vln.
Pno.
H
47
Allegro
Con fuoco
I


50
Tpt.
Vln.
Pno.
53
Fl.
Tpt.
Vln.
J
Pno.
57
Fl.
Tpt.
Vln.
Pno.
cresc.
dim.


60
K
Fl.
Tpt.
Vln.
Pno.
mf
f
n
cresc.
8vb
62
dim.
mp
68
p


Colla parte
Misterioso
♩=50
L
The two soloists (violin & flute) should play off one another,
with a certain degree of rhythmic flexibilty, the piano follows.
73
Fl.
Tpt.
Vln.
Pno.
mp
n
p
mf
L Misterioso ♩=50
una corda
pp
8vb
Ped.
77
79


81
Fl.
Vln.
Pno.
Ped.
83
Fl.
Vln.
dim.
Pno.
Ped.
86
Fl.
Vln.
Pno.


M
As before, the soloists (violin & voice) should play off one another
with a certain degree of rhythmic flexibility.
Fl.
Tpt.
Vln.
cresc.
p cresc.
Bar.
when the raw earth of the tren - ches is o'er-
Pno.
Con passione
Tempo giusto
N
mf cresc.
con sord.
mp cresc.
pizz.
f cresc.
spread with ver - dant grass
Per haps here and there
tre corda
8vb
ff
pp
mp


101
Fl.
Tpt.
Vln.
Bar.
Pno.
e - quip - ment of war will be ly ing with fresh spring sprouts of grass threa-ding
105
O
arco
cresc.
through in - ter cies


109
Fl.
Tpt.
Vln.
Bar.
Pno.
senza sord.
Approximate pitches and rhythms, as in sprechstimme/speech-like. Rhythms are provided as a guide to the overall intention, but need not be adhered to metronomically.
cresc.
in - ter - cies
fresh spring sprouts of grass threa-ding through in - ter - cies
P
112
poco accel.
pizz.
cantabile
un-der neath the sad li-ttle mounds res-ting sons, sons of a great na - tion


Q
Tempo primo
116
=50
R
Fl.
Tpt.
Vln.
arco
Bar.
mf
p
mp
p
mf
p
in the clear sky o-ver head, in-stead of bur-sting shra - pne - l li-ttle flee - cy clouds
Q
=50
Tempo primo
R
Pno.
mp
8vb
Ped.
121
Fl.
Tpt.
p
mf
mp
Vln.
Bar.
Pno.
Ped.
Ped.


124
S
Fl.
Tpt.
Vln.
Bar.
fleecy clou-
Pno.
Ped.
8vb
127
T
U
port.
-ds


132
V
Fl.
Tpt.
Vln.
Bar.
Pno.
mp
mf
n
port.
p
clou - ds
f
ff
8vb
Ped.
137
con sord.
I wo - n - de - r what this va - lley will be like when there is
(8)


W
141
Fl.
Tpt.
Vln.
Bar.
Pno.
p
n
III
mp
3
no lo - nger noise of fi - r - ing
W
dim.
8vb
144
II
p
n
ppp
8vb